COMPARATIVE ASSESSMENT OF MODELS OF INSTRUCTION FOR TRANSACTING TRIDOSHASIDHANTA

THESIS

Submitted to the

TILAK MAHARASHTRA VIDYAPEETH PUNE

for the Degree of

DOCTOR OF PHILOSOPHY
in
AYURVEDA – SAMHITA AND SIDHANT
Under the Board of Ayurveda Studies

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2019

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I, **VINDOKUMAR M V** is the Ph.D. Scholar of the Tilak Maharashtra Vidyapeeth in AYURVEDA – SAMHITA SIDHANT subject. Thesis entitled COMPARATIVE ASSESSMENT OF MODELS OF INSTRUCTION FOR TRANSACTING TRIDOSHASIDHANTA under the supervision of Dr. UPENDRA DIXIT, Solemnly affirm that the thesis submitted by me is my own work. I have not copied it from any source. I have gone through extensive review of literature of the related published / unpublished research works and the use of such references made has been acknowledged in my thesis. The title and the content of research is original. I understand that, in case of any complaint especially plagiarism, regarding my Ph.D. research from any party, I have to go through the enquiry procedure as decided by the Vidyapeeth at any point of time. I understand that, if my Ph.D. thesis (or part of it) is found duplicate at any point of time, my research degree will be withdrawn and in such circumstances, I will be solely responsible and liable for any consequences arises thereby. I will not hold the TMV, Pune responsible and liable in any case.

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ACKNOWLEDGMENTS

I acknowledge the support received from different strata of persons and institutions towards the successful accomplishment of this research work.

My respected guide **Vd. Upendra Dixit**, a versatile, pro-active and genuine teacher-cum-practitioner effectively imparted confidence and encouragement to get along with this project, whose positivity fuelled the whole process.

The prompt and professional leadership of **Prof (Dr.) Abhijit Joshi** , respected Head, Dept. of Ayurveda, Tilak Maharashtra Vidyapeeth, Pune, was the force of inspiration behind all the projects being undertaken by PhD scholars, including me. The whole team of Dept. of Ayurveda, Tilak Maharashtra Vidyapeeth, who professionally engaged in conducting Pre-PhD course work and the proceedings afterwards deserves special appreciation.

The original idea of this work was sprouted during the inception period of my career as a teacher when I was entrusted to teach Padarthavijnana for BAMS students where meaningful teaching of strange content (like Darsana) to a new learner became a big problem for me. I was immensely inspired by some of my students who constantly summoned me for a better method for transacting basic concepts of Ayurveda. Evoking memories on my own days as a BAMS student made me to catch their feelings easily. My teachers like the late C R Agnives, the late K Baby and Dr. K Sundaran are some of many who taught me, apart from the assigned content, the ways through which one can proceed for better transaction of the content assigned.

The concept of this project took its form during discussions with my beloved teacher Dr. A K Manojkumar, Professor, VPSV Ayurveda College Kottakkal, a true inspirer in almost all my ventures. At the initial stage, discussion with Dr. Ramakrishnan, educational expert helped a lot to shape the outline of the project and preparing the

research protocol. During that period, I visited Regional Institute of Education, Mysore to learn more about Education and Research with the help of my co-brother Sri. Madhu B, Associate Professor there.

The process of developing a new model of teaching was the most demanding component of the whole project. Lack of expertise in such field was the main hindrance. This gap was filled by conducting a Focus Group Discussion, where in experts from different fields gathered to formulate the principles and process of new model. Among the experts, Dr. T Mohamed Salim, Associate Professor, Dept. of Education, Farook Training College, Kozhikode had been a constant source of support, rather a rescuer in crises, throughout the whole span of the project. Other discussants in FGD Smt. Vijayasree K V, Dr. Anjali Sivaram, Dr. Prakash Mangaassery, Dr. Uma Karthik, Dr. Thushara Joy and Dr. Sherin P put valuable insights to the problem, which later turned to be vital in determining nature of the new model and approach to its implementation.

The preparatory phase of the innovative model was nourished considerably by the inputs from students and teachers of my institution, through their active participation in brainstorming session and survey respectively. Pilot trial conducted among +2 students of Govt. Rajahs Higher Secondary School Kottakkal and BAMS fresher's of PNPS Ayurveda Medical College, Kanjangad proved the feasibility of the new model, in a miniature form. All these participants were vital in evolving the project to a new phase.

Three experts such as Dr. Rani Sayed, Professor; Dr. Resmi B, Asso. Professor, Govt. Ayurveda College Thiruvananthapurm and Dr. Jayaree A, Professor, Pankajakasthuri Ayurveda Medical College, Kattakkada did the review of questionnaire and the new model. Their reflections on the new model were highly encouraging.

The experimental part of the study was conducted at four Ayurveda Medical Colleges in Kerala. Principals in succession of VPSV Ayurveda

College Kottakkal such as Dr. M.P.Eswara Sarma and Dr. P.E.Prema showered this venture with their official and personal blessings. Dr. C.V.Jayadevan, the present Principal and Dr. K.V.Dilipkumar, Professor, are more than a beloved teachers to me; they are part of my life in many other hearty ways. Dr. A Jayasree, Principal, Pankajakasthuri Ayurveda College, Kattakkada, Dr. S Vijayakumari Amma, Principal, PNNM Ayurveda Medical College, Cheruthuruthy and Dr. Rani Sayed, Professor, Govt. Ayurveda College Thiruvananthapuram supported this venture through offering consent to conduct the study at their respective institutions. My friends Dr. Athri S, Dr. Nidheesh and Dr. Resmi B co-ordinated the activities at different centres on my behalf.

My beloved colleagues in my department, Dr. P.P.Kirathamoorthy (Professor & Head); Dr. Vinod D.S.(Associate Professor); Dr. A.Shameena Beegum (Associate Professor, Sanskrit) and Dr. Anoop A.K. (Asst. Professor) remained with me as never ending source of concern by proposing selfless encouragement in all my activities including this project. We feel our department to be like a family which fills with affection and intimacy to an extraordinary level. All my PG students, need not spell by names, also were members of this family to support me where ever I need help.

Students of 37th BAMS batch of my institution voluntarily consented to be the participants of experimental study with the new model. I wish them hearty greetings and am optimistic about a positive outcome of the efforts they imparted in the present project.

My friend Dr. Sreejith Sreekumar, Director, Clinfound Research Foundation, Kochi turned to be a scaffold at many of the obscurities during the study as an expert consultant in research methods and as the moderator of Focus Group Discussion. Dr. Valsaladevi, guided me with timely and intelligent advices along with some technical support.

Rare kind of comradeship is there with my colleague Dr. Jeena N J, Associate Professor, Dept. of Salakyatantra, being my fellow PhD Scholar at TMV, who had been my class mate in all my academic phases including BAMS, MD and now PhD. My senior colleague Dr. K K Bindu, Professor, Dept. of Rachanasareera, also my fellow researcher in Tilak Maharashtra Vidyapeeth was ever a genuine and caring source of support in all my activities. Dr. Chaitanya R Menon, Associate Professor, Dept. of Kriyasareera went through the pages to pick out the errors and to correct them.

My beloved friend Riju Hari from RK Grafix,Thiruvananthapuram was the man to make the thesis pretty presentable by working out the graphics and making the pages artistic and imaginative.

My beloved parents Sri. K.Balakrishnan Nambiar and Smt. Radha M.V. were the persons who constantly persuaded me for prompt and speedy completion of the project. They will be the happiest persons to see my project successfully completed.

My wife Dr.Beena P.G. and my kids Aravind and Pradyoth accepted my career as a PhD Scholar with limitless tolerance and responsibility. Words do not suffice to express how I do worth their presence in my life.

I will be ever thankful to all those who directly and indirectly stood with me in completing this research project.



Kottakkal
28.03.2019

Dr. Vinodkumar M V

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Abbreviations

A.H	Ashtanga Hridaya
A.S	Ashtanga Sangraha
C.S	Caraka Samhita
Su S	Susruta Samhita
…. Ci	…. Cikitsasthana
…. I	…. Indriyasthana
…. K	…. Kalpasthana
…. Ni	…. Nidanasthana
…. Sa	….. Sarirasthana
…. Si	…. Sidhisthana
…. Su	….. Sutrasthana
…. Vi	….. Vimasasthana

INTRODUCTION

Background

Learning is a lifelong process. It is the act of acquiring new or modifying and reinforcing existing knowledge, behaviours, skills, values, or preferences which may lead to a potential change in synthesizing information, depth of the knowledge, attitude or behavior relative to the type and range of experience. Pre historic evidences are rare, to make conclusions regarding the exact nature of teaching and learning, but the social necessities led man to learn and adapt with his surroundings and social life circumstances properly. In India, theories related to knowledge, its generation and transaction became systematized in a crude form during the Vedic era, where the methodical learning of Vedic hymns became imperative. Oral tradition (Sruti, learning through hearing) supported by memorizing (Smriti) was the major modality then. On a later period epistemology (knowledge on systematic acquisition of knowledge) got equal status of as that of ontology (knowledge on materials), wherein different theories of knowledge acquisition attracted concerns of Darsanas. Reflective practices related to philosophical thoughts, sprouted in Upanishats took its

systematic form in Darsanas. In Upanishats, oral tradition got substituted with manifold interactive practices like discussions, inquiry method, simulation, case studies etc., in an informal way. On the other side, Buddhist tradition introduced democratic systems in knowledge transmission in the form of discussions, practical demonstrations and other systematic discourses during establishment of centres for education. Vedic system, on a later period, also developed effective platforms for discussions and dialogues, in the form of Parishats. It was in this critical juncture Ayurveda developed as an independent scientific discourse.

Ayurveda is a health care system, traditionally, geographically and culturally sustained as an integral part of Indian subcontinent through the last three millennia as a formally practiced and transacted medical system. Health care practices existed even before as an informal and unstructured discourse of life, claimed to be eternal, at least as a natural phenomenon of the human biology. As an independent scientific discipline, that too as a vocational discipline, Ayurveda necessitated methodical pattern for its transaction and training. Oral transmission of knowledge prevailed during early Vedic era and contemplative methods of Upanishat and Darsanik era became insufficient in the transaction and training of practical science like Ayurveda. Instead of *describing* the nature and human experiences, as it was done by Darsanas, Ayurveda *intervened* on human sufferings with practical and instant solutions, demonstrable on a regular basis. Such a practical outlook influenced the formation of its methods of transmission also, where demonstrative and interactive methods got more significance than mere oral / auditory

transmission. By the time applied sciences like Ayurveda formulated its their theoretical and practical paradigms, methods of transaction became more and more formed and even became part of the scientific content of major treatises (Samhitas) written during its classical age. Along with the content of science, methods of transaction, methods of selection procedures related to instructional policies, methods of discussion etc. with their moral and ethical implications, became encoded in Brihat-trayees, the major classical textbooks in Ayurveda. More or less, the description of teaching and learning encoded in them became the first ever systematic description of ancient teaching methods in India.

The classical methods were systematized as Gurukula system, prevailed in India till 19th Century AD, though subtler aspects of the system subjected to revisions at different historical junctures. Almost all the political and cultural shifts in Medieval India (800 CE – 1700 CE) reflected well in its teaching tradition also, where, familial tradition again got augmented significance, apparently due to the decline of democratization of knowledge sustained in Buddhist era. Along with classical Gurukula, schooling system in the form of Pathasala became a major prospect. Learning Ayurveda became formalized as an integral part of Sanskrit learning in such Institutions. To be more precise, Gurukulas created practitioners of Ayurveda, whereas Pathasala created more Pandits (scholars) who showed more affinity to the theoretical and linguistic aspects of Ayurvedic textbooks. In all the stringencies, Gurukula promoted individualized transaction methods, where learners got an opportunity to get an early exposure to the practical aspects of the discipline,

keeping the merits of apprenticeship or mentorship in a proper way. Even then, there were many defects reported to the system by the incumbents.

On a later period, as a part of Anglicization of education in general, after 18th century CE, the pedagogy changed to class room bound settings. This affected Ayurveda also. Didactic lecture method got predominance in transacting Ayurveda, especially its concepts. On the other part, when standards of Ayurvedic graduate courses got streamlined with other medical systems in late 1970's, students from the back ground of Biology, Chemistry and Physics came to learn Ayurveda. This contributed a lot to the scientific basis of Ayurveda, but, new problems evolved in Ayurvedic pedagogy. The main problem was challenge offered to the learners due to lack of conformity of new concepts and ideas with previously acquired knowledge base. This situation led to cognitive dissonance and subsequent avoidance behaviours, disruption of teacher-learner match, discomfort, continuous frustration and even "shut down" which prevent effective learning.

Recently, to be precise after 1980's, New Curriculum Framework, initiated by Govt. of India, and later adopted in Kerala as Kerala Curriculum Framework totally reconstructed the pedagogy by primarily redefining the role of teacher and students in the process of learning. Also, it offered substantial changes in application of educational philosophy, teaching strategies and outcome assessment. Process oriented, activity oriented and student centered learning substituted product oriented, passive and teacher centered pedagogy after the above revolution. Recent advancements in technology enabled teaching practices again reformed the structure and functions of pedagogy. In

the recent years role of teacher in the process of learning is getting redefined. From the erstwhile “authority” the role changes to “facilitator”. During knowledge explosion and media proliferation, where learners are exposed to any sorts of knowledge any time, teachers’ role still changed to “guide” to guide the learner on how to discover proper knowledge from a mess.

In the case of Ayurvedic pedagogy, especially in relation to concept learning, there exists much stringency due to poor efforts to build up smooth transition of learners from their previous learning premises to an entirely different theoretical and applied construct, especially during the period of induction. Lack of proper teaching methods, especially in concept learning; generatea notion of rejection, that too during the initial phase of their study. This dissonance persists through the whole period of study and even after that. The need of the hour is to visualize a transition curriculum, which brings out smooth transition of the learner to the new subject which minimize the challenge to the cognitive integrity of a beginner learner, within the earliest feasible timeframe. In this back ground, a research is undertaken to develop new model of instruction to transact Tridoshasidhanta, which addresses the problems, needs and solutions related to concept learning in the pre-clinical phase and probable nature of a transition curriculum and to compare its outcome with conventional teaching of the same subject. Tridoshasidhanta is taken as the theme of the new model, considering the fundamentality of the principle in Ayurveda. Tridoshasidhanta is a single theory which can readily represent the philosophical, biological and psychological uniqueness of

Ayurvedic approaches and can explicitly link beginner's knowledge to the higher dimensions of the scientific content of Ayurveda.

Problem statement

Presently, the issue of abrupt transition from Physics-Chemistry-Biology based scientific temperament to a totally different conceptual paradigm became imperative when a learner approaches to Ayurveda pedagogy. The method of transaction of Ayurvedic material often alleged to be challenging the scientific temperament attained by the learners before reaching to learn Ayurveda. Ayurvedic material, which is naturalist in character, when adapted to a formal class room setting, went in a wrong direction in optimally delivering itself with scientific integrity. The changeover became scandalized due to lack of proper planning for a transition curriculum. It was rightly observed that, the content being delivered during the induction phase of Ayurvedic graduation was not palatable due to absence of convincing methods adopted during its transaction. The problem is not always with the content, but with the method of transaction also. Clarity in concepts is indispensible during the formative phase of a new learner for properly advancing to the applied aspects of the science. Discussions and observations on problems in Ayurvedic pedagogy are often summarized accepting vitality of issues in the formative face of a young Ayurvedic learner, that too regarding concept formation. Novelty of concepts coupled with strangeness of language in which they are transacted put double burden to the learners. Problems evolved on a later phase of pedagogy are mostly built up on this fundamental crisis. This crisis, in its effect, seems to transpire to the whole course of pedagogy and even after that. The most intense outcome is the way in

which the above obscurity reflects in the quality of reforms in Ayurvedic pedagogy. Though such reforms are largely attempted now-a-days, the initiators fail to assure substantial changes due to the lack of clarity among themselves. In that way, when a generation lacks clarity in concepts, next generation suffers it with magnified impact.

In the scenario of General Education, after the reforms put forth by National Curriculum Framework, role of teacher is getting redefined from the status of “authority” to “facilitator”. In the recent advancement of Technology Enabled Learning (TEL), the scope e-enabled self learning practices makes the situation more student participatory and the responsibility of teacher changes from “mastership” to “guide-ship”. In the present educational premises, teacher need not create knowledge, but, they should know how to organize knowledge. Teacher behaves as a motivator. Students exposed to such a learning premise, when comes to learn Ayurveda, if the teacher fails to cope up with their requirements, the transaction becomes ineffective and the content thus transacted becomes worthless.

Conventional teaching of concepts like Tridoshasidhanta is not well standardized with respect to method of transaction, skills expected and outcome measurement. The conventional method is figured by varying degrees of combination of memory oriented didactic lecture method blended with traditional sloka learning method. Teacher to teacher difference mostly happens in conventional teaching.

Need and essentiality

KN Udupa committee, in the report of Report on Ayurveda Research Evaluation (1959) recommended the necessity of improving teaching methods in Ayurveda[1]. Different committees and councils formed after this laid attention on two main aspects of Ayurveda; one is regulatory mechanism of Ayurvedic *practice* and the other is standards of Ayurvedic *education*. Major discussions focusing problems related to educational standards of Ayurveda, precisely, Ayurvedic graduate syllabus was concerning the question of integration with modern medicine. Recent focus has been shifted equally to the case of teaching standards. Teaching standards is an umbrella term consisting of different aspects like infrastructure, staff strength, qualification and placement of teachers, curricular framework, methods of teaching, examination etc. Most of the time, structuring and modifying the course content and curriculum were the focal point in discussions on teaching standards. Except in a few instances, teaching methodology was not focus of discussion in such situations. Still, there are some highly significant observations from various corners which strongly suggested the significance of revision in teaching methods in Ayurveda education.

In 1983, Santilal Mehta Committee reviewed the status of medical education and addressed the issue of dominance of lecture method in medical education and recommended for introducing other available teaching methods and technologies in medical teaching[2]. The National Curriculum Framework formulated in 2005 offered large scale revisions in philosophy of education, its characteristics and characters. NCF formulated some guiding principles to bring out effective reforms in School education such as, connecting knowledge to life

outside the school; ensuring that learning shifts away from rote methods and enriching the curriculum so that it goes beyond textbooks[3]. National Curriculum Framework offered substantial changes in the whole curricular framework by substituting product oriented, passive and teacher centered pedagogy with process oriented, activity oriented and student centered one. As evidenced from the report of national level survey conducted by KishorPatwardhan et.al. in 2008, the above reforms didn't even touch the field of Ayurvedic education, which still remained memory oriented, teacher centered and passive. The study also observed that teaching and learning in Ayurveda education institutions was more 'memory-oriented' than 'understanding- and application-oriented' in general, along with being teacher-centric. The study also recommended that newer methods of active learning such as 'problem-based learning' be incorporated in Ayurveda education[4]. The survey also identified teaching methodology as one of the major areas which needs to be updated to keep desirable standards in Ayurveda pedagogy. The study did not attempt to work out on the nature of reforms suitable in teaching methodology. Such studies put forth an impact on the policy making of CCIM in 2015, where the draft curriculum seriously considered problems in teaching methodology and recommended three important innovations in teaching: (1) Conceiving importance of a transition curriculum in the form of Freshers' Orientation Course, (2) Allocating two third hours to interactive, practical, clinical or/and group discussions (3) Placing activity oriented learning including living experiences, problem oriented approach, case studies and community health care activities to limelight. Importance of transition curriculum, which allows easy captivation of a fresher learner to the new paradigm, was rightly endorsed through

the above initiative. At the same time it substituted didactic lecture with activity oriented, problem based learning[5].

R H Singh (2015), observes changing paradigms in teaching and education as a shift from teacher centeredness to student centeredness and from directed teaching to inducted learning[6]. Revival of teaching methodology has been the topic for research in a few PG research projects in India, especially in Kriyasareera[7].

Still missing is to take such reforms in a comprehensive and fundamental outlook, designing a new model fulfilling needs of a beginner, as a model to transition curriculum, offering an activity oriented, student centered attitude. Building such a new paradigm definitely necessitate revisiting classical methods of teaching, evaluating their merits and demerits, searching its conformity with contemporary methods and designing new model with an underlying stream of a particular educational philosophy.

Evaluation of the merits and demerits of transition of *Ayurvedic education* from Gurukula to the collegiate system had been attempted many times. But, the same exercise has not been keenly attempted regarding the *teaching strategies* adopted in both the systems. Tridosha-sidhanta, is taken as the topic for preparing a new model considering the primacy of the theory in reflecting the philosophical and scientific identity of Ayurveda.

Rationale of the present study

Students seeking admission for BAMS, most of them strangers to

the concepts in Ayuveda, have to surmount many crises to finally reach the core of the subject being transacted. Lack of familiarity with concepts and language is the main cause for the above crisis. This situation is reported to hold more complexity due to many factors including lack of convincing methodology adopted in teaching the concepts. While placing concept learning to a new paradigm, it is mandatory to have a probe on methodology adopted in classical method of learning, as it is available Ayurvedic literature. There is no separate method ascribed for concept learning, but, reading in between lines will make the methods clear. Brihat-trayees, the major triad, have rich explanations on teaching methods as a separate subject content as well as reflected content. So, in the present study Brihat-trayee is taken as a source material to examine the nature of teaching methods adopted during the classical learning of Ayurveda. Ayurveda as a vocational science would necessitate some sort of distinction with reference to Teaching Methods, when compared to the then existed general pattern represented by Vedic, Upanishat and Buddhist tradition. It is same as the improvisations in the field of present medical teaching adding to the other contemporary teaching methods. Nature of improvisation done by Ayurveda, if any, should be analyzed, for deriving comprehensive ideas on reforming teaching methods.

Concept of Tridosha truly represents the philosophical integrity of Ayurveda based on its naturalist and holistic ideology. Holism, as a hall mark of Ayurveda, explains human being as an integration of multiple exposures and outcomes. Tridosha-sidhanta considers human being as a mechanism influenced

by multiple variables related to all the realms of human existence like physical, psychological, pathological and even environmental. While inculcating such a holistic idea in a new learner, who is previously unexposed to such ideas, or even pre-occupied with reductionist approach, methodology of transaction takes a pivotal role. Imbibing a new idea, without challenging the old is a demanding task in this situation. When a learner is introduced to new idea, initially he/she tries to assimilate it to the existing schema as a part of eschewing from cognitive dissonance. When the new idea offers a bigger challenge to the existing schema, the next effort is to widen or modify the schema to accommodate new information. These psychological processes should be duly considered while attempting renewal of teaching methods. Here comes the role of learners themselves add knowledge to their existing ones, slowly transit their paradigm to the new, and actively participate in the transition, getting facilitated by the teacher as and when needed. Roles of teacher and student will be redefined in this process. In short, adopting constructivist model brings out student centeredness, activity orientation and participatory nature. When a transition curriculum is envisaged, this structural framework asserts easy transition from previous knowledge base to new without offering load of distress.

There is substantial difference between the nature of induction of a student to modern medical system and that to Ayurveda. Learner starts learning modern medical system easily because they find it as an extension of an acquainted paradigm. But, in Ayurveda that shift is not very easy. Unfortunately, by convention, pedagogic parameters for Ayurveda are often framed through blindly mimicking such efforts in Modern medical system. Traditional teaching sustained in Gurukula

cannot be completely written off while planning new methods. The comparison between traditional method and contemporary method is expected to elicit how much they agree in principles and practice and upto what extend they can complement each other in the context of learning Ayurvedic concepts.

There are different models of instruction available in modern teaching technology under different headings, with different objectives and different forms. Models of instruction are usually planned to enhance the effectiveness to transact particular subject content. Most of them are comparatively new when compared to the traditional methods relevant in Ayurveda. Blindly adopting a predesigned model for Ayurveda will be like cutting the feet to fit the shoes. Seeking the feasibility of an innovative model incorporating features of traditional and contemporary teaching will be a worthy and relevant endeavor. Also, the innovative model can try to bridge the gap between the teacher and student by providing a learning experience conducive to their previous learning experience.

As a medical discipline, Ayurveda is expected to set the learners for an early exposure to clinical skills. Even though clinical exposure is imperative, offering a buffer period is highly warranted in the case of Ayureda, on contrary to modern medical system. This preparatory phase, better call it as a *pre-clinical phase*, they familiarize the concepts including Tridoshasidhanta, in environmental, behavioral and biological contexts, which would inculcate the sense of logicality by identifying the ideas in their premises. Ayurveda, on contrary to modern medical system, always try to put biological theories in a universal perspective, which need to be indoctrinated as a philosophy in beginner learners from the beginning itself.

This research titled "Comparative assessment of *Models of Instruction* for Transacting *Tridoshasidhanta*" is being planned based on the problem mentioned above, with a probable rationale stated.

Aims and Objectives

Aim

To compare the effectiveness of different Models of Instruction for Transacting Tridosha-sidhanta

Objectives

1. To make a critical analysis on Ancient Indian Methods of Instruction explained in Vedic sources, Buddhism and Ayurveda
2. To compare the instructional methods mentioned in *Brihat-trayee* with those in *contemporary teaching* and learning
3. To develop *innovative model* of Instruction for transacting Tridoshasidhanta suitable for beginner learner in Ayurveda graduation course within three months of their admission to the course.
4. To compare the effectiveness of the innovative model with *conventional teaching* for transacting Tridosha-sidhanta
5. To probe on the feasibility of developing a *transition curriculum* for beginner learner in Ayurveda graduation course.

Hypotheses

1. Basic elements of ancient teaching is similar to the principles and practices of contemporary teaching
2. The newly constructed innovative model is more effective in transacting Tridoshasidhanta when compared to conventional teaching.
3. It is feasible to develop a transition curriculum for beginner learner in Ayurveda graduation course

Elaboration of key terms

1. Models of instruction : A teaching model is an instructional design that describes the process of specifying and producing particular environmental situations which cause the student to interact in such a way that specific change occurs in his behavior. A teaching model should have five predefined functional components such as (1) systematic sequence (syntax), (2) role of teacher and student in the process of teaching (the social system), (3) principles on how teacher reacts to different situations (principles of reaction), (4) supporting system like teaching aids and (5) the effects of the model. There are many such predesigned models available in the contemporary teaching.

2. Innovative model: Innovative model is the newly developed model, with ideal structural features of a model, but not following a particular pre-established model. In this study, the innovative model is developed by merging principles of modern teaching and traditional teaching.

3. Instructional module and Instructional package: Instructional Module (Teaching Module) is a unit of work in a course of instruction that is virtually self-contained and a method of teaching that is based on the building up skills and knowledge in discrete units. Generally a module contains a title, objectives, nature of transaction, materials, teaching strategies, learning activities, method of assessment methods etc. Instructional package is a series of instructional modules on different aspects of the same subject. The modules in the package will follow a common format, and the package will have a total integrity forming its own of objectives, rationale, sequencing, content planning and assessments.

4. Contemporary teaching: In this study contemporary teaching implies the teaching methods prevalent in general education, which was followed by learners who come to join BAMS especially that developed after National Curriculum Framework.

5. Conventional teaching: It is the teaching strategies, unstructured and non-homogenized, presently available in Ayurveda Colleges for transacting concepts like Tridoshasidhanta. This subject is dealt in Maulikasidhanta in 1st BAMS syllabus.

6. Transition curriculum: A curriculum which aims at bridging the learners from a pre-occupied paradigm to a new paradigm by building up conceptual transparency, especially, where the subject content is not conforming to previous learning experience.

7. **Tridoshasidhanta:** Tridoshas are the basic components of human body which fundamentally explains human biology through working in three principles: Vata, Pitta and Kapha. As a statement this theory explains that when these three principles are under harmonious state of functioning, the result will be health. Any disturbance to this state will lead to disease.

8. **Brihat-trayee:** Three classical Ayurveda textbooks – CharakaSamhita, SusrutaSamhita and AshtangaSangraha which represents the classical tradition of Ayurvedic theory, practice and transaction.

Methodology

The present study has three distinct phases:

1. The Literary Comparison
2. Development of innovative model for transacting Tridoshasidhanta
3. Experimental study to compare the effectiveness of innovative model and conventional teaching

The Literary comparison

Literary comparison of the instructional methods in Brihat-trayee and Contemporary Teaching was done in the following steps:

1. Collection of material
2. Framing historical outline
3. Identifying items of comparison

4. Item wise comparison
5. Finalizing comparative statements
6. Fixing degree of agreement with Hypothesis.

Methodology of developing of Innovative Model of Instruction

New model was developed by following steps assigned for formative evaluation, done as a part of Evaluation Research, which usually evaluates new programs. There are five steps in the formative evaluation of a new program: (1) Need assessment (2) Evaluability assessment (3) Structured conceptualization (4) Implementation assessment (5) Process evaluation. In the present study, the above steps are accomplished as follow:

1. Need assessment: Brainstorming among UG & PG students
2. Evaluability assessment: Semi structured survey among Ayurveda teachers
3. Structured conceptualization: Focus Group Discussion
4. Implementation assessment: Pilot trial with a miniature module
5. Process evaluation: Structuring the new model and trial

Experimental study

The experimental part of the study was done for comparing the effectiveness of Innovative Model with Conventional teaching. The methodology is elaborated elsewhere.

Organization of the report

The whole report is organized in five parts, with different chapters sequenced within, as given below:

Part -1: Review of Literature

This part mainly deals with literary review on ancient and contemporary teaching. Also, special review was done on constructivism, and problems in contemporary Ayurveda teaching and Tridosh-sidhanta. It builds up rationale for developing new innovative instructional model. There are five chapters in this section as follows:

(1) Instructional methods in ancient India, based on Vedic and Buddhist sources

(2) Instructional methods in Brihat-trayee

(3) Contemporary teaching – Principles and practice

(4) Review on issues of contemporary Ayurvedic teaching

(5) Review on Tridoshasidhanta.

Part-2: Methodology

This chapter deals with the methodology of the following steps, in separate chapters:

(1) Methodology of literary comparison

(2) Methodology of developing the innovative model

(3) Methodology of the experimental part

Part-3: Results and Interpretation

Here, observations, results, their interpretation related to three stages of the study are described in separate chapters.

(1) Results of literary comparison

(2) Results of development of innovative model

(3) Innovative Model for Transacting Tridoshasidhanta

(4) Observations and Results of Experimental Study

Part – 4: Discussion, Summary and Conclusion

This part contains discussion in three chapters

(1) Discussion on Literary Comparison

(2) Discussion on Development of New Model

(3) Discussion on Experimental Part

(4) Summary and Conclusion

All other relevant documents are attached as appendix.

Part - I

REVIEW OF LITERATURE

Chapter - 1 **Ancient Indian Methods of Teaching and Learning - an overview**

Chapter - 2 **Methods of instruction in Brihat-trayee**

Chapter - 3 **Contemporary teaching – Principles and Methods**

Chapter - 4 **Current issues in Teaching Ayurveda**

Chapter - 5 **Tridoshasidhanta**

Chapter - 1
ANCIENT INDIAN METHODS OF TEACHING AND LEARNING - AN OVERVIEW

Ancient Indian education is to be understood as being ultimately the outcome of the Indian theory of knowledge and a part of the corresponding scheme of life and values[1]. Ancient Indian or the Vedic age education positively compels the student to understand the meaning of education and the importance of personal instruction by a teacher in a different way compared to many other educational practices.

A historical overview of ancient Indian educational ideals and practices makes it clear that the terms to describe the major subdivisions of literature such as Srutis and Smritis by the terms themselves convey the key idea through which they are transacted. Sruti, means 'to hear' or more specifically 'to listen' to the contents of subject texts and scripts like the Vedas and the Upanishats that are traditionally understood to be divine revelations arising out of the breath of Lord Brahma[2]. These are basically oral text books and are taught by the teacher, listened attentively by the student and stored into the memory chambers through concentration and repeated memorization.

Smriti means 'those that are remembered'. Naturally, Smriti needs

an internal reflective practice of the learner, which, through this process, comes out with personal interpretations. Technically, Smritis are a corpus of diverse literature and sacred writings by great sages, philosophers and thinkers putting forth codes of conduct for human life through stories, biographies, illustrations, instructions and examples. The great epics of all times Mahabharata and Ramayana, the six Vedangas (Shiksha, Chandas, Vyakarana, Niruktha, Kalpa, Jyotisha), the social norms authoritarian compilation Manusmriti and other Dharmashastras and the story oriented Puranas are a few examples of Smriti[3].

1.1.1. Caturasramas or four stages of Life in relation to learning

Ancient Indian or Vedic period divides the whole of an individual's life into four age based successive stages or Ashramas. The stage of studentship is called BrahmacharyaAshrama (8-25 years of age) and it was spent in the Gurukulas residing with the teacher, involving in the domestic routine of the Gurukula and learning from the teacher. The second stage after 25 is the GrihasthaAshramaor domestic householder life (25 – 50 years), wherein the learned student is initiated into the real tough world of professional and family life, a practical application of the learned knowledge and acquired skills. In Vanaparastham (50-75 years) the person realizes the real intent and meaning of life and its utility and futility. Sanyasam (after 75 years)is the stage of self-realization. In such a way, the four ashrams reflect different stages of learning.

1.1.2. Pre-Gurukula learning in relation to Samskara

Ancient Indian belief was that education began from the womb. The story of Abhimanyu listening from the womb of his mother Uttara, to the details of Chakravyuha, narrated by his grand uncle Lord Krishna substantiates the statement[4]. After the birth, the child learns the skills of survival through natural basic instincts till the age of three months. The first formal teaching by the parents is at the start of four months through the ceremony of Nishkramana, the seventh among the Shodasha Karmas. The baby is ceremoniously bathed, dressed and taken out to show the sunrise, sunset, moon rise, greenery, the outer environs of the house and the temple[5]. Here the parents and the family take the role of teachers and the baby an ardent, curious student.

The next of the Shodasha Karmas is the Annaprashana during the sixth month during which the baby is introduced to the solid staple diet by feeding sweetened cooked rice and other food items[6,7]. The aim is to educate the child to the knowledge of food, one of the basics of life. The baby is further taught the need of personal cleanliness and hygiene by performing the Chudakarma[8], the ceremonial shaving of the hair and trimming of the nails at the age of one year, three years or seven years depending on different local traditions. Chudakarma is either preceded or followed up by Karnavedha, the piercing of the ear with a sterile gold or silver needle and adorning with an earring. This inculcates the knowledge of looking good and appealing factors necessary as part of socialization and cultural emersion[9].

The actual commencement of the child's formal education is with Vidyarambham, literally meaning "beginning of study". It is also known as Akshararambha or Aksharavikara[10,11]. It is a ritual that is marked as a milestone in the child's learning life, as the ceremony is the child's first formal attempt to learn the tools of knowledge. The ritual is traditionally performed for all children in their fifth year of age[12]on the Vijayadashami day at a temple or inside a sacred place of the house[13].

1.1.3. Formal Learning System-The Gurukula Education

1.1.3.1. Upanayana : Initiation into formal learning through a Guru

Upanayana splits into Upa and Anayana, translating as to "get near" or to "move closer" or to "draw closer", simply to beresiding with or next to the source of knowledge[14].It is an important stage in a person's life and is supposed to be conducted at the age of eight. The rite of passage symbolizes the leading of the child to the school by a teacher and the customary farewell by the parents and the family[15]. It is a ceremony in which a Guru (teacher) accepts and draws a child towards knowledge and initiates the rebirth of the child, invoking the virgin, curious young mind and spirit[16].Upanayana had different rules in different castes, the age of induction was different. For Bramhins, the age was 8 years, Kshatriya-11 years and Sudras-11 years. The child undergoing the Upanayana ceremony is called Vatu[17].Upanayana is mentioned and discussed with relevance to the three Varnas - Brahmins, Kshatriyas and Vaishyas[18]. But

Ayurveda Brihatrayee Sushruta Samhita in the Sutrasthana includes Sudras entering schools and undergoing formal education process, stating that the Upanayana Samskara was open to everyone[19,20]After the ceremony the Vatu is lent alms, the Bhiksha by the family as a blessing and farewell. The Upanayana ceremony extended to women, in ancient Sanskrit texts, and the girls who underwent this rite of passage then pursued studies were called Brahmavadini[21]. Those who did not, were performed Upanayana ceremony at the time of their wedding. Instead of sacred thread, these girls would wear their robe (now called sari or saree) in the manner of the sacred thread over the left shoulder during this rite of passage.[22,23]

1.1.3.2. Gurukula system

Once the Upanayana ceremony is completed the Vatu who has attained the status of Sishya reaches the Gurukula, which is a self-sufficient residential facility with the teacher and the students living together sharing the space, food and the daily domestic chores necessary to keep the Gurukula operational. This was indeed a practical method of teaching a growing individual the benefits and needs of sharing. The Sisyas lived under the single roof of the Gurukula with brotherhood, humanity, love and discipline being their guiding principles. The student was treated as a part of the Guru's family which taught the student to get along with a different family set up. The cultured and disciplined life at the Gurukula was a comprehensive learning process where the students are taught apart from academics, the good habits of respecting the elders, mother, father, guests and teachers.

The motto was complete teaching by the teacher and devoted learning by the student. The Guru-Sishya relationship was valued and the teacher was held in high esteem and commanded respect. The teacher always thought and acted in the interests of the students. The students were treated equally irrespective of their social status and background. This equal status for all principle was an education to the student about valuing the inner worth of a person and not the social status. Gurukulas nurtured intimate relationships and friendships between people of diverse strata of the society. The continuous interaction and co-habitation were also opportunities for novice students to learn from senior and experienced students while the senior students benefitting by self-testing their knowledge levels by helping their younger fellow students.

The main objectives of the Gurukula system are self-control, character development, social awareness, personality development, intellectual development, spiritual development, passage of knowledge to the future generations ensuring continuity, preservation of knowledge and culture. Students were divided into three categories as Vasu (those obtaining education up to the age of 24), Rudra (those obtaining education up to the age of 36) and Aaditya (those obtaining education up to the age of 48).

The basic education of a student at the Gurukula was multi-pronged and was not limited to ritual and philosophical speculations found in the Vedas and the Upanishats. Ancient Indian education system stipulated the learning of sixty four ‘‘kalas’’ or practical techniques and thirty two ‘‘vidyas’’

or fields of knowledge[24].The rites of passage during apprentice education varied depending upon the tradition of the respective guild[25]. This was the system followed up to the stage of Vasu. Those interested and capable of further learning continued to stay at the Gurukula and proceeded on to the specialized study as Rudras. The very few highly intellectual and devoted students continued into super specialization as Adityas continuing their education to become authorities in their field of study.

Learning methods chiefly constituted hearing (sravana), reflection (manana) and contemplation (nididhyasana)[26].Memorization constituted one of the major techniques of learning.Theguru-shisya system of teaching at the Gurukula was almost always communal, teacher-fronted, product-oriented and substantially based on practice-based apprenticeship system.

1.1.3.2.1. Salient Features of Gurukula Teaching

The teaching was more inductive and process-oriented. The teaching methods were diverse depending on the learner, context and subject matter. Teachers exercised total autonomy in curriculum and organization in Gurukulas. Pupils also enjoyed some degree of autonomy in choosing institutions or teachers; they, for example, could move from one Gurukula to another for better knowledge. Sometimes even the teacher could advise the students to go to another teacher to satisfy their queries. The Gurukula system also encouraged the possibility of self-study and learning. Methods of debate, discussion, speculation and argument were salient features of education in the Gurukula system of education. Discussions and debates would take the

form of intellectual challenges between the Guru and the Shishyas or among the students themselves. Many learned persons from far off places used to assemble and participate in the debates and discussions that regularly took place at the Vedic education centers. Such use of discussion as a method of teaching later led to the development of logic called Vakovakyam or Tarkashastra or the science of disputation. Such a tradition of arguments can be substantially exemplified from dialogues between Krishna and Arjuna in the Bhagavat Gita[27].

The term Guru-paramparya or simply Sampradaya was defined by Udyotakara in his Nyayavartika as the uninterrupted ideal succession of pupils and teachers by which knowledge is conserved and transmitted[28].

1.1.3.2.2. Guru-Shishya Definition and Relationships

Guru means dispeller of darkness and shishya means the one being moulded by a superior person. Lord Sree Krishna in the fourth chapter of Bhagavadgita, while answering to a query by Arjuna, specifies the qualities of an apt Guru and an ideal Shishya. He says an apt Guru is a jnani and tatvadarshi which means he should have acquired theoretical knowledge through the study of scriptures and should be well versed in the practical techniques of applying the techniques and should have had the experience of realization of truth. Ideal qualifications of a student are Pranipata, Pariprashna and Seva; which implies that the student should be totally obedient to the teacher and always be respectful to the teacher by prostrating, the student should always be trying to gain more knowledge by contemplating

the acquired knowledge and raising questions before the Guru seeking answers leading to more questions and the student should always be available to be of any service to the Guru[29].

Gurukula education system did not ignore intervention and voice of the students in the process of teaching. As mentioned in the Dharmasutra, teacher should not restrain the students for his own advantage in such a way that hinders their studies. Teachers were not given power to refuse instruction to students unless they found a defect in them. In addition, teachers were not expected to encourage blind unquestioned obedience from the students. Dharmasutra clearly mentions that students can confidentially draw the attention of the teacher to any transgression of religious injunctions that he might have committed deliberately or inadvertently. Students could forcibly restrain the teacher from wrong-doing either by themselves or with the help of their parents. The teacher not imparting knowledge did not indeed deserve the designation, respect and reverence of a teacher. Although teachers enjoyed certain degree of authority and reverence, they did not compromise learning potential and agency of the students[30].

1.1.3.2.3 Stages of Gurukula education

The student life at the Gurukula was divided into three different stages: (1) Vedarambha or Praishartha (start of the learning of Vedas and Upanishats) (2) Keshanta /Ritushudhi (coming of age ceremony and marking the attainment of basic knowledge in Vedas) and (3) Samavartana or Snana (graduation and end of Vasu stage and also renouncing Brahmacharya).

1.1.3.2.3.1 Vedarambha

During the initial phase of Vedarambha student enjoys a cooling off period for preparatory adjustment phase through helping with school chores, living a simple life, going to villages and towns to seek donations of food (Bhiksha), bringing water, collecting firewood for cooking, general maintenance of the school and sharing the collected food with the teacher and fellow students. Prior to the initiation into the Veda study, the student learnt the vocabulary, grammar and other basic subjects[14]. The teacher's observation of the student during the preparatory period followed by an academic evaluation by the teacher is the qualification for Vedarambha.

Praishartha or Vedarambha was the rite of passage that marked the start of learning the Vedas and Upanishats in the Gurukula or Pathashala (school) under the watchful eyes of the teacher. It was a yajna or fire ritual, with the teacher and the student sitting together. The teacher recited the initiation hymns and the student following suit. The ceremony is the first landmark for the student after getting accepted in the Gurukula, and heralds the actual start of Veda studies and was the bench mark for the student's intellect that he was ready and qualified to learn theVedas and Upanishats[31]. The emphasis of the stage, where the student started Veda study was both the memorization and knowing the meaning of each hymn, verse or mantra[32].

Initiated into the process of study with Vedarambha,the student had to pass through two qualifying rituals during each school year of study.

The Upakarma or Upakarana marking the start of a new stage of Veda and the annual testing of the acquired knowledge at the end of the school year called Utasarjanam or Utsarga or Samapana. Utsarga marked the suspension of the Veda studies for a certain period of the year[33]. The Upakarma was observed on the full moon day of the lunar month of Sravana (August) every year. It was held in the morning, and was attended by the students, the teacher, Grihasthas (householders, parents) and Vanaprasthis (retired, grandparents). The Utsarga or closing of the academic study year was held in the month of Magha (about February). After Utsarga the student was entitled to a vacation and an easier life until he went back to studies[34]. The whole system is very similar to the present day schooling system with academic years, annual examinations, promotions into the next grades and vacations.

1.1.3.2.3.2. Keshanta and Ritusuddhi

Keshanta (cutting the hair tips) is the first shave of a youth's facial hair. This was typically observed about the age of sixteen, and the nascent beard and moustache were shaved. The ceremony included gifts to the barber and to the teacher. The teenager was also blessed and gifted by the elders. The coming of age ceremony ended with the student reciting his vow of chastity and the code of Brahmacharya[35]. This ceremony was a lesson on personal hygiene to the student and the recitation of Brahmacharya vow was a method of reminding the teeming teenager to keep his bursting hormones under his control.

Ritusuddhi, also called as Ritu Kala Samskara, is the corresponding

coming of age ceremony for girls, after menarche or first menstruation. This milestone in a girl's life was observed by her family and friends, with gifts and her wearing a sari for the ritual[36]. The formal education of most of the girls ended with this ceremony and later she was trained domestically, preparing her for the role of a homemaker. These two ceremonies were an indication and reminder to the teenagers to exercise self-control, prosper in their studies and to prepare themselves for the multi-tasking of the life ahead. The ceremony marked the teenager's entry into adulthood and is also an education about the peculiarities and uniqueness of their sexualities.

1.1.3.2.3.3. Graduation or Convocation ceremony or Samavartana

Samavartana or Snana was conducted after a minimum of 12 years of schooling at the age between 21 and 24 and was the ceremony associated with the end of Vasu stage. This was a conclusion of the student's basic formal education and the Brahmacharyasrama stage of life. This rite of passage included a ceremonial bath[37]. After the bath the student was blessed by the teacher and elders. The student's skills and knowledge were publicly displayed and tested. The teacher publicly announced that the student was qualified as a Vedior learned person. It was the option of the student to leave the school or stay back as Rudra for specialization. A student reaching Samavartana stage was considered a Vidyasnataka (one bathed in knowledge and showered with learning). The symbolic bath was the symbolic relief from the fatigue of the hectic swimming across the ocean of learning and finally reaching a shore. This ceremony was also the thanksgiving ceremony by the student to the

teacher. The student would inquire on the gift the teacher desired. The gift specified and demanded by the teacher was known as Gurudakshina and it was the responsibility of the outgoing student to deliver the Gurudakshina to the teacher over his lifetime. Following the Gurudakshina phase the ceremony concluded with the recitation of Snatakadharma (graduate's convocation oath) and a Yajna (fire ritual) after graduate taking the oath[38].

The Snatakadharma is the first shloka from Taittiriya Upanishat eleventh Anuvaka of Shiksha Valli, which translates as "After having taught the Veda, the teacher instructs the pupil: 'Say what is true! Do thy duty! Do not neglect the study of the Veda! After having brought to thy teacher his proper reward, do not cut off the line of children! Do not swerve from the truth! Do not swerve from duty! Do not neglect what is useful! Do not neglect greatness! Do not neglect the learning and teaching of the Veda".[39]

The eleventh Anuvaka of ShikshaValli also lists behavioural guidelines for the graduating students from a Gurukula. It highlights on treating the parents, teachers and guests as Gods and also entails the graduate to follow charity with faith, sympathy, modesty and cheerfulness[40]. Thus a graduate Vasu entering the world from Gurukula is a learned person. The graduate was supposed to roam the world and involve in jobs putting his knowledge to practical testing and thereby gaining the much needed experience to live the life of a Grihastha (homemaker) and a Karmayogi (professional).

1.1.4. Vedic methods of instruction

Vedic education can be distinctively considered in two stages: (1) an early, Rigvedic stage, which stressed on oral tradition (maukhika) of reciting mantras (2) a later Upanisht stage which stressed on the meaning and interpretations (Chintana-manana) of hymns[41]. The oral tradition helped in preserving the hymns through generations, where as Upanishat methods contributed much to the higher order of thinking which evolved into different philosophical systems. Apart from the Gurukulas where the tutelage was by a single teacher there existed Parishads, where many teachers resided and taught different subjects. Bigger Parishads developed into permanent institutions like universities. Teaching and learning also happened at Sammelans where scholars gathered at one place for learned discussions and competitions generally on the invitation of the king. Scholars were appropriately rewarded[42]. Swadhyaya was considered more important and vital in the Vedic Education System.

The scheme of Vedic learning is first studying and recitation of the hymns Samhita followed by performance of Yajnas, Brahmana, then an enquiry into the rationale behind the performance of these Yajnas, Aranyaka and ultimately an enquiry into 'ParamatmaTattwa' and attaining its actual experience Upanishat. Since mastering these tasks in their entirety is an almost impossible job, a method in the form of Shakhas of the Vedas evolved whereby only the required for each purpose was taught. Shakha contains that many required mantras under each category of Samhita, Brahmona, Aranyaka and Upanishat as would enable a seeker to accomplish liberation or Moksha[43].

1.1.5. Upanishat methods of Instruction

Probably composed between 800BCE and 500 BCE, Upanishat etymologically, means to sit down near. Upa is near and shad is to sit. The name owes the origin to the process of sitting at the feet of an illuminated teacher to engage in a session of spiritual instructions and gain knowledge. The purpose of the Upanishats is to inspire and show the way towards learning. Each of the Upanishats adopts a unique methodology of knowledge transfer stressing more on Swadhyaya or self-learning by experience. Upanishats are taught or expounded by an illuminated teacher from the basis of personal experience. The highest understanding, according to this view, comes from direct perception and intuition[44].In Upansihad period, the content or subject of education became more and more flourished to include different areas to which a learner can opt according to his/her will and aptitude. Twenty eight such areas are enlisted. The proper study of Vedas (Trayeevidya – Rk, Sama and Yajus) was the formal content of learning, besides the, 28 categories of knowledge can be met with:[45](1) Anusasana – According to Sayana, Six Vedangas – Siksha, Kalpa, Vyakarana, Nirukta, Jyothisha and Chandas. (2) Vidya – The philosophical systems of Nyaya, Mimamsa etc. (3) Vakovakyam – special theological discourses (4) Itihasas and Puranas (5) Akhyana – story telling (6) Anwaakhyaana – after story, the supplementary narratives (7) Anuvyakhyana – Explanation of mantras (8) Vyakhyana – commentaries of different forms of literature (9) Gatha – song or verse, in Rigvedic context (10) Narasamsi, a Gatha celebrating man (11) Brahmana, the religious explanation (12) Kshatravidya – the science of the

ruling class (13) Rasi, science of numbers and mathematics (14) Nakshatravidya – science of lunar mansions (15) Bhutavidya – the famous meanng of Bhutavidya is demonology. Macdonell takes this science as that of creatures that trouble man. Sankara explains it as science of life. (16) Sarpavidya – science of snake (17) Atharvangirasa – auspicious practices related to Athravaveda including which crafting (18) Daiva – knowledge of portents (19) Nidhi – science of divination (20) Pitrya – rituals concerned with worship of manes (21) Sutra book of rules for the guidance of sacrifices and so forth. (22) Upanishat (23) Slokaslokas found not in Vedas but in Brahmanas (24) Veda of Vedas – grammar of old Sanskrit (25) Ekayana – Nitisastram (26) Devavidya – science of worship of Gods (27) Brahma-vidya – Vedangas like Siksha, Kalpa and Chandas (28) Deva-jana-vidya – Fine arts

During a later period, often technically described as Sutra period, a few more appendices appeared to Vedic literature called Upavedas, which paved way to development of some secular subjects like Ayurveda, Arthasastra etc. Each veda was appended with one each of Upavedas – Ayurveda, Architect (Stahpathya), Gandharva (dance and music) and Dhanurvidya (archery). Upavedas contained the vocational educational system existed at that period.

Besides indicating these branches of knowledge, art and science, the Upanishat speaks of the supreme and highest knowledge technically called Para vidya (superior knowledge), the knowledge of the Ultimate Reality. On

the other side Aparavidya (inferior knowledge), according to Mundakopanishat (Mundai,I,4) Aparavidya comprises of four Vedas and six Vedangas. In an extended meaning, Apara-vidya comprises of all sorts of subjects dealt in form a practical learning, which finally leads to the ultimate knowledge called Paravidya. In short, Aparavidya denotes the learning process of the formal education and Paravidya is the final realization which comes from within the person after all attaining sorts of such learning processes.

1.1.5.1. General Principles of Upanishat methods of instruction

All Upanishats do not offer a single comprehensive system of teaching or learning; but there exists a common thread stringing together all of them into a single garland. Some of these basic general principles are Samsara Karma, Dharma and Moksha. The concept of Samsara is reincarnation, Karma is action either good or bad and is the determiner of the conditions of next life, Dharma is right behaviour or duty and Moksha means liberation or release from the eternal cycle of deaths and resurrection. All the Upanishatsteach the learner the truth that the core of one's own self is not the body or the mind, but the innermost essence, the Atman or Self. They also convey the meaning of the unchanging Absolute Being, the intangible essence of the entire existence Brahman. They say that Brahman is beyond all description and intellectual understanding. The ultimatum by all Upanishats is that Atman and Brahman are made of the same substance and when a person achieves Moksha or liberation, Atman returns to Brahman, to the source, like a drop of water returning to the ocean[46].

1.1.5.2. Specific teaching methodologies of Dashopanishads

Upanishats exceed 200 in number, among them 108 are listed and 10 of the listed are of prime importance. These are known as Dashopanishads and they are Aitareeya, Taittireeya, Ishavasya, Prashna, Kena, Katha, Mundaka, Mandukhya, Chandogya and Brihadaranyaka. The Gurus of the Vedic period were cognizant of the various philosophical, psychological and sociological principles of education[47].The instructional strategies of the Upanishats may be classified as illustrations, demonstrations, catechesis, story-telling and discussion. The ultimate aim of education during the Upanishat period was self-realization and in the process of attaining the final goal the moral values of character formation, wisdom, morality, truthfulness, respect towards parents, teachers and guests were imparted and inculcated into the psyche and conduct of the students.

The Upanishat Gurus believed that four related factors have to work together for the successful completion of each and every educational session. They are Adhikari, Vishayam, Sambhandam and Prayojanam which are qualifications of a student, subject of study, student-subject relationship and the usefulness of the study respectively. The student was supposed to possess NityaanityaVastuViveka or a sense of clear discrimination between eternal and materialistic elements, iha-amutra-artha-phala-bhoga-viraaga or indifference towards worldly pleasures both on earth and heavens, Shatsampat or the six fold virtues of Shama, Dama, Uparati, Titiksha,

Shraddha and Samadhana or control of mind, control of sensory perceptions, detachment from worldly pleasures, trust, devotion and faith in the teacher's teachings, tough endurance of pleasures and pains and deep concentration and finally Mumukshatva or strong desire for liberation from the cycle of births and deaths. To acquire these qualifications the student should be educated in Aparavidya or the study of Vedas and related subjects. The student had to successfully get through stringent assessment tests to finally be eligible for the ultimate knowledge of Paravidya or Brahmavidya[48].

The instructional methods followed in Upanishats are logical and scientific. All finer elements of education like the principles of curriculum construction, teacher student relationship and concept of discipline were matters of due importance. According to Brahmasutra six characters are essential to understand a text in total. They are Upakrama Upasamhaara ekavaakyata which is agreement with the concept of the conduct prior to and on completion of the discussion, Abhyaasa is repetition of the subject for better memorization, Apoorvata or unique features of the subject, Arthavaada or praise and explanation of the subject with the detailed meanings and Yukthi or logical reasoning[49].

The instructional methodology of the Upanishats can be divided into six important categories as Oral, Illustrative, Demonstration, Catechetical Methods, Storytelling and Discussion.

1.1.5.2.1. Oral Method

In the absence of printed material and limited availability of palm leaf manuscripts the recitation by the teacher was the learning material and repetition of the teachings were the student's notes for future reference. Oral method consists of three steps as Sravana, Manana and Nididhyasana. Sravanais the student listening to the teacher's words with deep concentration emphasizing on the content, accent, pitch, rhythm, pronunciation and grammar. and mechanically memorizing. It proceeds on to Manana which is contemplation, reflective thinking on the listened subject and brainstorming of the study resulting in better understanding and newer ideas. The deep understanding and innovative ideas provoke the student's learning curiosities and lead to experimentation and meditation process of Nididhyasana, where the real worth of the student is put to test and from this stage emerges a genius.

1.1.5.2.2. Illustrative Method

Analogical illustrations appeal to the senses with abstract ideas taking audio-visual sensory forms which help in registering the subject deeply into the student's faculty and inspiring imagination and understanding of the intended subject to be learnt. In Mundaka Upanishat three simple illustrations are used to make the students understand the complexity of the imperishable "Brahman". The spider spinning a web out and drawing it again into itself teaches the student the concept of the creation and dissolution of the universe into Brahman. The teacher anticipates a doubt in student's mind about the purpose

and effort of Brahman and hence further illustrates with the example of plants sprouting on earth naturally without any purpose or effort. Further doubts may arise about the consciousness of Brahman related to creation which is clarified with an analogy of hair growth on human body without effort, but with the awareness of the individual. These three very simple evident illustrations enable the student to comprehend the ultimate knowledge of “Brahman”.

1.1.5.2.3. Demonstration Method

The teacher used sensory skills to make the student perceive an abstract concept. In Chandogya Upanishat, Uddalaka demonstrates to his son that by knowing a heap of gold all things made of gold becomes known. As the student is not able to understand the concept taught by the teacher, the teacher asks Shvetaketuto bring a fruit from a nearest banyan tree and to break it. Upon questioning the student says he can see atomic seeds inside the fruit and on further breaking the seed he says that he sees nothing inside. Uddalaka tells him that there is a huge banyan tree inside the seed. The Brahman is also existent but cannot be seen just like the banyan tree inside the seed. Both can only be believed and perceived. To further clarify the doubt the teacher asked the student to put some salt in water and keep it for a night. Next morning the teacher asks him to bring the salt back. Shvetaketuwas not able to bring back the dissolved salt, but was able to experience the salt by its taste. This way the teacher with the use of environmental objects imparts education about the subtleness, invisibility and omnipresence of the Supreme Self to the average student.

1.1.5.2.4. Catechetical Method

Art of questioning was encouraged as sensible questions could be used to test the previous knowledge of the student and to find out whether the intellect of the student is sufficient for further knowledge. For afinal assessment of the student at the end of the study period this method was utilised. Many of the Upanishats are in the form of Samvaada or dialogues between the teacher and the students. Prashnopanishad is in the form of questions and answers between sage Pippalaada and six learned men. This Upanishat is the best example for the efficient and effective education using Catechetical Method.

1.1.5.2.5. Story Telling Method

Story telling method was one of the efficient techniques of Upanishat teachers to make the learning process interesting and to influence the students directly or indirectly. In Chandogya Upanishat there is a narration of the story of Satyakama Jabala and his quest for learning with Guru Gouthama to inspire the students. The story carries the moral values of thirst for knowledge, truthfulness, austerity, faith and the importance of quality over lineage. Satyakaama turns to Nature for learning which indirectly hints to the student to look around and find knowledge from Nature and surroundings. The interesting story by Prajapati about the importance of Praana, the impulsive, motivating story of Nachiketas in Kathopanishat persisting with Yama to reveal the secret of Brahmajnanam, the thought provoking story of Ushasthi in Chandogya Upanishat and the value educative story of

Satyakaama Jabala's disciple Upakosala are a few samples of the powerful usage of story telling instruction methodology in Upanishats.

1.1.5.2.6. Discussion method

Discussion is a give and take education method. Most of the Upanishats adopt this technique more than once while elaborating the subjects. If a group of students and the teacher discuss a common topic different new views, opinions and versions evolve and the discussion concludes in a comprehensive, clear and perfect idea about the discussed topic. The discussion of five Grihasthas about Brahman in Chandogya Upanishat which led to their meeting sage Uddaalaka and continuing the discussion and finally arriving at a conclusion with the teachings of King Asvapathi is an illustration for discussion method of teaching and learning. Another episode of discussion about Udgita by scholars Shilaaka, Daalbhya and Pravahana, each one of them an authority of Udgita is a proof to the discussion between stalwarts which resulted in brainstorming and emergence of fresh concepts of the topic happens along with the brushing up of the knowledge of the participants. Healthy discussions have always been a part of educational strategy from ages all over the world and still continue to hold a prominent position in the academy even today.

1.1.5.2.7. Enigmatic method

Puzzling or enigmatic method is used to explain the unseen but perceivable abstracts in Upanishats. One such sample is the description of the Reality in Sevetasvatara Upanishat, where it is said that, Reality is like a

great circumscribing felly whose tyres are the three Gunas, whose ends are the sixteen Kaalas, whose spokes are the fifty Bhaavas or conditions of Samkhya philosophy, whose counter-spokes are the ten senses and their ten objects, whose six sets of eights are such as the eight Dhatus. These kinds of puzzles can also be found in Isavasyopanishad and the other Upanishats.[50]

1.1.5.2.8. Aphoristic Method

In this method, knowledge is compressed to small aphoristic sentences or Sutrams, which require higher level of intelligence to understand them. It is for this reason that the same sentences have been interpreted differently by different commentators[7]. The aphorisms of Patanjali and Paanini are a couple of examples for this method of education. The depiction of OM in Mandukya Upanishat also is in aphoristic method.

1.1.5.2.9. Etymological Method:

In the etymological method, the meaning of word is explained according to its root. In the Brhadaranyaka Upanishat,it is told that “Purusa” is really Purisaya or inhabiting the citadel of heart. Examples like this can be seen in other Upanishats, also[51].

1.1.5.2.10. Mythical Method

Mythical method to preach the values has been used multiple times in the Upanishats. In Kena Upanishat, the parable of Indra and the demons preaches the lesson of humility. Sometimes a myth is introduced for

aetiological purposes, as, for example, the myth of the sun coming out of the huge world egg.

1.1.5.2.11. Analogical Method

Things which cannot be explained by reasoning are explained by analogy for easy understanding. Yajnavalkya introduces the analogy of the drum or the conch in order to explain the processes of the apprehension of the self. Aruni explains the non-difference of the individual soul from the universal soul by the analogy of the different nectars uniting to form honey.

1.1.5.2.12. Dialectical Method

The dialectical method is one of the most sophisticated and advanced teaching methods of the Upanishats. It is more of a discussion of equals rather than a teaching and learning process. The scholars assembled at a place and discussed different problems among themselves. In the Upanishats such symposia are mentioned as Parsihads.

1.1.5.2.13. Synthetic Method

Creative synthesis of the ideas to devise stand points is the model of this method. In the fourth chapter of the Brhadaranyaka Upanishat, Yajnavalkya synthesizes and fine tunes the several stand points explained by king Janaka. Examples like this can be found in Chandogya, Prasna and other Upanishats[7].

1.1.5.2.14. Monologist Method

Monologue is rare in Upanishats and almost all learning processes are participatory. But sometimes the philosophers of the Upanishats entered into a monologue completely involving themselves in the subject they are expounding and the learners could learn listening to this monologue. Sage Yajnavalkya's reply to King Janaka's question in Brhadaranyaka Upanishat andYama's answers to Nachiketas's query in Kathopanisad are instances of monologist teaching method[7].

1.1.5.2.15. Adhoc or Temporizing Method

The teachers of the Upanishats taught their disciples according to their intellect, endurance, patience and spiritual enlightenment levels. In the temporizing method, as the spiritual level of the enquirer rises, the teacher shows him the path ahead and tells him the whole truth gradually.This method has been accepted as very important by the modern educational psychology. In the famous parable of Indra and Virochana, Virochana is satisfied by the first answer of his teacher Prajapati, but Indra is not satisfied and goes on questioning him and finally Prajapati tells him the secret of the soul.

1.1.5.2.16 Regressive Method

The regressive method is in the form of many successive questions in which every new question takes the answerer back to the answer to the previous one. The discussion in Brihadaaranyaka Upanishat between Janaka and Yajnavalkya, between Yajnavalkya and Gargi are examples of the regressive method of teaching and learning[7].

Apart from these ten methods three types of symbolisms are employed by the Upanishats While Nature symbolism is common in the methodology of Upanishat, it is the usage of the sacrifices and sacrificial items as symbols and the use of the mystic sound syllables such as the Aum as symbols silhouettes the methodology of the Upanishat[7].

In the midst of dialogues, symbolism and narratives what exist is an evolved methodology of teaching deeply embedded in the Upanishats which has been transmitted from one generation to the other. By this methodology of the Upanishat the student is gradually taken from where he is, to a point where he cannot but see the ultimate reality.

1.1.6. Buddhist education system

1.1.6.1. Comparison with Brahmanical system

Historians mark the Buddhist period to be between 600 BC and 800AD[52]. The importance accorded to education during the Buddhist period which is known as the Golden Era of Indian Culture encouraged the development of many centres of learning which did not exist before[53]. The Buddhist system of Education was in many ways a continuation and parallel of the existent Gurukula system as they were framed by the monks and nuns who embraced Buddhism who still retained elements of their previous culture and system. A few features are (1) The Buddhist Sanghas, the centres of Buddhist education were similar and parallel to the Gurukulas and centered round the monasteries just like the Vedic education round the sacrifice. The monks substituted the

monks[54]. (2)In both the systems the student was required to move out of his home and reside with the teacher. This process was known as Upanayana in Vedic culture and Pravrajya or Pabbajain Buddhism and the in house student was categorised as Antevasin, meaning the one who resides inside and Pabbajit, one who has become homeless to seek education. (3) Both the systems earmark the age of eight to start education and stipulate a period of a minimum of twelve years of studentship. The completion is known as Upasampada. (4) The number of students admitted depended on the capacity of the teacher to accommodate and manage. The students in both systems had to be of service to the teacher always[55].

The difference between the systems were: (1) Gurukulas centred around one teacher. Viharas or Buddhist monasteries were large institutions with thousands of teachers and a number of teachers teaching various disciplines similar to the modern day universities. (2) Gurukulas were restricted to Brahmans and upper castes, while Viharas considered personal merit irrespective of caste as the admission criterion. (3) Gurukula educational medium was Sanskrit while Buddhist system used the popular Pali or Prakrut as the medium of instruction[56]. (4) The aim of Vedic education was social while the Buddhist educational aim was missionary. (5) The curriculum of the Gurukula was limited to the expertise of the Guru while the Buddhist Viharas offered a multi-discipline curriculum with literature, philosophy, medicine, astrology, law, administration, politics, music and arts to name a few[57].

1.1.6.2. System of Learning, Curriculum, Methods of Teaching and Graduation in Buddhism

The syllabus is decided based on the merits of the student. The students had to follow the advice of the teachers and obey them. Students had to perform daily routine works beyond learning. Arranging water, cooking, serving meals to the teacher and accompanying the teacher for seeking alms were part of the day's duties of the student.

The minimum study period was 12 years. The method involved questions by the students to the teachers; answers by the teachers and discussion of matters related to their education. The ultimate aim of education was to attain Nirvan. The academic curriculum included three major Buddhist principles of discipline, meditation and wisdom through teachings of Buddha, Dharma Shastras,Shakyamuni's Trijataka, Sutta, Binaya, Dhamma, Pitak, documenting, writing, arithmetic and vocational skills like spinning, weaving, tailoring, printing, etc. Sanskrit education which was the gateway to the parallel Vedic education was also part of the syllabus. Students were exposed to the Vedic curriculum of Veda, Purana, Vyakarana, Tantra etc. Extensive travelling was an important part of education. As the studies advanced optional choices were offered in subjects of religion, philosophy, military training, study of law, Ayurveda, Nature Study, etc. Eighteen disciples were taught at the Sanghas[58].

Verbal education and discussions were the primary methods of teaching. The education of novices started with Sutant by-hearting sutras which progressed on to question-answer method of Binaya. As the studies

progressed they were introduced to religious preaching and observance of austerities. Single accommodation to facilitate undisturbed study was provided. The aim was to reach the stage of Bodhisatva, an individual with a character of highest morality and purity. Establishment of the disputed fact through eight evidence forms of Sidhanta, Kaarana, Udaaharana, Saadharmya, Vaidharmya, Pratyaksha, Anumana and Agamana; prominence of logic, long tours, monthly conferences that had to be compulsorily attended on Poornima and Pratipada of every month and meditation in solitude were the important methods of teaching apart from basic verbal education and discussion. The medium which was Pali in the beginning gave way to Sanskrit as the subjects taught got more intricate and complex[59].

Once the Sharman successfully completes twelve years at the Sangh, he would be considered as a permanent member of the Sangh after the Upasampada, the graduation ceremony similar to Samavartana of the Gurukula. The awarding of the status of Bhikshu or monk unanimously on the decision of the majority was the crux of the event which is democratic in nature. The Sharman presents himself in front before all other monks of the monastery to reassure the Sangh of his capability[60].

1.1.6.3. Qualities of a Teacher and Teacher - Student Relationship

High moral order and mental order were the basic qualities of a teacher. The teacher had to complete at least ten years as a monk to qualify as a teacher. He must possess purity of character, purity of thoughts and

generosity. Imparting education to the students, writing books, propagation of religion, discussion, and arrangement of debate for the doubt clarification on important topics were the primary academic duties of the teacher. The teachers being responsible for physical, mental, spiritual and moral development of the students, was supposed to be affectionate and assistive to his students. The teachers observed and mentored round the clock ensuring all-round development of the students and their strict adherence to the rules and regulations of the place[61].

The salaries of the students were meagre and were expected to lead a simple life. Inefficiency of a student to complete education would account to incapability of the teacher which would mean his termination of teacher hood in many instances. The student had the freedom of reporting a teacher's misconduct to the higher authorities[62].

Both the teacher and student were responsible to the monastery. The teacher was totally responsible for the clothes, food, residence and health care of the student.The teacher was fatherly loving the student and considerate enough to guide the student in any matter. In return the student respected the teacher, obeyed him and served him taking care of his food and daily needs. The teacher student relationship spanned various dimensions of teacher-student, father-son and friend-philosopher-guide[63].

1.1.6.4. Higher education System

The minimum age of admission to the universities including

Nalanda and Takshashila was sixteen. The students were charged a fee of 1000 coins which was utilised for the upkeep of the university. There was an option to pay the fee in kind in the form of labour. Scholarships for meritorious students were also provided. One head teacher, Acharya assisted by Upadhyayaas a panel of assistants were in charge of a batch of 500 students. Fee paid students were taught during the day and working students during the night. Syllabus was high and specialised with Buddhism, all Vedas except Atharvaveda, Ayurveda, Vaseekarana, Kamatantra, Tantra-Mantra, Dhanurvidya, Hathisutra, Akhet, Vidya, giving life to the dead, knowledge of animal sounds, grammar, law, etc. Student hostels and individual family accommodations were available[64].

1.1.6.5. Medical Education during Buddhist Period

Medicine received a lot of importance during the period. Takshashila was the main center of medical education offering the seven year medical course. The medical system was very well developed by that period which got sophisticated and documented with the efficient university education system of the Buddhist period. The students were required to prove their knowledge of herbs, their diagnostic capabilities, treatment expertise and surgical skills to pass the examinations. Once they entered the practice they were eligible for remuneration. It was considered to be a duty of the physician or surgeon to undertake even hectic journeys to reach and treat a needy patient.

Reference of Jivak who studied medicine and surgery for seven years in Takshashila and undertook extensive journeys to gain knowledge of the roots and herbs is found in the Buddhist scriptures. He is believed to have performed a successful stomach surgery in Kashi and a brain surgery in Rajagriha. The author of Charaka Samhita, Caraka also lived and practiced during the Buddhist period. The scripture Milind Panha lists the names of famous medical men as Narada, Dhanwantari, Angarika, Kapila, Atula and Pubba Kuchhayana. The development of Vishachikitsa and the treatment of snake bites developed during the period. Instigating the snake to suck up its own venom from the bitten person through the recitation of mantras was popular[65].

Chapter - 2
METHODS OF INSTRUCTION IN BRIHAT-TRAYEE

1.2.1. Background

AYURVEDA originated and flourished just after Vedic period adopted the teaching and learning methodology of the Vedic period, with some characteristic modifications. Gurukula system was generally followed with more emphasis on practical skill development by mandating the students to learn the scriptures, keenly observe and interact with the masses belonging to all strata of the society, visit the forests and lands of all kinds to improve their pharmaceutical knowledge, spend time in the pharmacies learning the processing of medicines and finally assisting the teacher in healthcare delivery. Caraka instructs the learners of Ayurveda to talk to common people. "Knowledge of medicinal plants and their identification should be gained with the help of cowherds, hermits, hunters, forest dwellers and those who gather plants of the forest for food"[1]. Vagbhata dwells on the objective of learning Ayurveda as "the poor, those suffering from disease and those afflicted by sorrow should be helped. Even insects and ants should be treated with compassion, just as one's own self" [2].

Ayurveda is the native Indian system of healthcare that is currently used by millions of people in India, Nepal and Sri Lanka for their day-to-day healthcare needs. Though some of the practices, mainly providential ones (Daiva-vyapasraya) are richly available in Vedic literature, it attained a comprehensively documented form known as the “Samhitas” during the last centuries of BC. Classical Indian method of education, which is applicable to Ayurveda also, involves four levels. (1) Adhiti is the first level when information is collected and absorbed (2) Bodha, which involves understanding and internalization of knowledge (3) Acarana, which means application of the knowledge and its practice. (4) Pracarana, which involves preaching, teaching, advocacy and dissemination of knowledge.

The ancient medical education system in India is a wholesome balance between theory and practice. The practical session had three main objectives as preparation of medicine, examination of the patients, diagnosis of the disease and practice of medicine and practice for surgery initially on dummies. Gurukula the personalized, teacher-based institutions were later developed as full-fledged institutions. Around 3rd to 6th BC there were big universities of Indian learning like Takshashila and Nalanda who were imparting education in different streams including Ayurveda. In medieval period the tradition of teacher to student and father to son continued in learning and practice of Ayurveda.

Anatomical knowledge in ancient India was derived principally from animal sacrifice, chance observations of improperly buried human bodies,

and examinations of patients made by doctors during treatment. Susruta Samhita emphasized surgical matters, including the use of specific instruments and types of operations. It is in his work that one finds significant anatomical considerations of the ancient Indians. There is also compelling evidence suggesting that the knowledge of human anatomy was revealed by both inspection of the surface of the human body and through human dissection, as he believed that students aspiring to be surgeons should acquire a good knowledge of the structure of the human. Susruta was able to achieve his remarkable knowledge of human anatomy by using a brush-type broom, which scrapped off skin and flesh without the dissector having to actually touch the corpse. Susruta Samhita mentions the role of a student in the dissection: 'A pupil, otherwise well-read, but uninitiated, in the practice (of medicine or surgery) is not competent to take in hand the medical and surgical treatment of disease'[3].

Caraka describes learning process in three steps in a sequence: Learning (Adhyayana), Teaching (Adhyayana), and discussion (Tadvidya-sambhasha). Two types of discussions were in the form of well-structured and advanced methods of learning. They are Sandhaaya Sambhaasha or friendly discussion and Vigruhya Sambhaasha or competitive discussion[4]. Caraka acharya says in first chapter that as far as life, health and its maintenance is concerned with Ayurveda and is Anantam or infinite. At the end in last chapter it is said that if at all there is any knowledge in the universe it is well available in Caraka Samhita. The documentation of knowledge in the Brihatrayees and Laghutrayees is very complex and demands high perception

levels to understand them. Such level of intellect is not expected in every one. In fact even for those with high perception levels Suruthaacharya advocates to go through various other relevant Shaastras in detail (Paratantravalokanam)[5].

1.2.2. The Exposition of Brihatrayees

Ayurvedic classical textbooks are popularly known as Samhitas. The term Samhita means a treatise where subjects are dealt in a systematic way (Samyak hitam pratipadyam anena). There are three major classical texts, collectively known as Brihat-trayee (means, the major triad), which by volume and nature of content, documented the development of Ayurveda as an independent science. The period of composition of those textbooks are considered to be the golden age of Ayurveda where the science subjected to maximum popularity and development. Caraka Samhita, originally written by Agnives'a (600 BC) and redacted by Caraka (100 AD), was the major treatise in Kayachikitsa. Susruta Samhita, authored by Susruta is master textbook in Salyatantra, the surgical tradition, was claimed to be composed to be in around 600 BC. On a later period, during 400 AD, Vagbhata composed Ashtanga Sangraha, by judicially integrating and summarizing the vast knowledge depicted in the two Samhitas mentioned above. These three treatises laid down the scientific platform for Ayurveda in a period around 1500 – 2500 years back. These textbooks became the basis of all other treatises written on a later period.

1.2.3. Caraka Samhita as a standard document of ancient medical education system

Conferred with the title of Indian Father of Medicine the fool proof identity of Caraka Maharshi still needs to be established. A commonly accepted personal credentials of the Ayurveda scion is that he lived somewhere around 2nd to 6th BCE[6] at Kapisthala, the present Kapurthala sandwiched between rivers Iravati and Chandrabagha (Ravi and Chenab) in Panchanada (Punjab). A great scholar and ethical person, Caraka seems to have practiced what he learnt and taught, an ideal quality of a good teacher. The treatise in his name was redacted by Caraka by systematizing and documenting the expounded healing science and knowledge by sage Atreya Punarnavasu through his six adept disciples Agnivesha, Bhela, Jatukarna, Parashara, Harita, and Ksharapani. Each of the disciples compiled the knowledge bestowed to them into a Samhita. Sage Agnivesha was the prominent among the disciples and he compiled his revered Guru's teachings into an encyclopedic treatise Agnivesha Samhita. The period of treatise is widely believed to be 6th century BCE.

There seems to be a wise strategy adopted by sage Atreya Punarvasu in selecting six students for the purpose. He would have wanted the knowledge he disseminates to be compiled and transmitted with different versions as understood by the students with diverse perceptional capabilities and would have wanted the best compilation to survive, flourish and win the test of time. Sage Atreya Punarvasu's scheme seems to have worked and two centuries later Caraka revised and redacted the treatise that gained

popularity as the standard text book among the learners of medicine. Sage Drudhabala added a few portions of redaction to complete the work which exists today.

1.2.4. Knowledge Transmission Process in Caraka Samhita

The entire teaching, learning and analysing exercise of the treatise for the purpose of knowledge transmission seems to have adopted the knowledge transmission policy of the Upanishads and is in the form of proper disciplined deep discussions between the teacher and the students as Guru-Sishya Samvada. Ayurveda Gurus were always regarded as the authorities and respected with esteem by the students and the society as they donned two highly responsible roles as teachers and healers. In turn the Gurus who aimed and achieved the prestigious master titles lived up to their reputations imbibing and including all the ideas, ideals, principles and processes they preached. This is a noteworthy principle which is relevant to be absorbed into the modern day medical teaching-learning-practicing process. Ayurveda and the teacher student community of Ayurveda always adhered to the Vedic roots and honored the Vedic hierarchy of knowledge dissemination or the Guru-Sishya Paramapara. This is well substantiated in the explanation about the descent of Ayurveda, in the first chapter of Caraka Samhita Sutrasthana. The genealogy of knowledge transmission process of the science of Ayurveda is always from a Guru to a Sishya or a group of Sishyas. In the chronology of Brahma to Dakshaprajaapati to twin Aswinkumaras to Indra transmission of knowledge from one generation to another is symbolized[7].At this stage ends

the divine hierarchy. This divine and mythological chronology could be a part of the plan to safely preserve the purity, sanctity, trust, faith and ethics of Ayurveda in the lives and practice of the healing hands. It could have been a veiled strategy to safeguard the science and prevent it to be misused by wrong hands and minds.

From Indra the knowledge with enough safety and security precautions and measures is transmitted to the humankind. The first human being who qualified and received the knowledge of Ayurveda was sage Bharadvaaja who passed it on to Punarvasu Atreya. Atreya might have clearly realized and understood the instability and limitations of the humankind and hence with a broader vision he disseminated the knowledge to six stringently scrutinized and exclusively selected disciples. Agnivesa, Agnivesha, Bhela, Jatukarna, Parashara, Harita, and Ksharapani[8]. Here it could be noted that sages Bharadvaja and Atreya were enlightened souls who had divine qualities in a human physique. The knowledge was safe in their hands. As the transmission continued through generations the fear of idealistic dilution or the positive desire for expansion of the science might have prompted the later teachers for collective dissemination process.

Ayurveda and other sources of Vedic Knowledge are collective societal products, the seminal ideas of which germinated simultaneously in many minds and evolved through mutual sharing and discussions as systemized subjects and hence cannot be credited to a single person or group. This also helps to preserve the anonymity of the collective knowledge

and emphasize the truth that knowledge is a collective product and never individual achievement.

The mythological characters represent the nascent and formative phase of Ayurveda. Each of the four Vedas encouraged descent, rooting and upward growth of the Upavedas which later on developed on to establish themselves as independent specialized forms of knowledge. This formative phase of Ayurveda is very clearly depicted Caraka Samhita[9].These verses are proofs of the Vedic origin and connection of Ayurveda with Atharvaveda. The commonness with the origin source, the socio-cultural format of the period and the loyal adherence to the parent science are some of the influencing factors responsible for the mythological trait of Ayurveda found in Vedic and Prevedic tradition of the science.

The title of the first chapter of the Sutrasthaana, Deergham Jeeviteeyam Adhyaayam elucidates the purpose of the transmission of Ayurveda from divine to human hands as a means of restoring the health and happiness of the suffering humankind by ensuring a long life with robust health. The path breaking parishad organized at the foothills of the legendary Himalayas[10] indicates the reforming of the till then orally transmitted codified subtle knowledge into simplified and refined form suitable for the purpose and context of the period. The motivational force to seek the knowledge transition was the intended wellbeing of all earthly living beings (Sarvabhutanukampayaa)[11].

The teaching and preaching in Caraka Samhita is in the form of four types of aphorisms or Sutras. The Sutras are put forth in such a way that they open up with their meaning depending up on the learner's level of intellect and understanding. The superficial meanings are for general perception and further analysis leads to deeper subtler inner meanings showing up before the learner. This process is guided by the teacher and deeper the propulsion of the student, better the teacher. Four models of Sutras can be found in Caraka Samhita[12]. They are:

(1) GuruSutra–These are mostly personally addressed to by mentioning the name of the disciple. In Caraka Samhita Guru Athreya dictates many aphorisms calling Agnivesha's name to draw his special attention towards the Sutra and to stress its importance. GuruSutras are statement dictions and advices by the teacher to the students and this method of teaching is capable of ensuring a permanent place in the student's memory to be recollected as and when the need arises. (2) Sishyasutra–These are questions in the form of Sutras by the Sishya to the guru. These aphorisms are markers of student caliber and a tool for the teacher to assess the student's intellect and also doubling up as a self-assessment exercise for the teacher to re-examine the method and content of teaching. In Caraka Samhita Agniveshasutras are of a high standard that elicited higher standard replies which was the reason why Caraka Samhita stood high among the contemporaries. A keen student and a learned dedicated teacher together completes a model knowledge transmission process with Guru and Sishyasutras. (3) Pratisamskartru sutra are verses added or revised by the

redactor or Pratisamskarta. Caraka and Dridhabala are considered as the major redactors of Caraka Samhita, Caraka on an earlier and Dridhabala on a later period. The Pratisamskart as who most always belong to a future generation of the original work could bridge the vital gap between the original and the revised one by adding their aphorisms stemmed out of their own learning or teaching knowledge and experiences. (4) Ekeeyasutra – These are opinions, differences and assertions by other teachers or masters. These are products of Sambhashas and Samvadas, discussions and debates by different masters and the recorded minutes of these scientific congregations.

The sutras are solid proofs to declare that the teacher, student, and contemporary subject experts were all links in the chain of knowledge transmission process of Caraka Samhita.The treatise provides ample space and opportunities to all involved in the generation and transmission of knowledge. The verses “thus the sage transmitted” (“Bubudhetanmanaa muni”)[13] “thus the ancestor prescribed” (“Bubudhe yam pitaamahah”)[14,15,] “He (guru) gave it to his disciples (“Sishyebhyodattavaan”)[16] “Mootraanyashtau nibodha me”[17] “Krimighnam cha upadsiyate”[18] “Bhooyovakshyaamiaseshatah”[19], are a few examples of the sutras of Caraka Samhita. Similar to the texts of the period the work relates itself to its roots and maintains a distinctive identity both together and harmoniously interspersed.

1.2.5. Philosophy of education in Ayurveda

The Vedic aim of education was ultimate merger or Moksha, whereas Ayurveda is more earthly oriented and the aim is to alleviate the

physical, physiological, mental, emotional and intellectual imbalances that manifest in the form of diseases. Caraka paves this road of Ayurveda to lead a person to the final realization and hence he while describing the best choices of different things in Yajja Purusheeyam Adhyayam, the 25th chapter of Sutrasthana deviates to wisely state that "the best medicine is knowledge" (Vijnaanam aushadheenaam sreshtam)[20] that the aim of education is to procure the best of medicines which is none other than the knowledge itself. The knowledge in the hands of an enlightened, skilled, learned, wise physician is the best medicine capable of finding utilitarian benefits to simple available things around and devising simple remedial measures in the most hostile situations. Hence attaining scientific knowledge is the best medicine. And Knowledge in itself is the best medicine of all times as this is the only medicine that can cure the human souls of the distress and unrest.

This intangible and irrevocable wealth of knowledge makes the person possessed with it exuberate the radiance of science and scientific knowledge, says Caraka in his conclusion of Mahachatushpaada Adhyaya and reinforcing the fact that, to decide on the Chikitsa a thorough patient examination guided and illuminated by the light of attained knowledge of Shaastra or science is very important and the student's aim of education should be to equip himself with knowledge for showing him the light in the professional path (Saastram jyoti prakaasaartham)[21].

The aim of education is to attain knowledge jnana and elevate it to the state of vijnana by vivechana or analysis, classification, categorization

and experimentation all characteristic features of shaastra or science. Though Jnana and Vijnaana are defined in various contexts with different meanings, when considered from Ayurveda point of view it should be understood that jnana is realization of the soul (Adhyatmajnana) and vijnaana is the scientific knowledge acquired by the aspiring physician through years of hard work and apprenticeship under a Guru[22].The student's aim is to attain both jnaana and vijnaana by opening his eyes, senses and intellect to meditatively focus, observe and imbibe through continuous learning the literature, techniques, skills and knowledge of Ayurveda, a process which Caraka refers to as the opening up of the meditative eye or Dhyanachakshus[23]of the student. Dhyanachakshus means focused observation and Jnaanachakshus is observation through his own wisdom[24].

Caraka in his Khuddaka Chatushpaada Adhyaaya of Sutrasthana specifies six essential qualities of a physician (1) Vidya or education and knowledge (2) Vitarka or logical reasoning, analytical ability, critical approach, probing questioning skills and positive attitude (3) Vijnana or in depth knowledge, understanding of the science and specialization (4) Smriti or powerful memorization and revocation skills (5) Tatparata unrelenting perseverance and patience and (6) Kriya or continued observant skills, psychomotor excellency and practical knowledge[25]. These six qualities are to be developed in the initial years of studentship and are to be honed and sharpened regularly in the Vaidya's professional life too. This is comparable to the present day continued medical education programs and skill

enhancement training workshops. Age, professional and domestic compulsions often make a Vaidya lethargic and stagnant. The aim of education should be to sow and grow the right attitude essential to overcome this inertia and has to be inculcated by the teacher in the nascent years of apprenticeship by instilling in the student a deep acceptance of the fact that learning never ceases and is always a continuous process.

Caraka further details five qualities both for a student and a teacher of Ayurveda which are to be their life breath, if they wish to excel in their science of choice. These qualities are respectively (1) Vidya or education and knowledge, (2) Mati or intellect, (3) Karmadrushti Abhyasa – practical observation, training, experience gaining and skill honing, (4) Siddhi fool proof knowledge and expertise in the science and finally (5) Ashraya cooperative and accommodative aptitude and mind set[26].These are the attributes and qualities a physician-teacher should practice and teach the student by being a role model. The students lived with the teachers and always looked upon them as virtuous and ethical models. Hence it is a default responsibility of the teacher to live a life of good example. The aim of education was and is always to mold a raw apprentice into a soulful skilled humane professional. Caraka emphasizes this as a keyword to both students and teachers in these quotes.

Caraka warns and cautions the student not to be restricted to the teachings of the teacher alone. The lessons learnt from the teacher should be the spark to kindle the fire of quest for further sources of knowledge of

which the world around is the best teacher. He makes his point in his words that “the world in its entirety becomes a teacher for the wise””Kritsno hi loko buddhimataam acharya”[27]which may be summarized as to those who have the observant eyes and ears to the happenings of the world and to those who have the intellect to imbibe the knowledge nature bestows, the whole world becomes a gifted teacher. Caraka seems to give a message of the importance of the learning of life skills along with the academic education. This virtue is very relevant in the present context where the students coming out of the academies with flying colors are pathetically failing in their lives, professionally and personally. This point of Caraka about the necessity of equipping the students with the life skills needs is a teaching methodology that has to be mandatorily included in the Ayurveda curriculum.

Caraka in his usual style of intelligent calculated deviations tells the students to emerge out of the fear of failure and strengthen the acquired knowledge by refining and redefining it with trials, errors, experimentations and innovations. Pareeksha is the test of one’s kshamata or capability. Tougher the tests, better become the skills. So a student is supposed to expose self to the trying process of experimentations and trials so as to learn from the errors and successes to become a Kushala wise skilful Vaidya (Pareekshyakaarino hi kusalabhavanti)[28].

Caraka has a definite aim and purpose for the teaching and learning of Ayurveda which he very categorically and definitively states in his very first chapter of the very first section. His empathetic statement which

seems to emerge out of the heart and is a truth of all times very cordially says that Athreya Punarvasu is gifting the knowledge of pure Ayurveda to his six disciples who represent the whole of the Ayurveda student community with a sole purpose of the good of the world and caring kindness towards all living beings. In his own words "then, Punarvasu, the master disseminated the sacred knowledge of Ayurveda to his six disciples being driven by compassion towards all living organisms"[29].

In Ashtanga Sangraha, the aim of Ayurveda education is explained to be "building a physician approved by the Ruler, who is well versed in aetiology, symptomatology, sure and non-recurrence of diseases. Also, one who is conversant with the science but not skilled in his work, gets delusional when he approaches the patient, just as a coward in a battlefield. At the same time, one who is practicing with audacity without proper knowledge of the science, does not get respect from the wise, deserves death sentence by the king"[30].

1.2.5.1. Learning objectives of Ayurvedic education

Prime and foremost objective of Ayurveda is to protect the health of the healthy and to treat the disease of the diseased[31, 32]. To fulfill this objective, the society should be able to ensure the services of physicians possessing the four fold qualities of deep theoretical knowledge, its clearly justified understanding and interpretation, trained knowhow and experience of the practical application of knowledge and very importantly having a clear vision of his profession that stems out of the keen observation of the practice of

experienced physicians[33].Such an eminent physician deserves utmost recognition in the form of being honored by the king for his professional excellence and all the quadruple segments of medical knowledge viz. etiology, symptomatology, therapeutics and prophylaxis[34].As the knowledge of Ayurveda is for the benefit of the society, Ayurveda education is open to all strata of the society each of them being served with a different objective. Vedas and their study were the exclusive right and privilege of the Brahmins. But Ayurveda trod a different path from its parent source by divesting the study of the science from the elite and making it accessible for study by anyone who desires to do so. Diseases and life threats can happen to anyone and anywhere. Medical care is an emergency service which has to be available at any time. Hence Caraka and other medical scientists might have thought that it is always better to divest the study of Ayurveda from the sparsely distributed Brahmanas and transfer the vital life-saving knowledge to other Varnas also. Caraka says that for the benefit of the world Ayurveda shaastra is meant to be studied not only by the Brahmanas; but also by the Kshatriyas and Vaisyas. Brahmanas should learn Ayurveda for the benefit of all living beings, Kshatriyas to ensure protection of the people andVaisyas as a means of livelihood[35]. This way all objectives of Ayurveda are completely accomplished and the society is healthily safe in the hands of the skilled Vaidya community.

Caraka after laying down the basic teaching and learning methods and criteria for the teachers and learners gives an abstract of the branches of medicine to be taught and learnt to become an accomplished physician. It is

also a technique adopted by Caraka to give an overview to the student and provide him an opportunity of rethinking about continuing the study of Ayurveda. This system minimizes compelled and forced study by allowing disinterested students to opt out and creating room and space for genuinely interested creamy layer of prospective physicians who are capable of carrying the science ahead. In his endeavor Caraka elaborates on the branches of Ayurveda. He states that Ayurveda Tantra aims to disseminate knowledge through the tools of structure of human body with Saareera; physiology with Vritti; etiology of diseases with hetu; pathology of diseases with Vyadhi; therapeutics with Karma, objectives of Ayurveda with Karya; climatology with Kaala; physicians with Kartaa; pharmacology with Karana and procedures with Vidhi[36].

Objective of study, as described in Susurta Samhita, typically epitomizes importance of gaining scientific knowledge with an interpretation aptitude “Even after the science has been studied if it is not properly interpreted in its meanings then it will only be causing exertion to the person just like the donkey carrying a load of sandal wood. Just as a donkey carrying a bundle of sandal wood understands only its weight and not the sweet smell of sandal wood, similarly a foolish person, though having read many sciences, acts like a donkey in interpreting the meanings of the science[37].

1.2.6. Content of Teaching

Caraka Samhita, the apex among the triad authorities of Ayurveda, the Brihatrayees, very clearly presents in the first chapter of the Sutrasthanaan abstract of the contents it intends to teach. The name of the

chapter Deergham Jeevitheeyam Adhyayam itself gives a vivid picture to the reader that the text is a search of long healthy fruitful life which can be achieved by living the life advocated by Ayurveda, the eternal and holy science revoked and taught to his successors by Brahma. Ayurveda the science of quadruple content of hetu-linga-oushadha (trisutra) which are the causes, symptoms, medications and tripartite principles of health care serves the dual agenda and purpose of preserving the health of the healthy and treating the disease of the diseased employing and deploying its two basic sections Swasthavritha and Athuravritha[38].

Ayurveda the science and knowledge related to Life is regarded by the commoners and philosophers as the most meritorious of all sciences, because it teaches mankind what constitutes their good in both the worlds[39].The emphasis of the treatise is on the quality of life which is possible only through good health and disease free existence in this life and in this world. Such a healthy person can lead a virtuous life gaining him a better life in his next incarnation and the best place in the world he is believed to inhabit after the liberation from the cycle of births and deaths.

The quantum and measure of the good and bad things; pleasures and sorrows constitute the dimensions of life. Ayurveda is the science of life that distinguishes in detail the Hitaayu or a good life, Ahitaayu or an undesirable life; Sukhayu a healthy, happy contented life and Dukhaayu or an unhealthy, unhappy and discontented life. Ayurveda explains the specifications or Maanams for a quality life and directs the person towards a better life[40].

The whole universe and everything that forms the universe or the Loka is based and sustained on the Tridandas or the tripods of life which are the Satva, Aatma and Shareera. Satva is the inner force or the mind, Aatma is the soul and Shareera is the body which is the instrument on which the others two rest, work and act[41]. . In a broader sense when the concept is applied to Ayurveda as a Shaastra, subject matter of the science or Adhikarana is said to be the mind or Satwa, the soul or cream content is the Aatma and the body or Shareera is the what the world endures by reason of cohesion and on that are all things established[42].

The complete content of Ayurveda is systematically classified into eight branches to facilitate a disciplined, structured teaching and learning methodology. These branches are Kayachikitsa (general medicine), Urdhwanga Chikitsa or Shaalakyatantram (the treatment of diseases affecting the head and supra-clavicular region including the eyes, ears, nose and throat), Salyatantram (surgery), Vishagaravairodhika Prashamana Chikitsa (toxicology, poisons and allergy treatments), Bhootavidya (psychiatry), Kaumarabhrityam (Paediatrics), Rasaayana (Rejuvenation and Restoration) and finally Vaajeekarana (aphrodisiacs)[43]. In Susruta Samhita, the branches are identified as the same with some modifications in designation. The names of branches are: Salyatantra (Surgery), Salakyatanra (Ophthalmology), Kayachikitsa (general medicine) Bhutavidya (psychiatry), Kaumarabhritya (paediatrics), Agadatantra (toxicology), Rasayana tantra (rejuvenative therapy) and vajeekaranatantra (reproductive medicine)[44].

Ashtanga Sangraha explains the same terms in a different order, substituting grahachikitsa for bhutyavidya, urdhwangachikitsa for salakyatantra, damshtrachikitsa for agadatantra, jarachikitsa for rasayanatantra and vrishachikitsa for vajeekaranatantra[45].

1.2.7. Materials for teaching

The word Tantra is derived from the root tan which means is to open, expand, spin out and weave a desired fabric. When it comes to teaching and learning, the teacher with the skill and fineness of a weaver opens up and expands the knotted threads of the desire for learning in the student, expands the neatly reeled threads of desire into curiosity, quest and search for the learning, encourages the search into a learning process and finally spins out a complete fabric of knowledge out of the threads. The tools for the teacher in this arduous task are the Shaastras and Tantras or treatises. Tantra is the technique and skill of applying the theoretical science in the treatises or Shastra into practical usage. Shaastra is defined as the treatise or text or book or instrument of teaching, or any manual or compendium on any subject or in any field of knowledge. It is referred to any precept, rule, teaching, ritual instruction or direction[46]. Thus Tantra and Shaastra collectively constitute the materials of teaching and learning assuming the roles of text books, the teaching techniques and the learning skills. The base reference and primary material of teaching is always a textbook or treatise which is otherwise known as Tantra. Ayurveda can always be categorized as a complete Shaastra and Tantra.

The science of Ayurveda, the Shaastra is methodically systematized and arranged to suit the teaching methodology and skills of the teacher and learning capabilities of the learner. The whole subject is sub-divided into different medical specialties or branches termed as Shaakhas explaining the Vidya or lore of these Shaakhas in the form of intellectual Sutras or aphorisms or formulae which can easily be memorized and also possess immense scope for detailed interpretations. The knowledge or Jnaana so attained should be practiced with the stipulated values for good and bad life or Lakshanas which altogether form the system or Tantra in the form of treatises which are synonymous with Ayurveda[47].

Ayurveda is defined and classified to be a system or Tantra because it systemizes and partitions knowledge into specific sections or Sthaanas with chapters dealing predominantly with a given subject. Physicians who are scholars of Ayurveda Tantra involve in discussion with peer professionals on eight different topics viz. the system or Tantra, its interpretation or Tantraartha, the main sections of the Tantra or the Sthaana, the interpretation of the sections or Sthaanaartha, the chapters in the sections or Adhyaaya, the interpretation of the chapters or Adhyaayaartha, the questions in each chapter or Prasna and the interpretation and solution of the questions or Prasnaartha by quoting the textual data, interpreting and summarizing the content in its entirety[48]..

1.2.8. Ideal features of Sastra as per Caraka Samhita

Shaastra can be defined as a treatise or text book of reference or

a literature or a scientific paper would be called an ideal tool of comprehensive knowledge only if it satisfies certain regulations. An ideal Shaastra is the one which is accepted universally as a 'well documented standard reference' as explained in Ayurveda. The qualities of an ideal treatise is explained in Carakasamhita[49].

"Many treatises of medicine are current in the world. From among these, one should choose that treatise which has obtained great popularity and is approved by wise men, which is comprehensive in scope, held in esteem by those who are worthy of credence, suitable alike for the understanding of the three grades of students (highly intelligent, moderate and low) free from the faults of repetition, revealed by the seer, arranged in well-made aphorisms, commentary and summary, well authenticated, free from vulgar usages and difficult words, rich in synonyms, possessing words of traditionally accepted sense, concerned mainly with determining the true nature of things, relevant to the theme, orderly in its arrangement of topics, rapidly elucidating and enriched with definitions and illustrations, such a treatise is to be chosen"[50]. The Shaastra should have been analyzed in detail, scrutinized minutely, accepted universally and authenticated and verified by learned, experienced, famous and dedicated authorities well versed in the related topic or topics being discussed in the mentioned treatise[51].

1.2.9. Process of Learning

To learn is to acquire knowledge or skill. Learning also may involve a change in attitude or behavior. There are six interactive components in the

learning process which are attention, memory, language, processing and organizing, grapho-motor (writing) and higher order thinking. These processes interact not only with each other, but also with emotions, classroom climate, behavior, social skills, teachers and family. In order to engage, motivate and teach all learners at optimal levels, teachers must understand the learning process in general, understand and respond to students' individual emotional and cognitive profiles and select instructional strategies and tactics that are effective for diverse learners[52].

1.2.10. Samhita as a learning material

The sequencing of content in Samhita itself proclaims the nature of learning concealed in it. Sutrasthana of almost all the Samhitas deal with preliminary knowledge about principles and practices. In Caraka Samhita which mainly deals with medical tradition of Ayurveda, at the outset of its first section (Sutrasthana) directly explains practical application of drugs to specific conditions like skin diseases[52], formulation of different food items (yavagu) for usage in different clinical conditions[53], collection of drugs for Panchakarma[54] classification of drugs according to drug action[55]etc. That means, prior to the theoretical instruction, from the very outset itself pupils are exposed to practical instructions. In Susruta samhita also, practical demonstrations of surgical procedures, knowledge of surgical instruments, application of specific surgical procedures etc. appear in the opening part of the textbook. In a Gurukula system, it can be assumed that a learner while approaching the master, from the beginning onwards he becomes like an

apprentice of the latter, where he need to be acquainted with all the practical aspect of the treatment, for assisting the master in different therapeutic procedures. Theory comes later only. In Ashtanga Hridaya, the order is slightly different, where preliminary theoretical aspects are discussed initially and familiarization with drugs, procedure and instruments comes later part of the Sutrasthana, essentially the introductory part of the textbook. Sutrasthana brings out preliminary knowledge about all other sections of the textbook. The benefit is, even without going to the minute details of the subject, one can start assimilating the experiences obtained through apprenticeship. Later comes study of human body (Sareerasthana), knowledge of aetiology and pathology (Nidanasthana), knowledge of preparation of medicine (Kalpasthana), knowledge of therapeutics (Chikitsasthana), advanced knowledge of preparations and procedures (Kalpa-siddhi-sthana) etc.

Another important observation is, in Ashtanga-sangraha and Susruta Samhita, the very second chapter of both the Samhitas deal with induction of student (Sishya-upanayana) . Names of the chapter, ie, Sishyopnayaneeyam (in both the textbooks) itself proclaim the importance of inducting Sishya to learn Ayurveda. That means, the sequence of the textbook itself starts by mentioning the selection of student to learn Ayurveda.

1.2.11. Means of learning

In Caraka Samhita, process of learning or cognition or jnaanotpatti is explained as a connectedness between the external object or stimulus which is the artha, the receptor of stimulus which is the sense organ or Indriya,

the processor of stimulus which is the mind or Manas acting as the internal instrument and the final destination of knowledge is the Atma or the inner self[56]. The object of knowledge has to stimulate the receptors to perceive the knowledge and transfer the data into the mind to be processed and finally accepted as knowledge. This process has to be continuous and collinear for Jnana or knowledge to be produced. Such a process is called perception (Pratyaksha). Perception is defined as the definitive and momentary knowledge produced through the association of soul (atma), sense organ (indriya) mind (satwa) and the sense object (artha)[57]. This basic process ends up with the production of perceptive knowledge (Indriyabuddhi) which is momentary but definitive[58]. This perceived knowledge (Indriya Buddhi) becomes the base and source material for further mental contemplations called inference (Anumana)[59]. Processes such as thoughts (chinta), or analysis (vichaara), assumptive reasoning (ooha), concentration (dhyana) and imaginations (sankalpa) also are based on such perceptive knowledge[60]. Inference is of three types pertaining to three times: Prospective inference (Poorvavat anumaana), Retrospective inference (Seshavat anumaana) and analogous inference (Samnyato-drishta)[61].All these experiences are retained in the form of memory (smriti) which when gets stimulated by proper stimulant recollection happens[62].

Logical application or Yukti is yet another mean of attaining knowledge. Yukti is defined as the judgment from multiple factors which pertains to the past, present and future[63].Yukti is supported with examples of

(1) growth of crops by proper intelligent skilful deployment of the combination of irrigation, land, seed and seasons. (2) the formation of embryo from the skilful combination of six factors namely the Panchamahabhootas and Atman (3) production of fire from the combination of the lower-fire-drill (4) upper-fire-drill and the act of drilling and prescribing a definite cure for diseases by utilizing the four Chikitsa Paadas or fourfold efficient therapeutic measures are examples for Yukti[64].

He further states that the foremost means of attaining knowledge is the direct information from authentic advices or masters or their scriptural compilations all of which are collectively termed as Aaptopadesa[65].

Memory or recollection or Smriti is another tool that facilitates the process of learning. Smrithi or recollection is so called because, by revoking the listened content from the memory and dwelling upon what was seen, heard or otherwise experienced, the learning process reinvents once again the fullness of past experience in the mind[66]. The methods of inducing recollection is of eight categories as : (1) Recollecting the cause from effect (2) Recollecting the effect from cause (3) Comparison for similarity (4) Comparison for Contrast (5) Concentration of mind (6) Practice (7) Repetition (8) Yogic practice[67].

In the process of cognition, soul is considered as the final abode (Jnana-adhikarana), Mind is the processing unit and sense organs are the instruments for receiving stimulus and executing responses. The process of proper learning induces and nourishes a positive behavior in the students and keeps them grounded.

1.2.12. Methods of teaching and learning

The method of teaching in Caraka Samhita is unique in its continuous drawing of the pupil's attention by addressing him personally and also using relevant terms for the purpose which reminds the student of his duties and responsibilities. Frequent usage of terms like Jagrihu, which means the awakened person or one who has to be open, attentive and awake for receiving the alms of education and knowledge being bestowed by the teacher; who assumes the role of giver, reminder and preacher as Dattavaan, a personality endowed with knowledge and willingly capable of imparting the same to the pupil. Repeated usage of Jagrihu which is an attempt by the teacher to retain the attentiveness and concentration of the student and the stressed repetition of Dattavaan underscoring the higher echelons of the teacher as the provider is found in Caraka Samhita from the very beginning of the text itself[68]. This is indeed an example of the intense teaching and learning methodology of Caraka Samhita. Mentions of Daanam and Grahanam are also found from the initial parts of the compendium[69]. Daanam is giving away with a noble cause.

In this context of teaching Danam is bequeathing the knowledge to the student, with an inbuilt clause of deploying the knowledge for the benefit of humankind and ensuring further transmission to future generations. Grahanam literally means complete submission and grasping. Both the meanings are true in the case of learning where a complete submission by the student towards the teacher and the learning process is a must to grasp completely whatever knowledge is taught by the teacher. Thus the intelligent

use of words with deep inner denotations is a noteworthy feature of the method of teaching and learning of Ayurveda as per the Caraka Samhita standards. Here the Daanam and the Grahanam are complementary and supplementary to each other so also the Jagruhu and the Dattavan.

1.2.13. Tri-sequential methodology of Caraka Samhita

Caraka Samhita complying to its systematic layout has laid down a concurrent yet consecutive learning sequence for the benefit of both the teacher and the student in the form of dedicated whole hearted teaching by the teacher, involved disciplined learning by the student and finally and most importantly understanding and recording the taught content in literary form so that the knowledge is archived and preserved for the needs of the future generations[70].This sequential form was followed by sage Punarvasu Aathreya when he taught his eight disciples including Agnivesha who learnt and imbibed the knowledge disseminated to them and completed the sequence by recording the contents of their learning in the form of individual Samhitas or compendia composed in their own names. This sequential form of teaching, learning and documenting followed in Caraka Samhita is very scientific and productive as the knowledge transmission continues with the content available in literary form and never dies with the person who has learnt it. The sequence completion is also significant as the interpretations of the learnt content vary from student to student which surfaces in their recordings. The future or contemporary learners get the opportunity of sifting through the documents and follow the best among them. Additions, revisions and periodical change oriented editions and adaptations which are seen in the Caraka Samhita is a

living testimony to the efficacy and proficiency of the tri-sequential learning methodology of Caraka Samhita, a method which can elevate the present Ayurveda education standards, if adopted.

Three distinct methods are described in Caraka Samhita related to teaching and learning as

(1) Adhyayana or the process of learning where the student approaches the teacher with a determined intention and aim to learn and involves completely in the process to achieve his set goal and fulfill his objective. Adhyayana is a word found in Upanashadic and Sutra literature which means to go near and express the will and wish of learning[71].Thus the one who has real interest only learns the particular segment of knowledge. This system ensures the transmission of knowledge to the right seeker.

(2) Adhyaapana or the task of teaching is one of the shat karmas attributed to a teacher which stipulates the delegation, dissemination and transmission of knowledge to the right pupil and ensures that the process is complete and the student has reached the desired levels of learning.

(3) Tadvidyasambhasha or peer discussion should involve the spirit of enquiry stemming from a mind of research and the zeal to share knowledge. Seminars and discussion fora are a means of finding solutions to the raised queries and for the emergence of newer ideas. These seminars and discussion fora are known as Sambhasha Parishad or a harmonious discussion and dialogues between the experts of the identical segment of knowledge. These Parishads are mentioned

to be the best in boosting up scientific wisdom[72].The seminars and discussions are stages for continued learning and updating of the learnt knowledge thereby enhancing and improving the learner's intelligence. The seminars were always a privileged teaching and learning opportunity in the ancient times and they still hold the same coveted place of pride even in modern education system including Ayurveda[73].

1.2.14. Phases of Transaction

For ease of description of the content, phase of transaction is distributed to the following headings, even though such a division is not mentioned in the source material.

Table 1.2.1 Phases of transaction

Preparatory Phase	♦ Introspection of the learner ♦ Selection of the treatise ♦ Selection of preceptor ♦ Selection of disciple
Phase of induction	♦ Ceremony of initiation (Upanayana) ♦ Behaviour towards preceptor ♦ Learners codes of conduct ♦ Initial advices of medical ethics
Phase of transaction	♦ Teaching strategies
Phase of graduation	♦ Entry to professional life

1.2.14.1. Preparatory phase

1.2.14.1.1. Introspection of the disciple

Caraka Samhita tows the line of its contemporaries by identifying and stipulating three distinctive phases in the process of learning as preparatory phase, induction phase and transaction phase. The first part of this stage is the introspection of the learner through self-realization and self-appraisal by the pupil, parents and the concerned faculty with respect to the pupil's academic interests, skills, strengths and weaknesses. This stage is very important and vital since this forms the key pillar on which the whole process of the prospective student's academic career rests up on. An intelligent practical wise student and his family is supposed do a critical impartial appraisal of the impending learning task considering whether the learning process will be demanding and heavy for the pupil or it would turn out to be enjoyable experience suiting his attitude and aptitude making the process lighter for him. The student should also think about the pros and cons regarding the rewards, obligations, lengthy duration of time for study and the diverse work places he might have to frequent before arriving at a decision to decide whether he is suited for the medical profession[74].

1.2.14.1.2. Selection of the treatise

Caraka Samhita explains selection of treatise as follows: "Many treatises of medicine are current in the world. From among these, one should choose that treatise which has obtained great popularity and is approved by wise men, which is comprehensive in scope, held in esteem by those who

are worthy of credence, suitable alike for the understanding of the three grades of students (highly intelligent, moderate and low) free from the faults of repetition, revealed by the seer, arranged in well-made aphorisms, commentary and summary, well authenticated, free from vulgar usages and difficult words, rich in synonyms, possessing words of traditionally accepted sense, concerned mainly with determining the true nature of things, relevant to the theme, orderly in its arrangement of topics, rapidly elucidating and enriched with definitions and illustrations, such a treatise is to be chosen"[75].

1.2.14.1.3. Selection of preceptor

Once the student and the family makes a decision on getting the willing student educated to be a medical professional the next task is to find, shortlist and select the right teacher. The learner has the discreet option and privilege of selecting his teacher by considering and evaluating the desired features. Caraka Samhita asserts that "any wise and intelligent prospective student who is well aware of the challenges, perseverance and patience necessary to become a physician must first research and decide his Guru or teacher and the books he must study. The teacher should be thoroughly well versed both in theory and practice, skillful, upright, pure, deft of hand, well equipped, possessed of all his faculties, conversant with human nature and the line of treatment, possess special insight into the science, free from self-conceit, envy and irascibility, endowed with fortitude, affectionate towards his pupil, proficient in reading and skillful in exposition"[76].The ideal teacher is the one who is known among the professional circles, academy and public as a subject expert, has experience gained from years of successfully treating

difficult diseases, is compassionate towards the patients and those who approach him, lives a life of inner and outer purity or shaucha, is well equipped with the skills and tools of his profession, knows the characteristics of health and disease, is without malice towards anyone, is free of anger, who respects the privacy and empathizes with the pain of his patients, is willing to teach and is a good communicator. When the prospective student finally finds such an ideal teacher, asserts the Caraka Samhita, the student must revere the teacher like a worshipping deity or own father because it is from the grace and blessings of the teacher the student gets educated[77].The teacher endowed with such qualities promptly equips the good disciple with all the optimum qualities of a physician just the way the brimming rain clouds shower right proportion of rain during the proper season on the fertile field to facilitate the growth of the best of quality bountiful crops[78].

The student should approach an ideal teacher with respect and humility seeking the teacher's kindness to grant him an opportunity to learn and receive the science in all its totality. The student should make a promise as an act of compliance, bonding and dedication for the sake of strengthening his understanding and assert that he will strive constantly for achieving the purpose. He should also commit that he will work towards perfecting himself by grasping the nomenclature, interpretation and the meaning of the aphorisms and utilize them through his power of exposition[79].In Ashtanga Sangraha, it is stated that disciple would be in a period of familiarization for six month before getting formal education in Ayurveda[80].

1.2.14.1.4. Qualities of an ideal disciple

Once the student makes his final decision on his career education and teacher it is the prerogative of the teacher to examine the student, evaluate his strengths and weaknesses and decide whether to accept the student or not. Caraka Samhita is very specific in providing a list of criteria in the selection of a student making the task easier and methodical for the teacher thus eliminating the possibility of errors. Caraka Samhita says that the teacher should look for the desirable qualities of a medical student and be assured of their existence in the prospective student: “The disciple should be peaceful, noble in disposition, not given to mean acts, looks straight and confidently into the eyes, should possess well set clean confident face, clean slender pointed nose, red, uncoated and clean tongue, flawless clean teeth and lips and clear distinct voice devoid of nasal twang. He should be persevering, free from egoism, intelligent, endowed with powers of logical reasoning and implicit memory, liberal minded, suited for the study either by inheritance or by aptitude, devoted to truth, perfect of body, endowed with unimpaired sensory faculties, modest, gentle, capable of understanding the nature of things, not irritable, free from addictions of any kind, endowed with positive character, purity, good conduct, affection, skillfulness, courtesy and will to study, focused and single-mindedly devoted to acquisition of both theoretical and practical knowledge, free from covetousness and sloth, desirous of the welfare of all creatures, obedient to all the instructions of his teacher and very much attached to him. A person gifted with all these qualities is considered to be the preferred one for receiving instruction in medicine[81].

To sum up, Charaka's description of an ideal medical student, it can be said that he/she should be of a mild disposition, noble by nature, never mean in his acts, free from pride, strong memory, liberal mind, devoted to truth, likes solitude, of thoughtful disposition, free from anger, of excellent character, compassionate, is fond of study, devoted to both theory and practice and seeks the good of all creatures. In Ashtanga Samgraha, the features of an ideal student is noted as below: "A student who is devoted to serve the teacher to study, endowed with great intelligence, memory and talent, whose face, mouth, nose and eyes are normal and pleasant to look at, who is a brahmachari, who can withstand the duels (extremes on opposites), who is courageous, virtuous and steadfast, who has exhibited these qualities to the teacher for six months, who is pure (in talk), humble in behavior, clean and endowed with many other good qualities should be initiated for study and taught till he attains mastery in the science and professional activities"[82].

Having decided on the student the teacher's immediate task is to assess and estimate the prospective student's intellect and learning capability. Students are of varied intellectual standards warranting the preparation of instruction methodology accordingly. Caraka Samhita is compiled considering all these possibilities and is designed to cater to the intellectual analysis and understanding of a plethora of students. Explicit categorization and listing of the 500 drugs into 50 tangible groups of Mahakashaya for easy comprehension is such an exercise adopted in Caraka Samhita to make the teaching and learning simpler and easier while consecutively sowing the seed of logical reasoning in the learners with a higher intelligent quotient. Caraka makes his

intentions clear with the quotes “this classification is meant for thorough reference of those who are intellectually poor and for provoking critical thoughts of those who are sufficiently intellectual”[83].Moreover, an ideal textbook (Sastra) is idealised to satisfy the needs of students having different intellectual capacities (Trividha-sishya-buddhi-hitam)[84].

Susruta explains the ideal qualities of student as : “The physician preceptor should initiate a person belonging to brahmana, ksatriya, vaisya or any other family, who is endowed with age, chastity, bravery, cleanliness, right conduct, politeness, strength, prowess, intelligence, courage, memory, wisdom, ability to grasp the meaning of words and interpret them: whose lips, tongue and teeth are thin; mouth, eyes and nose are straight; whose mind, speech and activities are pleasant and who is capable of withstanding strain. He should not initiate any person who has qualities opposite of the above. The student who is clean in body and mind, devoted to the teacher, efficient, devoid of laziness and sleep and studies in this manner reaches the end of the science (gains deep and wide knowledge)[85].

He who has completed the study` should strive for achieving clarity of speech, correct understanding of all the implications of the teachings, boldness, efficiency in work, constant practice and success[86].

1.2.14.2. Phase of Induction

1.2.14.2.1. Ceremony of initiation (Upanayana)

The induction into the learning process is methodical and is

considered as one of the sixteen rituals of life as per the Vedas. The ceremony of initiation into education is known as Upanayana which is defined by ancient Vedic philosophers Kumarila Bhatta and Prabhaakara as “Ashtavarsham brahmanam upanayeeta tam adhyaapayeeta” which means that a celibate boy considered to be a brahmana is ready to be tutored at the age of eight and has to be initiated into the process through the ceremony of Upanayana[87].During the ceremony, the teacher should affectionately and caringly address the disciple who has thus come to the teacher with an intense ambitious desire to study and who is sitting reverentially and humbly close to the teacher’s feet. The teacher should direct the student as “Come and take your seat near my feet and be ready to receive the instruction during the Uttarayana Kaala which begins with the winter solstice of Makarasankranti marking the northern ascent of the sun. Come to me on an auspicious day during the ascending phase of the moon the bright shuklapaksha. Come to me when the day is auspiciously graced by Pushya, Hasta or Sravana constellation and the initiation moment is the auspicious Karana and Muhurta of that particular day. Shave your head (mundana), bathe and clad yourself with earthy brown fiber made clothes. Fast during the day and come to me carrying in your hands and baggage divine fragrances, selected dry twigs or samiths, sacred fire, ghee, sandal paste, water pots, flower garlands, a lamp, golden ornaments, pearls and corals, silk garments, sacrificial stakes, the sacrificial grass (kusa), roast puffed paddy (laaja), white mustard seeds (sarshapa), white rice grains (akshata), flowers strung into garlands, as well as simple, loose and pure food. Do remember to adorn yourself with sandal

paste." The disciple is supposed to oblige and follow as directed and adhere to all the given instructions.

When the prospective disciple approaches the teacher in the above manner the teacher should begin the initiation ceremony. A clean patch of ground sloping towards the east or north and is of four cubit square dimension is selected, besmeared with cowdung water, spread with sacred grass (Kusa) and bound on all sides with sacrificial stakes. The place must be decorated by the order wise placing of the above mentioned sandal paste, pots of eater, silk garments, gold, ornaments made of gold silver, precious stones, pearls and corals. The sacred fire place is prepared and ceremonious offerings of holy items of food, perfumes, white flowers; roasted puffed paddy, mustard seeds and rice should be made. Then the sacred fire is ritualistically lit by igniting with the dry sticks of forest flame, Palasa or Zachum oil plant, Ingudee or Gular fig tree Audumbaree or Mahwa tree Madhukee.The student should seat himself facing the east, and purify himself to be ready for instruction. He should offer into the fire three libations of honey and ghee accompanied by the recitation of the holy verses prescribed. The ritual should be followed by the recitation of the sacred verses accompanied with the ending utterances of acceptance requests of Swaha. The libations should be offered to Lords Brahma, Agni, Dhanwantari, Prajapati, Aswini twins, Indra and all the sacred sages who have authored the Sutras and Samhitas related to the science and to all eminent personalities who have contributed to the growth of the science. After the offering of the libations into the fire, the student should circumvent the sacred fire in the clockwise direction always keeping it to his

right. Then he must seek the blessings of Brahmanas and offer honours and worships to the physicians gracing the ceremony[88].

In Susruta Samhita, and Ashtanga Sangraha, chapters describing Upanayana appears in the beginning of Sutrasthana as another chapter Sishya-upanayaneeyam. Susruta says: “On a day having auspicious stellar constellation and at a precious time of that day, the brahmana who is initiating the pupil, should select a place in an auspicious direction, which is clean and even; which is four arms squire, smear it with cowdung and spread darbha grass over it; worship gods brahmanas and physicians offering them gems, flowers, lajja and bhakta.Then sprinkle holy water on the prepared ground, write the figure of brahma on the right side and that of agni nearby; then build a fire alter and kindle the fire; next using twigs of khadira, palasa, devadaru and bilwa trees or of four trees with milky saps, dipped in curds, honey and ghee; perform fire sacrifice in darvi homa method along with chanting of pranava and mahavyahrti, offering oblations of ghee to each god and sages, uttering the word svaha for each; the pupil should also be instructed to do likewise”[89].

1.2.14.2.2. Behavior towards preceptor

Once the student is officially inducted into the academy and into the learning process certain standard behavioral pattern and discipline is expected of him especially towards the teacher. The student should dedicate himself completely to the teacher and regard the teacher as the supreme authority. . The student should live and dwell with the teacher and it is his

default duty to serve the teacher in all ways like a servant or a slave or a supplicant. He should behave and act without arrogance and with care and attention. He should practice focused undistracted mind, humility, constant reflection and with ungrudging obedience. He should work to the best of his abilities towards the fulfillment of his teacher's purpose and aims[90].

1.2.14.2.3. Learner's code of conduct

Caraka Samhita further asserts the learner's code of conduct during the period of study as, when the teacher accepts a student as his apprentice in the presence and witness of fire by initiating the student, he sets forth the following mandates to be followed during the period of apprenticeship – "you shall always be a brahmachari, wear beard and moustache, you shall be always truthful, abstain from meat and unclean diet, never harbor envy, never bear weapons, you shall do anything I say except if that may lead to another person's death or to great harm or to a sin, you shall behave like my son, never be impatient, always be attentive, behave with humility, act after reflection, and always seek whether sitting or standing the good of all living creatures"[91].

Students are supposed to live a life of a celibate bachelor (Brahmachari) with untrimmed hair and beard and follow a puritan lifestyle by adhering to the virtues of speaking truth and eating no meat but only pure austere food. This kind of life is advocated to keep them determined to realize the goals of their stay at the teacher's place. The disciples should be engaged and busy all day and night and should endeavor themselves to the task of

providing relief to the sufferings of the patients with all their heart and soul. They should never ever desert or the cause of injury to the life and being of the patients should not commit adultery even in thought; should not covet for others' possessions. They should be modest in their attire and appearance. They should not be drunkard or sinful nor should associate with abettors of crime. They should speak words that are gentle, pure and righteous, pleasing, worthy, wholesome and moderate. Their behavior must be in consideration with the time and place. They shall act always with a view to the acquisition of knowledge and fullness of equipment[92].

In Ashtanga Sangraha the conduct of the disciple is explained as follows: "The student should wear clothes inferior to his teacher, dress himself differently than the teacher, he should serve the teacher like serving a king, should go to sleep only after the teacher has slept and get up early before he gets up, should not utter only the name of the teacher, should not imitate, making fun of any inadvertent word or act of the teacher"[94].

Oath taking

Susruta explains the following oath to be undertaken by the disciple at the time of stating study: The physician should go round the fire three times and instruct the pupil as follows. "You should remain here, avoiding desires, anger, greed, infatuation, pride, egoism, jealousy, harsh speech, finding fault in the speech of others, speaking untruth, laziness and acts of ill repute; keep yourself clean by cutting undesirable nails and hairs; put on ochre colored robes, maintain truthfulness; cultivate celibacy and habit of

prostrating essentially; go only to such places, use only such bed, seat for sitting food and the mode of study which are approved by me; indulge in such activities which are liked by me and beneficial to me; doing anything other than this will be unrighteous on your part, your knowledge becomes futile and will not earn reputation. If on the other hand, I misunderstand you though you are behaving properly and act otherwise (punish, not teach well etc) then I will also acquire sin and my knowledge becomes futile"[94].

Unsuitable time for study

Susruta and Vagbhata categorically describe time unsuitable for study, considering their physical, environmental and cultural implications. Vagbhata says "The study should not be undertaken at inauspicious times, at times of thunderbolt, earthquakes and eclipses, on days of full moon and new moon, during the absence of the Guru". Susruta elaborated this as "The eighth day of the dark fortnight, the last two days before its expiry; similarly of the bright fortnight; the time of two unions, days of untimely lightning's and thunder, time of calamity of one's own place, country and the king; at the burial ground, Time of riding, at places of slaughter; during war, great festivals, and times of appearance of natural calamities and such other days on which the brahmanas do not study and at times when the person is not clean; on these days and times, studying of the science should not be undertaken"[95].

1.2.14.2.4. Initial Advices on Medical Ethics

The Ayurveda samhitas were probably the initiators of ethical medical practice. Caraka gives a set of advices and words of caution to the

budding physicians so as to empower them with safe, moral positive clinical practice. He says no individuals who are despised by the King or who are haters of the King, who are hated by the public or who are a nuisance to the public shall receive treatment from the physician. Similarly, those who are very unnatural wicked and possess a socially undesirable character and conduct, those who have not vindicated their honor and those that are on the point of death and similarly women who are uncared and unprotected by their husbands or legal guardians shall not receive treatment[96].

Caraka further prescribes social behavioural pattern for the physician as not to accept offering of presents by women in the absence of their husbands or designated guardians and to ensure being accompanied by a man who is known to the patient while entering a patient's house. He also reminds the physician to seek permission to enter the patient's house and to go decently dressed, clad in full clothes and with confident looks. Self-possession and head hanging showing lack of confidence is not a desired behavior. The physician should think, adapt and re-consider his behavior and body language in the desired way. Once inside the patient's quarters, the patient should concentrate and devote his speech, mind, intellect and senses to nothing else except to that of being helpful to the patient and about things concerning the patient only. The physician should maintain decorum in maintaining the privacy with respect to the patient's household and the peculiar customs of the patient's household should not be made public. Even though the physician is aware of the nearing death of the patient the message regarding the patient's span of life drawing to its close should not be conveyed

bluntly and should be done with delicacy and consideration without causing a major shock to the patient or the concerned people[97].

If the disciple's behavior is as desired, expected and instructed by the teacher, then he deserves to be taught. If not, he does not deserve to be initiated into the learning process. It is for the benefit of the teacher and society to diplomatically dissuade the undesired student and make the better use of the time and energy of the teacher. The teacher who teaches the worthy disciples will obtain all the described known and unknown auspicious fruits of teaching for himself and to his student fraternity[98].

1.2.14.3. Phase of Transaction

Transaction is generally defined as exchange of tangible or intangible goods where both the parties involved benefit. When it comes to education it is the understanding and regular contact that propel the exchange of ideas and between the teacher and the student, the thoughts primarily from the teacher towards the student. The triggering point that ignites the transaction process may be a query or a finding or a statement or action by the student. It may also be the regular scheduled transaction process as in classrooms. These were some of the methods found to be followed in Caraka Samhita which is almost similar to the education transaction process of the period.

1.2.14.3.1. Teaching Strategies available in Brihat-trayee

Teaching strategies refer to methods used to help students learn the desired course contents and be able to develop achievable goals in the

future. The following strategies are easily identified in Caraka Samhita: (1) Oral method (2) Inquiry method (3) Discovery method (4) Discussion or dialectal method (5) Simulation or demonstration method (6) Synthetic method (7) Analogy method (8) Storytelling or mythological method (9) Temporizing method (10) Regressive method (11) Argument-counter argument method (12) Apprenticeship.

1.2.14.3.1.1. Oral method

Termed as the Maukhik method this was the very basic way of teaching and learning during the Caraka Samhita. As the texts are all in aphoristic system which are to be revoked whenever necessary, the Vedic teachers thought it best to deposit the knowledge in the memories of the students. The term Shruthi indicated for the Vedas means to hear and learn. Vedas are recited to be heard and learnt. The process employs the speech as a tool of delivery and the auditory faculty as a tool for reception for the transaction process through oral method. This method is very helpful in correcting the phonetics of the content and improving the memory along with developing the knowledge levels of the student.

The very description of "Thus told by Sage Atreya" (Iti ha ahu Bhagavan Atreya) in Caraka Samhita and "Thus told Sage Danwantari" (Yathovaacha Bhagavan Dhanvantari) in Susruta Samhita imply the oral method of transaction of knowledge. Verbs like abraveet (thus told), aahu (spoke), proktam (told) etc. indicates the oral tradition of Ayrveda. While describing the ideal features of a classical textbook (Tantraguna) it is stipulated that the terms used in it should be

easy for pronunciation (Akashtasabdam)[99]. Moreover, while explaining ideal features of disciple (sishya), it is specifically pointed out that he/she should have clear and thin tongue devoid of malformed teeth and lips and without nasal sound, which hinders proper pronunciation of the verses[100].

In Susruta Samhita while describing the method of teaching and learning, it is explained as: "The pupil having worshipped and recited his daily prayers should calmly sit near the preceptor, pure in body and mind, who should teach him a full sloka or a half or a quarter part thereof, adapted to his intellectual capacity. Then he should make a full and elaborate paraphrase of the recited sloka or any part thereof, and ask his pupils individually to do the same. When the pupils have paraphrased the same to the satisfaction of the preceptor, he should again recite the same stanza or couplet. The passages or slokas should not be recited too hastily, nor drawled out in a timid or faltering voice, nor with a nasal intonation. The voice should be neither too loud nor too weak, but each sound should be clearly and distinctly uttered and the lips, the eyes, the eyebrows and the hands etc. should not be lifted or moved to keep time with the recitation. No one should be allowed to pass between the pupil and the preceptor at the time of the study"[101].In Ashtanga Sangraha, the recitation of the sloka is explained to be with optimum volume avoiding noisy and feeble voice[102].

1.2.14.3.1.2. Inquiry method

Inquiry or query method is adopted at many instances in Caraka Samhita, which is one of the Upanishadic knowledge transaction methods.

An inquiry by a student prompted the teacher to explain the concept in detail to expand the transaction process or an inquiry by the teacher evoked a research tendency in the student, which many times led to more mutual knowledge transaction between the teacher and the student. Names of some chapters in Caraka Samhita itself reflected the inquiry nature of the method of teaching/learning. Chapters names like, Katithaapurusheeyam (Into how many categories is man divided?)[103], is the famous example. This chapter which deals with reply of 23 questions raised by Agniv'sa about nature of Body and Soul. In the same way, title of Keeyantha-siraseeyam (How many are the disease of head?)[104], Kathamani-siraseeyam[105], (Which type of persons that a physician should not undertake…?") reflect the very questioning nature in the content. Apart from this, some chapters in Sidhisthana[106]deals directly with answering the queries raised by disciples, especially Agnivesa.

In some of the chapters of Chikitsasthana[107-114]treatment of corresponding diseases are explained in the form of the reply for questions raised by Agnivesa on the same. In the chapter explaining treatment of Grahani[115], discussion regarding tissue transformation (Dhatu-parinama) through involvement of Dhatwagni was initiated through the questions raised by Agnivesa on the logic of dissimilarity between dhatus. Also in Snehadhyaya[116], Langhana –brimhaneeya[117]the chapters start with questions raised by Agnivesa on the subject content of the chapter. On the other side, in some other instances like Dasapranaayateneeya[118], questions regarding

tantra and related terms), Janapadodhwamsaneeya[119] (question leading to the concept of immunity (vyadhikshamatwa), Vyadhita-rupeeyam[120] (questions regarding types of Krimis), Roga-bhishag-jteeya[121] (questions regarding Pareeksha), Sareeravichayam[122], Agivesa's queries on formation of organs in fetus), Sareerasankhya[123] (regarding number of organs), the questions appear not in the beginning but in somewhere else. In Sidhisthana, chapters 1 (Kalpanasidhi) and 2 (Bastisutreeya sidhi), the former order prevails.

1.2.14.3.1.3. Discovery method

The knowledge transaction process of the Caraka Samhita period required the students to involve in swadhyaya or self-learning, both theoretically and practically. During the course the students discovered for themselves different interpretations for the aphorisms, spotted a rare drug in one of their forest trails or elicited an unnoticed symptom during their clinical sessions. The Vedic educational experts might have devised this method to groom students into inquisitive scientists who can shoulder the responsibility of taking the science ahead with more and more contributions from their side. Caraka Samhita leaves many scopes for discovering new things by the learners themselves. After describing fifty groups of Mahakahsayas in[124], he categorically states that the classification is for helping less intellectful persons, but leaves the intelligent with scope for further discoveries through their own logic and inference[125].Also, further contemplation based on deductive reasoning (also called Vitarka) is one of the most powerful tools for attaining success in scientific applications[126]. One who examines things properly will succeed in skillful application of the science[127].

1.2.14.3.1.4. Discussion or Dialectical Method

The Rishi Parishad at the foothills of Himalayas which discussed and deliberated on the miseries of humankind is a solid example of the peer discussion seminar methodology of knowledge transaction process of the Caraka Samhita period. These Tadvidyasambhasha Parishads were very productive as is proved by the quest for a remedy for the sufferings of humankind and the emergence of Ayurveda as a result. The science has always through these Parishads, a process still continuing. Intra-disciplinary discussion (tadvidya-sambhasha) was considered as a mean for building up wisdom[128]. Cluster of masters was deemed to be the best method to clear doubts[129].Types and methods of ideal discussion are described in Vimanasthana. Here, scientific discussion is explained as augmenting wisdom and enthusiasm[130].

Methods of discussion

Logical parameters of debate were considered as a main content in Physician's training by Ayurvedic masters. In Caraka Samhita, method of discussion is described as follows:

A physician should discuss with another physician. Peer discussion increases knowledge and happiness. It contributes towards the clarity of understanding, increases dialectical skill, broadcasts reputation, dispels doubts regarding things heard by repeated hearing and confirms the ideas of those that have no doubts. Discussion enables one to hear a few new things. Sometimes secret meanings which a teacher imports to the

ministering disciple in a propitious moment gradually are revealed by the excited disputant desirous of victory in the process of discussion. Hence, it is that discussion with men of the same branch of science is applauded by the wise.

Such discussion with the men of the same branch of science is of two kinds: Friendly discussion (Sandhaya sambhasha) and the discussion of challenge (vigrihya sambhasha).

Friendly method of discussion: This is enjoined with the person who is endowed with knowledge and experience. That is versed in the dialectics of statement and rejoinder that does not get angered that is possessed of special insight into the subject that is not carping. That is persuaded, that is adept in the art of persuasion that has tolerance and pleasantness of speech.

Discussing with such a person, one should talk confidingly and even inquire confidingly when one is questioned so confidingly, one must explain clearly the meaning to such a confiding enquirer. One should not be afraid of discomfiture. Having discomfited another, one should not rejoice. One should not boast before others. One should not get deluded by a partial or imperfect grasp of the subject. One should not expatiate on what the other is not at all acquainted with. One should persuade gently and in spirit of goodness. One should pay great heed to this. This is the method of proper discussion.

Before participating in hostile method of discussion

(vigrihyasambhasha), one must investigate before-hand the points of merit and demerit of the opponent and the difference in excellence between oneself and the opponent. One must investigate well the nature of the assembly (parishath). Such an investigation can find out the advantage and disadvantage of the disputant. That investigation is based on the following aspects: Learning, experience, power of retention, originality of resourcefulness and eloquence.

There are illustrations of seven parishats in Caraka Samhita as enlisted below:

Table 1.2.2 Parishats in Caraka Samhita

No.	Chapter	Topic for discussion
1	Deerghanjeeviteeyam[131]	About the way out from diseases, the way to learn Ayurveda
2	Vatakalakaleeyam[132]	About character of Tridosha
3	Yajja purusheeyam[133]	Origin of fetus
4	Athreya bhadrakapyeeya[134]	Number of Rasa
5	Garbhavakranti[135]	Factors contributing to formation of fetus
6	Sareeravichaya[136]	Organ firsta appeared in fetus
7	Phalamatrasidhi[137]	Most effective drug in Vasti

Apart from peer discussion, discussion among the students of the Gurukulam was encouraged by providing a knowledge sharing platform

for them. This method helped the students to improve their communicative skills, academically weaker students to learn better and studious wards to sharpen their acumen.

1.2.14.3.1.5. Practical Demonstration and Simulation Method

Practical demonstration: Susruta gives ample importance of practical demonstration of dead body dissection and procedures of surgery. In this manner, the intelligent student who has been made fit by the use of things which are suitable for practical training, as described in science, does not falter in his actions[139].

Simulation Method : An instructional simulation, also called an educational simulation, is a simulation of some type of reality (system or environment) but which also includes instructional elements that help a learner explore, navigate or obtain more information about that system or environment that cannot generally be acquired from mere experimentation[140].The main difference between demonstration and simulation is the former is related to the original situation and the later demonstrates things in another situation simulating the original. Caraka uses many situations with simulation as its methodology. The nature-human simulation theory (Lokapurusha samya-s idhanta) explains biological principles in simulation with natural phenomena. In Vatakalakaleeya, nature and functions of Vata in body is explained and simulates with the actions of wind in nature.

In Susruta Samhita, concept of simulation can be seen while describing the basic nature of Tridosha. Vata, Pitta and Kapha maintains body

as if Anila (air), Surya (sun) and Moon (Soma) maintains the equilibrium of nature through three principles respectively: creating (visarga), assimilating (adana) and diffusing (vikshepa) . The whole nature is represented in human body[141].

The chapter dedicated for practical demonstration of surgical procedures (Yogyasutryeeya) explains: “Different kinds of chedana should be demonstrated by using fruits and flowers of puspa phala, alabu, kalindaka. trapusa, ervaruka, karkaruka etc; utkartana and apakartna should be instructed. Bhedana should be shown by using bellows, urinary bladder, leather sac and such others filled with water or slush; Lekhana should be using a broad sheet of leather with hairs; vedhana using the veins of dead animals and stalk of lily plants; esana by using the holes in pieces of wood eaten by moths, bamboo, nala and dry alabu; aharana using fleshy portion of panasa, bimbi, bilva phala and teeth of dead animals; visravana by using plank of salmali wood smeared with beeswax; sivana by using thin and thick cloth or soft skin; bandhana its different kinds of bandha by using models of manikins prepared from mud, cloth and parts of human body; applications of fire and alkali on soft muscles; fabricating the ear, joining the severed ear and bandaging by using soft skin, muscles and hollow stalk of lily plant; washing eyes and ulcers/wounds should be shown using a pot having a spout at its side containing water or by the mouth of the alabu[138].

1.2.14.3.1.6. Synthetic Transaction Method

An established method for transaction of mathematical knowledge this method proceeds from known to unknown. Synthetic is derived from the

word “synthesis”, a complimentary analysis. Synthesis is combination of elements to produce a new one. The method a reverse of analytical method combines together a number of facts, performs certain mathematical operations and arrives at a solution. The connection of known data with the unknown part leads to hypothesis to conclusion and concrete to abstract. A short time saving method it suits majority of students and develops accuracy. The disadvantages include human errors like forgetfulness, passive listeners, lack of confidence and limited inquisitiveness[143].

Description of Tridosha in the first chapter of Ashtanga Sangraha Sutrasthana is the best example for synthetic method. In the beginning of the chapter, Tridoshas are simply nominated. Following discussions reveal the qualities pertaining to each Dosha. Here, simple nomination of Dosha expands to the knowledge of their qualities. Succeeding discussions put light on understanding of Tridosha in terms of multiple variables like digestive capacity (agni), state of gut (koshta), nature of a person (prakriti), environmental variables (desa, kala). These descriptions synthesize the concept of Tridosha in the brain of the learner. This process continues in further chapters like Doshadivijnaneeya (Sutrasthana 11th chapter) by elaborating the normal and abnormal functions of Dosha. In the same fashion, when advancing to the next chapters, even to the next sections of the textbook, the idea about Tridosha expands and synthesized. This process continues to the whole textbook and even after the completion of the textbook i.e., practical experience.

1.2.14.3.1.7. Analogy Method

The method is transacting knowledge with the aid of analogies. Matters that cannot be explained by reasoning are reflected through analogy[144]. A familiar analogy is easy to remember and hence the subject taught with the help of analogy remains set forever in the memory of the student. Caraka Samhita adopts this strategy very often in the form of Aupamya. Aupamya is defined as the method of identifying an unknown object through statement of comparison with a familiar object[145]two examples given are Dhanusthambha and Dandaka. Dhanusthambha is a clinical condition where body is bent like a bow (Dhanus), whereas dandaka body is stiffened like a stick (danda). In some other areas like Psychological personalities, a person is nominated to have a particular personality by considering similarity in character with famous mythological characters like Brahma, Indra etc. In the same way, grahonmada (possession syndromes) are explained in comparison with mythological characters to which the affected person shows similarity. For example, if a person imitates characters of Gandharva (dancing, abnormal affinity to colorful drugs etc.) such a psycho-abnormality is nominated as Gandharva-graha. Another area which makes use of analogy is description of plants. Many plants like Gandharva-hasta (ricinus communis, leaves like arm of Gandharva), Musalee (Curculigo orchioides, appearance like musala i.e, plough) get their name after their similarity in appearance with famous objects. Similarly description of symptoms, appearance of body parts in some diseases etc. are some areas making use of analogy. While describing some concepts, for easier understanding our masters make use of similies. Such similies or analogies put complicated concepts simple.

Susruta counts analogy (Upamana) as a separate mean of knowledge along with perception (pratyaksha), inference (anumana) and accumulated knowledge (agama)[146]. It was a usual custom in Ayurveda and Nyaya system of philosophy to explain complex theories with the help of some logics (nyaya) or similies. Three laws of tissue metabolism (dhatu-poshana) is the best example. Ksheera-dhadhi nyaya explains the transformation of Dhatus one by one in a sequential nature as milk is converted to curd, curd to ghee etc. Another method is Khale-kapota nyaya where, each dhatu gets its own nutrients from a common pool as if dove collects its own grains from a common heap of grains.

1.2.14.3.1.8. Storytelling or Mythological Method

Mythology is a concept that awakens a respectful unquestioned acceptance in the public minds. Hence the Veda period saw linkages of mandatory observances with mythological characters in order to ensure strict observances. The story of descent of Ayurveda is one such example. A system propagated with the back-up of a mythological story depicting the revocation of Ayurveda from Lord Brahma's memory found universal acceptance. So also is the involvement of Lord Shiva and Dakshayaga in the etiology of Jwara. In Caraka Samhita, origin of diseases on the earth is described through the story of Dakshayaga[147]. "It was during the destruction of the sacrifice of Daksha that Gunma first occurred in the past as the result of the agitated bodily movements gone through the assembled persons in all directions running, swimming, racing, flying, jumping etc. Also at this time, the diabetes

and dermal disorders took place as the result of the libations those were eaten. Insanity (unmade) occurred as the part of fear, alarm and grief, epilepsy (Apasamara) as a result of pollution by various kinds of unclean beings. As regards fever, we have already described how it arose from the forehead of great God Siva. From the heat induced by fever arose the disease hemothermia"[148].

In Susruta Samhita, importance of Salyatantra (Surgery) is conveyed by citing the story of surgical replacement of head of Yajna by Rudra during Dakshayaga[149].

1.2.14.3.1.9. Temporising method

This method also called the Adhoc method is one of the widely accepted educational methods even in the modern system. Here the teacher teaches according to the mental capabilities, understanding levels and psychological status of the pupil. The teacher slowly leads the student and finally takes him to the stage of ultimate knowledge transaction[150].

Caraka Samhita explains an ideal treatise as to be palatable for three kinds of pupils - Less intelligent, moderately intelligent and highly intelligent[151]. Also, while describing fifty group of drugs (Mahakahsayas), in Charaka Samhita, after completing the description of the drugs, it is evidently mentioned that "over conciseness will not help the mediocre, over extensiveness also is not the aim. The list will be practically helpful for mediocre, whereas helpful in enhancing the existing knowledge of the talented

people"[152]. In Susruta Samhita, consideration of intellectual capacity of the learners was given prime importance. It says[153]"Every word, part of the verse and the full verse of all chapters should be explained by the teacher and understood by the learner. This is because Dravya (drug), their Rasa (taste), Guna (quality), Virya (potency), Vipaka (metabolic effect), Dosha (internal equilibrium), Dhatus (tissues), Malas (waste), Asayas (viscera), Marma (vital spots), Sira (veins), Snayu (ligament) Sandhi (joints), Asthi (bones), products forming the embryo (garbha), removal of foreign bodies lost in side the body, determining nature of wound, kinds of fractures, curability and fatality of disease and such other topics are subtle and though analysed for a thousand times, still create confusion in the minds of even those who possess clear and wide knowledge; then what to say the less intelligent? So, every word, part of verse and the complete verse should be explained well by the teacher and made to understand by the students.

1.2.14.3.1.10. Regressive method

The regressive method is in the form of many successive questions in which every new question takes the answerer back to the answer of the previous question. In Katithaapurusheeya Adhyaya we can see the deployment of regressive method of knowledge transaction. Of the 23 questions raised, each successive question is related to the previous questions answered[154].

1.2.14.3.1.11. Arguments and counter arguments (Poorvapaksha-Uttarapaksha)

The other method of discussion was the Poorvapaksha-Uttarapaksha method of transaction adopted at many places in the Caraka Samhita. Poorvapaksha is a dialectical approach, taking a thesis by an opponent, poorvapaksha and then providing its rebuttal, Khandana so as to establish the protagonist's views Siddhanta. The poorvapaksha system of transaction requires the debater first to argue from the perspective of his opponent in order to test the validity of his understanding of the opposing position, and from there on to realize his own shortcomings. Only after perfecting and projecting his understanding of opposing views would he be qualified to refute them in the form of Uttarapaksha. Such debates encourage individuals to maintain flexibility of perspective and honesty rather than seek victory egotistically. In this way, the dialectical process ensures a genuine and far-reaching shift in the individual[155]. In the instance of Ayurveda teaching this system assumes a great role in explaining the science.

1.2.14.3.1.12. Apprenticeship

Dictionary defines apprentice as a person who is learning a trade from a skilled employer, having agreed to work for a fixed period at low wages. In Ayurveda apprenticeship is very important and was very well understood by Charaka. He urged his pupils to take up apprenticeship assignments with people practicing various skills including the humble cowherds. The cowherds who are in constant contact with the flora and fauna are exemplary repositories of the concerned knowledge and a student cannot find a better

source for acquiring knowledge about medicinal plants. Here a lay person who is in no way concerned with Ayurveda can also transact knowledge required for the student for gaining expertise in Ayurveda. The present day short term courses of computing, driving, etc. are examples for such transaction. For identification of medicinal plants with their names and morphology, the scholars need to take apprenticeship with cow herds, tribal men and forest men[156].

1.2.14.4. Phase of graduation

The physician who has completed the study of texts, understood the meaning/interpretations, observed the actions, made fit through practical training, recapitulating the teachings of the science always, obtained permission from the king, having removed unkempt/ugly nails and hairs of head, beard, mustaches and keeping clean, wearing white dress, holding an umbrella and a staff, putting on a footwear, not being gorgeously attired, maintaining good mind, wishing the good of all in word and deed, not behaving like a quack, remaining friendly with all living beings, and having good assistants; such a person should enter into the profession[157].

1.2.15. Importance of multidisciplinary approach

Leaning of Ayurveda needs a multidisciplinary approach. In classical age and afterwards, Ayurveda was one among many subjects taught in a Gurukula. Learners are exposed to many subjects under a single roof. When Gurukula system proliferated to Pathasala and later to Universities,

this approach got deep rooted. The most significant feature of ancient educational system was the opportunity offered to a learner to be exposed to multiple disciplines. Susruta Samhita categorically states that a person should be well versed in multiple disciplines to become a successful practitioner, because he/she who is literate on a single subject is deficient in the recognizing the real scientific spirit of the discipline[158]Susruta again confirms the same by stating that intellect of a physician will be boosted properly through continuous learning, dialogues and discussions within the discipline, observing other disciplines and following the masters[159]. In Ashtanga Sangraha, the ideal physician after completing his professional training is said to be expert in many disciplines[160]. Again Vagbhata asserts "The good or bad of the weapon, science and water depend upon the holder. Hence one should enhance his knowledge by the study of many sciences"[161].

Chapter - 3
CONTEMPORARY TEACHING – PRINCIPLES AND METHODS

1.3.1. Philosophy of education

Educational technologists define philosophy of education either as the philosophy of the process of education or as the philosophy of the discipline of education. It is part of the discipline in the sense of being concerned with the aims, forms, methods, or results of the process of education or it may be meta-disciplinary in the sense of being concerned with the concepts, aims, and methods of the discipline[1-3]. We understand Philosophy of education not as an academic discipline but as a normative educational theory that unifies pedagogy, curriculum learning theory, and the purpose of education grounded in specific metaphysical, epistemological, and axiological assumptions[4]. It may also be defined as the general theory of education[5]. There are a bunch of philosophical traits related to Philosophical of education in western philosophy.

1.3.1.1. Idealism

Idealism considers that reality, or reality as we can know it, is fundamentally mental, mentally constructed, or otherwise immaterial. Plato

(400-300BC) was its founder and was later popularized by Immanuel Kant (1724-1804) and Rene Descartes (1596 – 1650). Master idiom of this school was proposed by Rene Descartes as “Cogito ergo sum (I think, therefore I am) [6-8]. In Education, Idealism considers conception of true ideas as the highest aim. It had been influenced educational approaches about individual mind and self, focused on self realization. Idealists generally consider moral character as an outgrowth of thinking and thoughtful actions[9].

1.3.1.2. Naturalism

Naturalistic philosophy was almost contemporary with idealism. Jean-Jacques Rousseau (1712-1778), the founder of this philosophy considers education to be dependent on role of three mutually co-operating teachers– Man, Nature and Things[10]. Education values the act of observation with highest value.

1.3.1.3. Realism

Originally founded by Aristotle (383 – 322 BC), realism considered human nature, habit and reason to be uniformly important forces cultivated in education. Balancing of the theoretical and practical aspects of subjects taught was given great emphasis. Scientific development was considered to the outcome of realism. Observation, experience, experiment and scientific reasoning were thought to be the corner stones of realism. It aims to understand the material world through scientific method. Curriculum based on this ideology will be ideally problem centered, highly organized and

systematic. Here, teaching methods will ensure experimentation, critical reasoning, observations, enhancement of learning through direct or indirect experimentations etc.[11]

1.3.1.4. Scholasticism

Scholasticism lays importance to critical thought which dominated teaching by the academics of medieval universities in Europe from about 1100 to 1700. It was program of employed in articulating and defending dogma in an increasingly pluralistic context[12, 13]. The scholasticists would choose a book, by reading it thoroughly and critically, to appreciate the theories of the author. Documents related to the book would such as Church councils, papal letters and anything else written on the subject, would be referred. The points of disagreement and contention between multiple sources would be written down in individual sentences or snippets of text, known assententiae. Lectio, meditato, questio etc. were different components of scholasticism. *Lectio* is reading of an authoritative text followed by a commentary by the teacher, but no questions were permitted. This was *Meditatio* (meditation or reflection) allowed students to reflect on and appropriated the text. Finally, the *quaestio* enabled students to ask questions (*quaestiones*) about points raised through *meditatio*. Eventually the discussion of *questions* became a method of inquiry apart from the *lectio* and independent of authoritative texts. Finally, *Disputationes* were arranged to resolve controversial *quaestiones*[14].

1.3.1.5. Pragmatism

Pragmatism, well known as practical and utilitarian philosophy,

was described by Charles Sanders Peirce in the pragmatic maxim described as “Consider the practical effects of the objects of your conception. Then, your conception of those effects is the whole of your conception of the object”[15].In education, through this philosophy, we make activity as the basis of all teaching and learning and activity is deemed to be the one around which an educational process revolves. It infuses a sense of reality in education by making learning purposeful and through making schools into workshops and laboratories. Man will be converted to be optimist, energetic and active through pragmatism and it gives him self-confidence. Values, for a child, will be created spontaneously through his own activities. Pragmatism in principle argues that man can know nothing beyond his experience. Pragmatic education, otherwise known as progressive education, agrees that aim of education changes according to personal and social needs. Pragmatic curriculum will be activity centered and principle of curriculum construction will be its utility. Role of the teacher will be that of a friend, guide or facilitator. Projects, experiment and problem solving will be teaching methods in pragmatic style[16].

1.3.1.6. Existentialism

The philosophy that existentialism put forward conceive that philosophical thinking begins with the human subject—not merely the thinking subject, but the acting, feeling, living human individual[17].The aim of such a philosophy defines itself as to help students to apprehend themselves as unique individuals who accept complete responsibility for their thoughts, feelings and actions, to educate the whole person, not just the mind. Because

feelings are not divorced from reason in decision making and to help the learner become fully his authentic self. A curriculum basing such a philosophy as it basic doctrine is self-placed and self-directed. Wide varieties of options are given to students to choose. Dialogues, small group discussions and individualizations are mostly regarded as teaching methods. Teacher adopts a role of generating an environment in which learners freely choose their own preferred way. This approach is more applied in arts, drama, creative expression, literature and philosophy[18].

1.3.1.7. Critical theory

This approach, initiated by Paulo Freire (1921 – 1997) attacked on what he called as “banking theory of education” in which the students were viewed as an empty account to be filled by the teacher. The conventional teacher-student dichotomy in the classroom was largely challenged by promoting the roles of participants of the class as teacher–student (a teacher who learns) and a student-teacher (a student who teaches)[19].

Later the idea of critical pedagogy was developed from above approach. It is a teaching approach which attempts to help students question and challenge domination and the beliefs and practices dominating them. It helps students to become critically conscious. The objectives of this pedagogy are to empower students and help them helping themselves.

1.3.1.8. Progressivism

Most progressive educators believe that children learn as if they

were scientists, following a process similar to John Dewey's model of learning known as "the pattern of inquiry":1) Become aware of the problem. 2) Define the problem. 3) Propose hypotheses to solve it. 4) Evaluate the consequences of the hypotheses from one's past experience. 5) Test the likeliest solution[20].

1.3.2. Theories of learning

1.3.2.1. Behaviorism

Developed as systematic approach to the understanding of human and animal behaviour, behaviourism assumes that all behaviours are either reflexes produced by a response to certain stimuli in the environment. In another way it considers consequence of that individual's history, including especially reinforcement and punishment, as builders of individual's current motivational state as well as controlling stimuli. In connection with to theory of learning in education, it offers a change in external behaviour achieved through using reinforcement and repetition (Rote learning) to shape behaviour of learners[21]. Behaviorism considers that learner is essentially passive, response to responding to stimuli from the environmental. Ivan Pavlov's (1849-1936) developed a theory named classical conditioning which is considered as the basis of behaviourist approach. Later, a broad outline was put by John Watson (1878–1958) to make it an independent theory of learning. Radical behaviourism, later developed by B F Skinner (1904-1990) based on operant conditioning which considers that environmental influences in the form of reinforcement and punishment modifies nature of behaviour. Classical conditioning, operant conditioning and social learning theory are three basic approaches in behavioural theory.

1.3.2.2. Cognitivism

Cognitive theory was an outgrowth of Gestalt psychology. It focused on conceptualizing the student's learning process as (1) how information is received (2) how information is processed and organized into existing schema and (3) how information is retrieved upon recall. In other words, cognitive theory attempts to explain the process of knowledge, acquisition and the subsequent effects on the mental structures within the mind. On the other side, behaviourists considered the existence of thinking, but identified it as a behaviour. Cognitivists argued that the behaviour is greatly influenced by the way people think and therefore there cannot be a behaviour in and of itself. Thinking, as per cognitivists, is so essential to psychology that the study of thinking should become its own field[22].Thinking, memory, knowing, and problem-solving are considered to be the core of mental processes which need to be explored to learn the actual process in human mind. People are not assumed to be "programmed animals" that merely respond to environmental stimuli; but are rational beings that require active participation in order to learn, and whose actions are a consequence of thinking. Changes in behaviour are observed, but only as an indication of what is occurring in the learner's head[23].

1.3.2.3. Social Learning Theory

The approach in Social learning theory is to consider that new behaviours can be acquired by observing and imitating others. Learning is stated as a cognitive process that takes place in a social context and can

occur purely through observation or direct instruction, even in the absence of motor reproduction or direct refinrocement[24]. Social learning theory integrated behavioural and cognitive theories and provides a wholesome, comprehensive and practical model that accounts for the variety of learning experiences occurring in the real world. Bandura and Walters are considered to the founders of this approach, in 1963 and further detailed in 1977. The principles of social learning theory are as follows:

(1) Learning is not purely behavioural; rather, it is a *cognitive* process that takes place in a social context. (2) Learning can occur by observing a behaviour *and* by observing the consequences of the behaviour (vicarious reinforcement). (3) Learning involves observation, extraction of information from those observations, and making decisions about the performance of the behaviour (observational learning or modeling). (4) Thus, learning can occur without an observable change in behaviour. Reinforcement plays a role in learning but is not entirely responsible for learning.(5) The learner is not a passive recipient of information. Cognition, environment, and behaviour all mutually influence each other (reciprocal determinism).

1.3.2.4. Multiple intelligence

Multiple intelligence (MI) proposed by Howard Gardnerin his 1983 book *Frames of Mind: The Theory of Multiple Intelligences*. As per him, an intelligence must fulfill eight criteria: potential for brain isolation by brain damage, place in evolutionary history, presence of core operations, susceptibility to encoding (symbolic expression), a distinct developmental

progression, the existence of savants, prodigies and other exceptional people, and support from experimental psychology and psychometric findings[25-26].

Through this approach, in relation to learning, intelligence is differentiated into specific 'modalities', rather than seeing intelligence as dominated by a single general ability. Gardner proposed eight abilities that he held to meet these criteria: musical-rhythmic, visual-spatial, verbal-linguistic, logical-mathematical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic[27].

1.3.2.5. Brain based learning

Brain based education is the engagement of strategies based on principles derived from an understanding of the brain. It crosses and draws from multiple disciplines such as chemistry, neurology, psychology, sociology, genetics, biology, and computational neurobiology. It considers how the brain learns best[28]. This approach is based on 12 cardinal principles such as: (1) All learning is physiological (2) The brain/mind is social(3) The search for meaning is innate (4) The search for meaning occurs through patterning (5) Emotions are critical to patterning (6) The brain/mind processes parts and whole simultaneously (7)Learning involves not focused attention and peripheral perception (8) Learning always involves conscious and unconscious processes (9) There are at least 2 approaches to memory: archiving isolated facts and skills or making sense of experience (10) Learning is developmental (11) Complex learning is enhanced by challenge and inhibited by the threat of helplessness (12)Each brain is uniquely organized[29].

1.3.3. Models of instruction

1.3.3.1. Theoretical construct of Models of teaching

Quality of classroom teaching has definite backing from different active theories of learning, but still, they are inadequate largely for developing a theory of transaction and maximizing learning from student's part. To add complication to such a situation, theories of learning are more descriptive in nature as the other is prescriptive in nature. This is because it sets forth some rules concerning the most effective ways of helping children in achieving knowledge, skill etc. Theories of learning and teaching are closely related but are distinct by way of the former describing the process of learning whereas the latter sets forth rules for improving pupil's leaning.

Teaching models are just instructional designs as described by Joyce and Well (1972). Through the process of specifying and producing particular environmental situations models of teaching let the students to interact in such a way that specific change occurs in his behaviour. The same authors redefined the model in 1978 as "A model of teaching consist of guidelines for designing educational activities and environments. It specifies ways of teaching and learning that are intended to achieve certain kinds of goals[30].

Bruce Joys, Marsha Weil and Emily Calhoun (1980) have interpreted the existing knowledge in the learning and teaching as 'Models of Teaching'[31]that teachers can use in the process of transaction to realize

different instructional objectives. For them, models of teaching are plans of pattern that brings out methods to shape a curricula, to design instructional materials and to guide instruction in the class room and other settings. In a broader sense, models of teaching are really models of learning also. When a teacher helps students gather information, ideas, skills, values, ways of thinking, and means of expressing themselves, internally they teach students teaching them how to learn. The most vital long term outcome of instruction may be the students' increased capacity to learn more easily and effectively in the future, both because of the knowledge and skills they have acquired and because they have mastered learning processes[32]. Models of teaching (models of instruction) are designed for specific purposes those suits teaching of information, concepts, ways of thinking, the study of social values and so on, through asking students to engage themselves in particular cognitive and social tasks. Some models focus on delivery by the instructor while others develop attitude of the learners to respond to tasks and there the student is regarded as a collaborator in the educational enterprise. However all mature models emphasize how to help students learn to construct knowledge, learning how to learn and including learning from the sources that are often stereotyped as passive, such as learning from lectures, films, reading assignments and such. "Quite a number of Models of Teaching are designed to increase students' ability to process information more powerfully. These include methods for presenting information, so that students can learn and retain it more effectively by operating on it more conceptually, systems that assist memorization and teach students to collect and organize information

conceptually ,and ones to teach students to use the methods of disciplines, to engage in causal reasoning and to master concepts"[33]. One of the main advantages of adopting teaching models is said to be "stimulates the development of new educational innovations in teaching strategies and tactics, which may replace the existing ones in schools of today"[34].

1.3.3.2. Concepts for describing a model

The models developed by Joys and Weil (1980) have a definite structure. The operation of each model is described within this structure. The four aspects of this common structure are: Syntax, the Social System, Principles of Reaction and Effects of the Model.

Syntax of the model describes the model in action. It explains how well a model is sequenced systematically based on activities in it. Each model has distinct flow of phases.

The social system describes the role of and relationships between the teacher and the pupils. In some models the teacher has a dominant role to play. In some, the activity is centered on the pupils, and in some others the activity is equally distributed.

Principles of reaction suggest teacher's behaviour on how to regard the learner and to respond to what the learner does. They provide the teacher with rules of thumb by which to select model, appropriate response to what the student does.

Support system includes the supporting conditions required to implement the model such as books, films, lab kits, reference materials etc.

Effects of model- each model results in two types of effects: Instructional effects and Nurturant effects. The first one is direct effects which results from the content and skills on which the activities are based. Nurturant effects are implicit in the learning environment. They are indirect effects of the model.

Every teacher faces a wide variety of problems in the classrooms. An effective teacher can apply these models resourcefully and creatively so as to solve the problems. The Models of Teaching give ample opportunities to the teacher to adapt them to suit the classroom requirement. Only creative, flexible and resourceful teachers will achieve the maximum benefit from the Models of Teaching.

1.3.3.3. Classification of models of teaching

Joyce and Weil have identified 23 teaching models which are classified into four basic families based on their nature, distinctive characteristics and effects. These four families are:

1. Information processing models
2. Personal models
3. Social Interaction Models
4. Behavior modification models

The following table illustrates the classification of different models into the four main families.

Table – 3.1. Classification - models of Instructions

Name of family	Common basic concept	Names of instructional models
Information processing models	Concerned with theability of the learner to observe, organize data, understand information, form concepts, Employs verbal and nonverbal symbols and solve problems.	The Concept Attainment Model Taba Inductive Thinking Model Enquiry Training Model The Advance Organizer Model The Memory Model Cognitive Growth Model Biological Science Inquiry Model
Personal models	Emphasis of these models is on developing an individualinto an integrated, confident and competent personality. They attempt to help studentsunderstand themselves and their goals, and to develop the means for educating themselves.	Non-Directive Teaching Model Synetics Model Awareness Training Model Classroom Meeting Model
Social interaction models	Emphasizes the relationships of the individual to the society or other persons. The core objective is to help students learn to work together, to identify and solve problems, either academic or social in nature.	Group Investigation Model Role Playing Model Jurisprudential Inquiry Model Laboratory Training Model Social Simulation Modelf Social Inquiry Model
Behaviour modification models	Emphasis on changing the visible behaviour of the learner (based on behavioural theory of learning)	Contingency Management Model Self Control Model, Training Model Stress Reduction Model Desensitization Model Assertiveness Training Model

1.3.4. Concept learning and Constructivism

Concept is an idea explaining phenomenon[35] which defines particular sets of objects, events, symbols, properties or situation. [36] Concepts enable learners to classify items based on certain essential characteristics, features or attributes (Klausmeir, Ghatala& Frayer,1974). Every example of a concept shares certain must have features with all other examples of the concept. [37]

Learners have the capacity of either to distinguish examples of the concept from close-in (very similar) non-examples or Identify examples of the concept across a wide range of varying, non-defining *can have* features or demonstrate this with examples and non-examples (Bruner, Goodnow, & Austin, 1956; Clark, 1971; Merrill, Tennyson, & Posey, 1992; Sota, Leon, & Layng, 2011; Tiemann & Markle, 1990). Concepts are of two types: Concrete and Abstract. Concrete concepts are perceivable entities, while abstract concepts are neither purely physical nor spatially constrained[38].

1.3.4.1. Concept learning

R.Gagnes explains concept learning, as a specific method of learning belonging to Intellectual Skills, one among five learning outcomes based on Learning outcomes. (Smith & Ragan 2005)[39]. In other words classification requires, first, identifying the perceptual, functional and /or relational properties or attributes required of all concept , members and second, contracting those with the attributes of the newly encountered item[40].

The problem is whether Abstract concepts are learnt in the same method as that in Concrete concept. Analogy as an instructional method has the purpose to allow relational information to be mapped from a source known to the learner on to one that is unknown. In constructivism, analogy serves not just as a representative template but as a dynamic process which affects and is affected by changes in conceptual understanding. Analogies have been frequently utilized and have become integral parts of accepted theories of instructional design.

1.3.4.2. Constructivism – theory and practice

Constructivism says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When we see a new thing, we examine it with our previous experience. So, we are active manufacturers of our own knowledge. This is done through asking questions, exploring things and analysing what we know.

In the classroom, the constructivist practices internally aims at encouraging students to use active techniques of real-world problem solving to create new knowledge. It is followed then to reflect on and talk about what they have performed and understood. Role of teacher is to make sure that they understood students' pre-existing conceptions and then guiding the activity to address them and then build on them. There are Five E's in Constructivism such as Engage, Explore Explain, Elaborate and Evaluate.

1.3.4.3. How is Constructivist model different?

On contrary to Instructivism (where teacher instructs something), otherwise known as Transmissionist model, the former is more Student centered and Process oriented. More stress is given to “How is it learnt” than “What is learnt”. This philosophy believes that people actively construct or create their own subjective representations of objective reality; new information are linked with prior information. Constructivism is a form of discovery learning where learners discover facts and relationships for themselves. This model keeps contrast with transmissionist model where learner passively receives ideas transmitted by instructor. Difference between constructive model and transmissionist model can be summarized as follows:

Table 1.3.2. Conventional teaching v/s Constructivist model

Transmissionist model (conventional teaching)	**Constructivist model**
Passive learning	Active learning
Teacher is the authority	Teacher takes the role of a facilitator
Teacher centered	Student centered
Achievement/result oriented	Process/Quality oriented
Mainly didactic lecture method is adopted Concepts are taught	Active learning strategies like guided discovery, problem based learning, simulation based learning, case simulation, incidental learning etc. can be adopted Concepts are learnt
Less chance for peer interaction	Ample opportunity for peer interaction
Motivation is not an essential component	Motivation essentially associate with process of learning

1.3.4.4. Teaching strategies adoptable in constructivist classroom

Examples of activities in constructivism are (1) Experimentation (2) Research projects (3) Field trips (4) Films (5) Class discussions. Specific approaches include Constructionism (which allows learners to construct something like tools, instruments etc.), guided instruction, Problem-based learning, Inquiry-based learning, anchored instruction, cooperative learning (individuals working together), reciprocal Peer teaching (students becomes their own teachers), jigsaw (four stages: introduction, focused exploration, reporting and re-shaping, and integration and evaluation), and other methods like brainstorming, Group discussion, Audio-visual teaching (films etc.), Demonstrations, Role plays, Concept Mapping, OTB activities etc.

Chapter - 4
CURRENT ISSUES IN TEACHING AYURVEDA

1.4.1. Review on earlier efforts on teaching reforms in Ayurveda

The content and structure of Ayurvedic education were subjected to discussions many times during the last century. Different committees formulated for uplifting standards and pervasiveness of Ayurveda, as an indispensable part of this exercise, had discussion on educational standards also. The main focus of discussion on education (among many others) was curricula, syllabus, and statutory status, scope of integration and nature of research in Ayurveda[1].

Bhore committee (1945) did not attempt anything about the educational standards of Ayurveda except recommended to leave it to the provincial governments to decide what part, if any, should be played by the indigenous systems in the organization of public health and medical relief[2].Chopra committee (1948) framed out practical suggestions leading to integration of Ayurveda and modern medicine through restructuring the syllabus unified nationally. It suggested training for teachers to transact an

integrated content. But, Central Government denied approving the move of integration till Indian systems prove their own merits through adequate research activities. Also, it insisted to impart basic training for Ayurveda, Unani practitioners on modern scientific medicine. Recommendations of Chopra committee were followed up by Pandit committee (1949) and recommended to start research institute at Jamnagar. Also recommended that the incorporation of instruction in Ayurveda, Unani in the curriculum of modern medical colleges was not immediately feasible either at the under-graduate level or post-graduate level[3]. Dave committee (1954) insisted to have uniform standards and duration for Ayurveda graduate program with uniform subject wise textbooks[4]. The first attempt to address the issues of Ayurvedic teaching technology was made in Udupa committee report (1958).In the final recommendations of the report it is clearly stated that "Teaching methods require a great deal of improvement. Two fifths of the time should be devoted to lectures and three fifths to practical's by students themselves. The philosophical aspects of Ayurveda should be emphasized throughout the undergraduate training"[5]. While commenting on the present teaching styles, the report makes the following comment: "Innumerable new methods have been adopted in foreign countries to teach medical students. Formerly only class room lectures and clinical lectures only in wards were given. In recent times a number of reforms have been adopted with great benefits. Along with giving lectures, it will be much better to the internal system of teaching in which a small group of students freely discuss with all aspects of a particular subject"[6].

In 1983, the report on medical education review committee considered instructional reforms vital in medical education[7]. Report submitted under the chairmanship of Dr. Shantilal Mehta made a general apprehension on the teaching technology in the following way: "In our country we have been depending to a large extent upon the 'lecture' as a major instructional medium. While the value of this method is well known, its limitations should be recognized and attempts should be made to enrich the quality of teachers by introducing a variety of other instructional methods and aids which are now available". The report further commented: "It is well known that each student has his own style of learning, the teacher has to ensure the appropriate environment for maximum learning to take place and to adjust his methods and technologies suitably. A medical teacher has to select judiciously and use skillfully the available technologies. This implies that teacher should be familiar with a range of instructional methods and their potential. These include didactic lectures, group discussions, laboratory work, clinical work, field work etc." Regarding the subsequent change in perspective of medical teaching Mark Barrow et al (2010) observes a reasonable make over "the development of learner centered approaches in higher education has been mirrored in medical education at all levels, which has transformed the emphasis on teaching and learning"[8].

In the sector of general education role of the teacher and scope of teaching methodology in the newer curricular revisions were largely redefined during last 30 years. In 1993 report submitted by Yashpal committee,

"*Learning without burden"* enlisted the problems in the prevailing educational system in India. The major issues were enlisted as problem of over loading, joyless learning, examination system, textbook as the truth, observation discouraged, teaching everything etc. Root of the problem were identified as the lack of discrimination between knowledge and information, isolation of experts from class room realities, convention of teaching the text, competition based social ethos and absence of academic ethos[9]. The National Curriculum frame work formulated in 2005 offered large scale revisions in philosophy of education, its characteristics and characters. The framework has identified "the fact that learning has become a source of burden and stress on children and their parents is an evidence of a deep distortion in educational aims and quality"[10].

To correct this distortion, the present NCF proposes five guiding principles for curriculum development: (i) connecting knowledge to life outside the school; (ii) ensuring that learning shifts away from rote methods; (iii) enriching the curriculum so that it goes beyond textbooks; (iv) making examinations more flexible and integrating them with classroom life; and (v) nurturing an overriding identity informed by caring concerns within the democratic polity of the country. The fact that knowledge is constructed by the child implies that curricula, syllabi and textbooks should enable the teacher in organizing classroom experiences in consonance with the child's nature and environment, and thus providing opportunities for all children. (ibid) It gives importance to constructivist approach of learning. In the

constructivist perspective, learning is a process of the construction of knowledge. Learners actively construct their own knowledge by connecting new idea to existing ideas on the basis of materials/activities presented to them (experience)[11].

1.4.2. Recent calls on Ayurvedic teaching reforms

The quality of Ayurveda education in post-independence India has been a matter of concern since long and has attracted criticisms of various kinds. During the initial phase of attempts to revamp the scientific spirit of Ayurveda, focus was given to uplift the total status of Ayurveda, which was under decline after advent of colonialism in India. As we have already seen, the transition from Gurukula tradition directly put Ayurvedic education to the new frame work of modern education. Inadequate exposure to basic clinical skills, poorly structured curriculum, mushroom growth of sub-standard colleges, lack of innovation in the faculty development programs, and, ambiguities in the policies on integration - are a few points among others- that have been raised from time to time to suggest that the quality of Ayurveda training is poor[12].

In 2008, a nationwide survey conducted by Kishor Patwardhan et al, that included interns, postgraduate students and teachers from more than 30 Ayurveda institutions spread across 18 states of India, showed that the 'teaching methodology' was one of the crucial areas that needed instant attention. The study also observed that teaching and learning in Ayurveda

education institutions was more 'memory-oriented' than 'understanding- and application-oriented' in general, along with being teacher-centric. The study also recommended that newer methods of active learning such as 'problem-based learning' be incorporated in Ayurveda education[13]. In traditional teaching method, students are passive and are unable to express their ideas unless interrogated or encountered and may go with lack of analytical critical thinking[14].

In another study, reported by Deepti Singh et al, related to the domains being assessed in Ayurveda Post graduate entrance examination, the finding supports the notion that the current formal Ayurveda education is more memory-oriented than being competence based[15].

One must remember that the quality of training that is imparted during a postgraduate program becomes vital in giving shape to a future teacher, and surprisingly, the postgraduate curriculum of almost no subject states that it aims at producing capable teachers[16].

In the same survey among students and teachers about the basic clinical skills imparted through present Ayurvedic graduate curriculum the following conclusions are drawn: "The study indicates that there are some serious flaws in the existing system of the graduate level Ayurvedic education. Only a good exposure to basic clinical skills during the medical education can produce a confident physician. Though many topics related to the essential clinical skills are included in the curriculum, the education system has not been able to produce skillful clinicians. Since the Ayurvedic

graduates play an important role in the primary healthcare delivery system of the country, this study seeks the attention of governing bodies to take necessary steps ensuring the exposure of the students to the basic clinical skills. Along with the strict implementation of all the regulatory norms during the process of recognition of the colleges, introducing some changes in the policy model may also be required to tackle the situation[17]."

As observed by J Narayan (2010), lecturing well requires participating in colloquia (*Tadvid Sambhashanam*), normal practice today in super specialty hospitals: with critical patients, the physician concerned gathers all the experts around a table, where everything is discussed, and a solution determined. This does not happen in Ayurveda. Our teachers should incorporate such problem based learning into teaching practice[18].

Vaidya Dilip Gadgil (2010) listed out some cardinal problems which made Ayurveda education challenging.[19]

1. The fundamental problem is that up to the 12th standard nothing is imparted about ancient Indian wisdom and its knowledge systems like Ayurveda.
2. Secondly, many students who have not studied any Sanskrit, are admitted to Ayurvedic degree courses.
3. Thirdly, students taking Ayurveda in Ayurveda colleges and courses are often there as a second option: they failed to gain admission to medical school. To those, Ayurveda is only an alternative to what they really want to study; just a means

of obtaining an alternative medical degree. Once they have been admitted and start their course, the result is frustration.

4. Even after admission, considerable barriers to the proper study of Ayurveda are evidenced:
5. Syllabus structure and choice of subjects are more in accordance with MBBS courses;
6. Instead of a nourishing learning environment as in traditional education, students are faced with western examination-oriented education, and all the stress that entails;
7. Due to lack of previous exposure to Sanskrit, the language presents a barrier rather than an effective tool to understanding Ayurveda;
8. Pejorative comparison of the Sanskrit term '*Sharira*' with modern anatomy creates bad impressions about Ayurveda;
9. Basic, underlying subjects like *Padarthavigyan*(the six systems of Indian Philosophy or '*Darshanas*') are completely neglected.

Bhushan Patwardhan et al (2011) observes: "The present-day education appears to have not only segregated the cultural and traditional pedagogy practices, but has compromised the link between research and teaching. Ayurveda graduates, who play an important role in India's primary health care delivery system, are inept at basic clinical examination and skills. There is urgent need to transform the theory-oriented and textbook dominated

teaching into clinically-oriented practical training. If classroom-based teaching transforms into patient-centric co-learning, it would motivate students towards a lifelong passion for self-learning"[20].

Meena Shamrao Deogae et.al. (2015) put an observation on current Ayurveda education: "The Medical Schools of Ayurveda are adopting the three stage medical training as Perception, Practical and Practice. These methods even though serving their functionality and making the understanding of curriculum simple, are not able to satisfy the stakeholder i.e. learner at full strength. To overcome the problems of Ayurveda Education, one has to follow the student centered education strategy as followed in olden times"[21].

Also it was observed that the traditional "Receive-Read-Recollect" notion has to be supplemented by "Debate-Discuss-Decide" approach to solve the problems of the present pedagogy[22].

R H Singh (2015) observes the changing paradigms in teaching and education and enlists the following observations:[23]

The paradigms have been changing in recent years in the field of teaching and education worldwide. The most praised trends are

(1) Shift from traditional teacher-centered teaching to student-centered teaching where the leader of educational teamship is the student himself, not merely the teacher. The student has to play a proactive role. He/she can no more afford to remain a passive receiver of information or

knowledge. He/she has to become proactive and should also play a constructive and creative role in curricular reform and program development.

(2) Shift from directed teaching to induction of learning ability and skill. In this model, it is expected that the teacher will not merely transfer a set of information to his/her students in a classroom rather he/she will try to inculcate learning ability and skill in students so that they learn much more themselves than they are taught directly in a classroom by a teacher. This is very important because knowledge and information today has grown so much that it cannot be taught by a teacher in a classroom. It is advisable that the student has to be transformed into a good learner and should be motivated to self-learning all through his/her life. It is expected that every teacher should now remodel his/her teaching style in tune with such shifting paradigms.

N Sridhar (2006), in a note, enlists the basic challenges faced by Ayurvedic education as follows: 1. Non – availability of Literature. 2. Scattered Knowledge. 3. Inadequacy of Knowledge. 4. Lack of adequate clinical exposure. 5. Existence of misinforms / misconceptions. 6. Lack of uniform knowledge. 7. Lack of an effective and uniform professional media of conversation. 8. Reluctant attitude of governing bodies[24].

Students' perspective on the issues related to teaching/learning Ayurveda was reported as "the current curriculum makes us to feel that we are studying Ayurveda/Siddha /Unani hypothetically[25]."

In a nutshell, as suggested by Kishor Patwardhan, it may be stated that reforms are required at every level of ASU education to be able to produce skilful, resourceful and knowledgeable graduates who can positively contribute to the cause of humanity[26]. To summarize, there is no point in suggesting teaching reforms when the actual need is for curricular reforms[27].

1.4.3. Moves from Central Council of Indian Medicine

Central Council of Indian Medicine recently expressed its willingness to accept suggestions from academicians to modify curriculum and teaching methods[28]. The draft curriculum of CCIM offers new insights in the direction of reforms in teaching-learning patterns in Ayurveda Colleges. A fresher orientation course is being included in curriculum with an aim of familiarize Ayurveda at the beginning stage. The draft also recommends establishing a Medical Education Unit to develop their own learning modules and identify appropriate resource persons for their delivery. The draft also suggests that “Didactic lectures shall not exceed one third of the schedule; two third of the schedule shall include interactive, practical, clinical or/and group discussions. The learning process should include living experiences, problem oriented approach, case studies and community health care activities. The teaching roster should be carefully prepared by each institution so as to give adequate and justified time for students to learn as well as prepare for their assessments[29].”It is again specified in the following way: “Teaching and learning shall be aligned and integrated across Departments both vertically and horizontally for better student comprehension. Student centered learning

methods should include problem oriented learning, case studies, community oriented learning, self directed and experiential learning"[30]. Teaching Methodology workshops of different durations has been planned by CCIM recently which enable teachers to empower their teaching with new modalities in teaching technology.

In 2016, CCIM formulated a draft vision document for reforms in ASU education system which envisaged a change from content oriented learning to competence oriented learning[31].

1.4.4. Problems in concept learning

Srinivasulu M states that the fundamental aspect required to understand the pathophysiology in Ayurveda are based on Dosha-Dhatu-mala theory and imparting of this theory is improper and insufficient in most of the Ayurveda Colleges in India[32]. Teachers are not able to provide sufficient knowledge to the students regarding the analysis of human physiology and pathology based on Tridosha theory. According to him lack of enlightenment of subjects like Padarthavijnana, which is similar in importance like Biochemistry of modern medical science is another problem. Also, Samhitas are being misinterpreted either due to superstition or with imperfect modern knowledge by teachers[32].

When this problem exists in Ayurveda pedagogy, the search for its probable reason is obligatory. Vinodkumar M V enlists the following reasons for misapprehension of concepts especially in the beginning of Ayurveda

graduation (1) Ayurvedic concepts are strange to the scientific temperament gained throughout the previous years (2) Teachers speak from a different platform and insist learners to leap reaching such a platform (3) Abstract ideas are seldom supported by concrete explanations (4) Language in which the technical terms are conveyed seems to be strange (5) Learners seldom participate in building up conceptual paradigm. A feeling of being forcefully instructed prevails through the whole span of learning concepts (6) Blind by hearting and memorization becomes a major target of learning concepts in Ayurveda[33].

In the opinion of Sridhar N, documented knowledge in Ayurveda is only indicatory, but not explanatory. Therefore, each content of the Samhita demands further more explanation to understand its content[34].

The conceptual platform of Ayurveda was constructed by assimilating the inputs from philosophical systems in India existed at the time of its emergence mainly Shad-darsanas. Darsanas were the products high level intellectual speculations regarding the natural phenomena governing human life. Naturally they cover the physical reality of the nature as well as metaphysical contemplations on apparent reality of the nature. Many of them differ in defining these aspects, but Ayurveda accepts relevant theories from among them. Padarthavijnana, the material science, has an instrumental role in building up conceptual basis of Ayurveda. The development of conceptual basis of Ayurveda is highly indebted to the philosophical traditions sustained in India during its emergence. Indian philosophy is customarily called Darsana

and there were many schools. The empirical research conducted by different masters formulated different theories and laws to explain nature of universe. Eventually they became the basic sciences of that era. Ayurveda, initially developed its practices based on observations. Afterwards, it became essential to build theoretical explanations to such findings. Theorization of practices necessitated adoption of technical terminologies and concepts from Darsana. Ayurveda adopted the concepts depicted in different Darsanas with necessary modifications to suit its needs[35]. Darsanas influenced formation of Ayurvedic theoretical platform in two ways. One is by providing different concepts for explaining the nature of universe and human beings. This was known as Ontology (=study of objective world). Concepts regarding Categories (Padartha), Substance (Dravya), Five existents (Pancha-bhuta), Three attributes (Tri-guna) etc. are some of them. On the other side, Epistemology (=knowledge about how to generate knowledge) was one of the main concerns of Darsanas, which later provided the framework for developing methodology in formulating different theories in Ayurveda. Hence, Padarthavijnana mainly deals with different Categories of knowledge (Padartha) and Means of knowledge (Pramana)[36].

The prime problem in learning basic concepts in a disorganized fashion[37]. Vinodkumar M V proposes the following problems in concept learning in relation to study of Padartha-vijnana:

(1) Technical terms in Ayurveda need to be understood in three levels – Etymology, Definition and Concept. These three discourses need to be

addressed separately with adequate interval to assimilate them properly. Unfortunately, this approach is missing in the present curriculum. Usually beginner learners are forced to go into the elaborate details of the concept before the concept attains settlement in the thought process of the learner.

(2) Study of Darsana demands a different perspective from that accustomed by the learners in their previous learning premises. An "out of box approach" is needed to modify their thought process. Such an element is absent in curriculum.

(3) Mutually exclusive details of the same concept are introduced for a beginner which makes them confused. For example, when concept of Guna is introduced in I BAMS classes, almost simultaneously different types of approaches of Guna are being taught: Triguna, Chaturvimsatiguna, Vimsatiguna, 41 Gunas etc. Those details introduced simultaneously makes disorganization in the assimilation. The result is un-assimilated and unsettled concept of Guna.

(4) Unnecessary and irrational correlation with modern knowledge makes confusion among learners. The term 'scientific temperament' needs much attention here. The term science in scientific temperament has to be redefined in the context of Ayurveda. In a knowledge content, where modern science is applied in a different perspective, the term scientific temperament carries the meaning of logical temperament. It implies that, the material presented should allow the learner to have a logical sequence in understanding, putting easily assailable things first and

advanced knowledge on a later phase. This will never challenge any scientific temperament of learners. In short, scientific temperament is not always built up through correlative efforts of the ideas with modern science, but, making a sense through a logical sequence of any idea independently.

Psychologically, all the above riddles leave ample opportunities for cognitive dissonance, which hinder proper understanding of the ideas.

Chapter - 5
TRIDOSHASIDHANTA

1.5.1. Conceptual Background of Tridosha

HUMAN BODY is the most complex system ever existed on the earth. Most often various phenomena in human body abides the rule of the physical world; but, not always. A living organism exhibits mutually opposite phenomena within itself, which necessarily co-exist. Because, it needs mutually contradictory principles like stability/mobility, conservation/utilization, fullness/emptiness etc. to maintain its homoeostasis. Homoeostasis is never a static principle. Each and every feature that distinguish living organism from non-living proves the dynamicity prevailed in a biological system. The main features that distinguish living organism from non-living organism are:

1. Movement	4. Respiration	7. Sense & Response
2. Metabolism	5. Excretion	8. Repair
3. Growth	6. Reproduction	

These features are essentially co-existing and mutually contributing. No movement is possible without metabolism and respiration. The major three events selected for the above list will be: *Movement*, *Metabolism* and *Growth*. In another words they represent *Utilization*, *Conversion* and *Accumulation*

respectively. These three forces in a living organism repeat in any physiological activities in varying proportions, but never silent in any.

Indian ancient material sciences always agree with the concept of "mutually co-existing opposites" like the phenomena of *agneeshomeeyatva*. (The co-existence of hot & cold). This ushna & seeta are the two principal phenomena governing all the occurrence of the universe like sun & moon. But, in a living organism, there is the question of another principle called "water" which is the major share of its material content. Water is represented in living organism as *snigdha* or *sneha.*[1]. Absence of *sneha* is called *ruksha*. Basically, all the mechanisms in a living organisms can be understood as the combinations of the above four qualities: Seeta, Ushna, Snigdha & Ruksha. The four combinations possible with these qualities will be

Seeta-ruksha	the *utilization/ movement* principle
Ushna-snigdha	the biological *conversion/metabolic* principle
Seeta-snigdha	which represents the *accumulation*/*growth* principle
Ushna-ruksha	a principle which can be responsible for *destruction* of a biological system, so, *not considered* as an essential component as far as living organism is concerned.

In short, the first three principles which are the representatives of the three basic events in a biological system are known as Vata, Pitta and

Kapha respectively. They are collectively called Tridosha. As these principles are derived from the basic phenomena of the living system as well as the material world, the theory of tridosha can never be substituted by another.

Table 1.5.1. Summary of Tridosha

Dosha	Prominent qualities	Prominent activity	Physiological activity	Predominant bhuta
Vata	Seeta, Ruksha	Vikshepa	Movement	Vayu, Akasa
Pitta	Snigdha, Ushna	Adana	Metabolism	Agni (+jala)
Kapha	Snigdha, Seeta	Visarga	Accumulation	Prthvee, Jala

1.5.2. Historical & Philosophical Background

1.5.2.1. Vedic reference

A reference from *Rigveda* explains three physiological factors under a collective name of *tridhatu*. Sayana, a commentator of Rigveda explains this term as a synonym for Vata, Pitta and Kapha. The Vedic scholars and physicians of that period seem to have possessed a considerable knowledge of certain physiological processes of the body like digestion and properties and functions of some organs. But, the later teachers of Ayurveda should be given credit for formulating a systemic physiological science in which the tridosha play an important part.

1.5.2.2. Formulation of Tridosha theory

It is very difficult to ascertain the person who actually formulated the theory of tridosha, because the actual dates of creation

of our master textbooks (samhita) are unknown as of now. It can be roughly assumed that after Vedic era (1500BC – 500 BC), there was a period of intellectual renaissance in India which sustained the formation and development of several absolute and applied sciences in India. The absolute sciences comprised of Philosphical traditions, mainly Six systems of Indian Philosophy (Shad darsana) and the applied sciences comprised of that like Ayurveda, Jyotisha, Vastuvidya etc. The absolute sciences tried to *describe* the features of the material world where as the applied sciences like Ayurveda tried to *intervene* on the material content especially of living organism like man. When the philosophies spoke about the nature of the content of universe, Ayurveda found itself in need of explaining the physiological changes happening in a living organism. This was a point of crisis where Ayurveda needed much more sophisticated theory which could explain the physiological activities more precisely and comprehensively. Even though the *panchabhuta* theory was successful in formulating the content/structural basis of the universe as well as human body, it failed to explain the functional levels of living organism. When there was the question where to allocate the psychological activities of a human being, the theory of panchabhuta became more and more insufficient. So, our masters thought of a theory which can explain the dynamicity of body and mind together, in relation with the structural make up of human being. The result was formulation of Tridosha theory.

1.5.2.3. Relation of Tridosha theory with other theories

1.5.2.3.1. Relation with Samanya-visesha sidhanta

Samanya-visesha sidhanta is the prime theory in Ayurveda, which explains how human body is exposed to changes made by its interaction with external world. The six categories (shadpadarthas) mentioned in Vaiseshikadarsana is accepted by Caraka as such, (dravya, guna, karma, samanya, visesha & samavaya,) but in a different order, and explains them as the causal categories (karanapadartha).[2] They are called so because, the padarthas are the basic considerations to explain the mode of activities of treatment in human body. Apart from the treatment, any physiological process in human body abides the rule of similars and dissimilars. It assumes that there will be increase of factors by supplementing similar factors and decrease by supplementing opposite factors. In Caraka Samhita, the qualities of tridosha are explained in the view that application of the opposite qualities subsides the corresponding doshas.[3] By viparyaya tantrayukti it naturally comes that application of similar qualities tends to increase that particular dosha. In that way, tridoshasidhanta is explained as a tool for explain and establishing the role of samanya-visesha sidhanta in health and diseases. By mentioning *"sarvatha sarvabhavanam*" in the description of samanya-visesha sidhanta it explains that any form of change happenimg in human body abides the rule of samanya-visesha sidhanta. In fact, the main difference between samanya & visesha in darsana from that in Ayurveda is, the former takes the concepts of *samanya* & *visesha* to categorise and compare different

entities, but in Ayurveda they are used to explain biological activities and action of drugs in a biological system.[4]

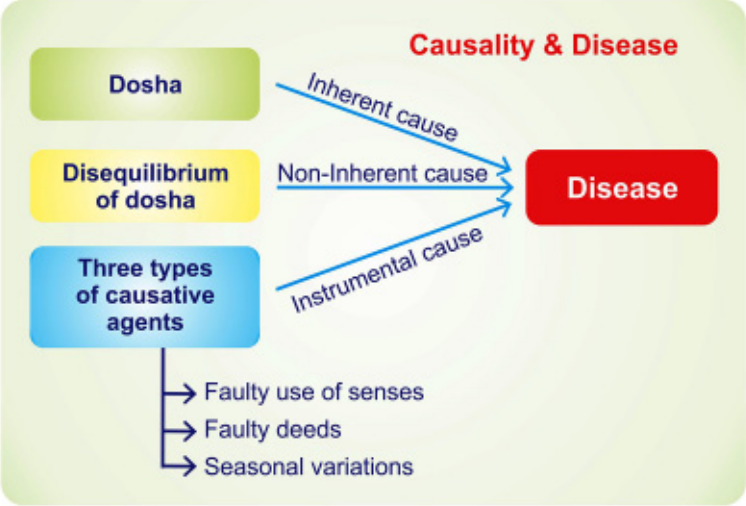
1.5.2.3.2. Relation with Karya-karana sidhanta (Satkaryavada)

Cause–effect relationship in Ayurveda abides mainly satkaryavada of Sankhyadarsana. In this doctrine, effect is said to be homologous to cause. The nature of doshadushti is homologous to the cause to which the patient is exposed. The five postulations of Satkaryavada in Sankhyadarsana[5] can be illustrated for tridosha in the following way:

Asad akaranaat – nothing is produced from non-existence. For every new product there should be a material cause (upadana karana). In the case of diseases, that upadana karana is tridosha. *Upadanagrahanat* – For new product, suitable cause should be selected. In the case of tridosha, if the effect pertains to a particular dhatu in the body, the dosha involved must be that which has an asraya-asrayee bandha with the dhatu, For example, pittadushti can manifest as raktadushti also. *Sarvasambhava abhavat* – there is no cause which ends in all types of effects. Similarly, there is no cause which creates all the diseases known so far. A particular cause result in a particular disease, mediated through doshadushti; the doshadushti will be homologous to the causative factors to which the person is exposed. For example, snigdha-seeta cause will affect kapha where as ruksha-seeta cause will vitiate vata. *Saktasya sakyakaranat* – An agent can produce an effect which it is capable to produce. Here *sakta* in the case of diseases is

Nimittakarana. The causative triad (kala, artha, karma) produce vitiation of dosha which it is capable to produce. *Karanabhavat* – there are visible reasons for doshadushti.

Three types of causes (samavayee, asamavayee & nimitta) can be explained in relation to disease causation in the following way:



1.5.2.3.3. Relation with Lokapurushasamya sidhanta

Lokapurushasamya sidhanta (Caraka) explains that "whatever things are there in the universe all of them will be present in human body; and vice-versa".[6] That means, man can be understood as an epitome of the universe. Suruta explains that, three doshas in human body represents three natural phenomena present outside the body. Vata in human body represents Vayu (air) outside the body; Pitta represents Soorya and Kapha, Soma (moon). They explain three phenomena in human body also: Visarga, Adana and Viksepa.[7] In Vatakalakaleeya chapter, Caraka categorically states

that, Vata performs in the body as Vayu performs outside the body in normality and abnormality. Pitta is nothing but the fire present in human body; and kapha is jala.[8]

1.5.2.3.4. Relation with Panchabhuta theory

Panchabhuta theory can be taken as a universal theory (sarvatantra sidhanta) which was originally explained in many darsanas, accepted in Ayurveda with necessary modifications. This theory explains the structural make up of a living organisms. As man is considered as the epitome universe, there is no alternative way than explaining human body as a conglomeration of five elements. Also, the materials used as food/drug have panchabhautik structure, which when readily acts on human body, the latter should have the same structural components as the former. So, there is nothing in human body structurally, which is not made of panchabhuta, except the Soul (atma) and Adhyatmadravya, especially Mind (manas). So, substantially tridoshas are related with panchabhuta, as explained in major textbooks. All the three doshas are essentially composed of all the bhutas, with predominance of one or two as shown in the figure.

1.5.3. Uniqueness of Tridosha Theory

Tridosha theory is the limited theory (pratitantra sidhanta) explained in Ayurveda. By formulating this theory, our Masters tried to explain all possible physiological phenomena through a single theory; tridosha. It is like famous scientist Stephen Hawkins tries to formulate a single theory to

explain all the phenomena of the universe. Tridosha theory becomes unique in the following aspects:

It is based on the fundamental observations of nature. Movement, Heat and Accumulation are the basic phenomena of the nature applied anywhere. Whatever modifications come to other theories to explain the natural phenomena, the fundamental observations stand unchallenged. So, there is no question of making amendments to this theory. Any other phenomena can be understood in terms of the above three features of nature.

Tridosha explains the biological, physiological as well as psychological dynamicity of living organism. Environment (desa), season (kala), food (ahara), physical activities (cheshta), psychological activities, age etc. are some of the factors which can make variations in the tridosha configuration of a person. In that sense, tridosha explains multiplicity of factors affecting human health.

Tridosha are explained as the sole regulatory factor of health as well as diseases. The core idea shared here is, whatever factors contribute to the health, in an altered state can contribute to the ill-health of a person.

1.5.4. Dosha – Scope of The Terminology

The factor which is not only capable of vitiation but also of vitiating other factors of the body is known as dosha. That means, the other two items among three domains in human body viz; dhatu and mala, get vitiated

when the factors of vitiation are mediated through doshas. In a broader sense, anything affecting the body finally affects the tridosha structure of human body. Or, tridoshas are the factors which themselves are capable to make substantial changes in human body, So, they are customarily called *Saktimatradravya* – that means, they are more functional than structural. But, dhatus are *saktiyuktadravya* - more structural than functional. Malas are less functional (when compared to doshas and dhatus) – *saktiheenadravya*. The doshas are called dhatus when they are conducive to the homoeostasis, and are called malas when they are in the form of impurity. That means, the difference between purity and impurity of human body does not lies in material but, state of affair. The same materials in one status (doshasamya) becomes pure, but in another status (doshavaishamya) becomes impure. In that way, doshas can be explained as the dynamic entities which are easily get vitiated by faulty external agents, whereas they are keeping the internal environment intact where the external agents are perfectly conducive to health of a person. In nut shell, doshas are the agents inside the body which can reflect the changes in the external environment through some or other forms of deviation from their normal functioning.

1.5.5. Whether Tridoshas are Dravya?

By definition, tridoshas are *dravya,* because they have qualities (guna) and activities (karma), and are inherent cause (samavayeekarana) of all diseases.[9] In the cases where *dravya* is not directly appreciable, we can

very well go for their qualities and activities to validate their presence. In the case of tridosha, their physical presence is often validated by assessing their qualities and activities. That is why, the precise one line definition for dosha is not available in any textbook; instead, there are clear description of their qualities and activities in normal and abnormal status.

Tridoshas are otherwise called "three pillars of the body" (tristhoona).[10] They are chiefly located in the lower, middle and upper part of the body and look after the functions in the corresponding area like three pillars supporting the body. When Vata, Pitta and Kapha are described as somatic doshas, Rajas and Tamas are described as psychological impurities. As in the case of tridosha, they also are very essential in all normal psychological discourses, but, when dominate over Satva, they become impurities. *Rajas* is impure due to its arrogant nature (roshamsa) and *Tamas* due to ignorant nature (mohamsa).

1.5.6. Enumeration of Dosha

The word tridosha clearly denotes that the somatic doshas are three in number. But, there was an attempt from the side of Susruta to establish Rakta as another dosha considering the following facts:

- Rakta is described to have specific seats (yakrit & pleeha)
- Rakta has specific qualities (colour of indragopa, madhura rasa, paichilya etc.)
- Rakta has specific function like enlivenment (jeevana)

- Rakta has its own specific causes for vitiation (drava-sigdha-guru food, day sleep, exposure to heat, injury etc.)
- Rakta has its own pathological manifestations (diseases) like vidradhi, pleeha, vatarakta etc.
- Vitiated Rakta has its own specific treatment (raktamoksha)
- In spite of all the above arguments to prove the doshatva of rakta, it cannot be considered as a dosha due to the following reasons:
- Rakta is explained as dhatu, formed by the transformation of Rasa.
- Yakrit and pleeha becomes the seat of Rakta, due to its connection with pitta where Ranjakapitta is explained to be located in those organs (as per Susrutasamhita)
- Rakta is explained as one seat of pitta (in AH). One dosha can not be a seat of another dosha because they represent three entirely different domains activities in human body.
- Rakta cannot be vitiated independently by any causative factor without the involvement of Vata, pitta, kapha either in single or collectively. So, Rakta is not another dosha.
- While enumerating doshas Vagbhhata use the term "*samasatah*`" (means briefly) and Caraka use "*doshasangraha*" (means doshas summarised). Both the above terms indicates the possibility of many doshas; by the way of innumerable combination of the three. It is like summarising the whole universe and its material content into panchabhuta or triguna.

1.5.7. Structural Basis of Tridosha

Even though doshas are omniscient in the body, some sites are marked as their specific sites; by considering many aspects regarding production, dependence, composition and functions of doshas shared with such specific areas. One among the sites will be the chief location. The chief location is considered so, with mainly three logics:

- A location where doshas are produced during digestion of food.
- A location where maximum activity of a particular dosha is reported.
- A location where, during treatment, the vitiated doshas can be easily tackled or eliminated.

In a gross anatomical outline of human body, if the body is landmarked into three areas upright down, the lower part dominates with Vata, middle body Pitta and upper part Kapha. This allocation explains the areas where the corresponding doshas exhibit maximum activities. This order prevails if the internal tract (alimentary tract) is grossly divided into three portions – pre-processing area (stomach and above), processing area (duodenum and small intestine) and post-processed area (colon, rectum).

Table 1.5.2. Important sites of Tridosha (Vagbhata)*

Vata	Pitta	Kapha
Pakvasaya**	Nabhi**	Uras**
Kati	Amasaya	Kantha
Sakthi	Sveda	Sira
Srotra	Lasika	Kloma
Asthi	Rakta	Sandhi
Sparsana	Rasa	Amasaya
		Rasa
		Pitta – Pakvamasayamadhya

* *According to Susruta Chief sites are: Vata – sroni, guda, Kapha – Amasaya*

*** Chief sites according to Vagbhata*

Among the sites mentioned above, the dhatus are said to be having dependent-depended (asraya-asrayee) relationship with doshas in a peculiar way. Vata depends on Asthi, pitta on Sveda and Rakta and kapha on all other dhatus.[11] As a general rule, factors causing increase/decrease in a dhatu cause the same change in the corresponding dosha; and vice-versa. But, in the case of Vata and Asthi the relationship is reciprocal. Because, increase of dhatu always cause decrease in Vata. Human body is composed of different channels (srotases). Whatever entity the body bears, all of them has their own channels in the body.[12] But, as the doshas are existing in each and every microscopic unit of the body, there is no separate channel for them, or, all the channels tends to conduct them in the body.

1.5.8. Production Of Tridosha In The Body

Even though Ayurveda is based on the tridosha theory, the basic doctrine revolves round its concepts of food and nutrition. It is no doubtful that body is the product of food (aharasambhavam vastu). *Dhatus,* the structural component s of human body is explained to have direct sequential origin from the food; but, dosha, is not so explained directly. Production of dosha from food can be illustretd by the following concepts mentioned in our textbooks.

1. Food is basically *rasapradhana*. Each rasa finally affects human body by way of decreasing/increasing the doshic functions as a whole. The relationship between Rasa & Dosha explains the fashion by which food increase/decrease dosha.
2. The stages of digestion is divided into three (avasthapaka) anatomically related to the upper, middle and lower part of the alimentary tract. These three parts physiologically represent kapha, pitta & vata respectively. This representation comes from two aspects of digestion:
    a. The upper part represents the slow digestive processes where sweet taste has the predominance. The middle portion has predominance of amla and lower part, katu. So, these three distinct stages increases Kapha, Pitta and Vata respectively.
    b. Anatomical locations of doshas are otherwise fixed as upper, middle & lower part of human body. So, they are the areas of maximum activity of the respective dosha.

3. The end digestion (nishtapaka) is said to be having predominantly three vipakas. These three vipaka has sure roles in the production/ maintenance of three doshas. Madhuravipaka, Amlavipaka and Katuvipaka promotes Kapha, Pitta and Vata respectively.

The chief repositories (mulasthana) of doshas are said to be related to the centres of their production during digestion. Amasaya (or uras), pachyamanasaya (nabhi) and pakvasaya for kapha, pitta & vata respectively. The respective treatments (vamana, virechana & vasti) also emphasise the relationship with their centres. So, in short, it can be ascertained that, importance to those centres can be considered as the indicator of the relationship of doshas with the digestive process in human beings. No need to say, any concept in Ayurveda confers finally with their connection with the digestive process in the body (agnimulam balam pumasam).

1.5.9. Variations of Tridosha

1.5.9.1. Tridosha In Relation to Physiological Variables

Doshas influence the variable contents of human physiology. This concept is mainly elaborated in relation to bio-fire (agni), the channel system (srotas represented by koshta) and the biological identity of a person (prakriti).

Table 1.5.3. Tridosha – relation to physiological variables

Dosha	Variables *Agni*	*Koshta*	*Prakriti*
Vata	Vishamagni (fluctuating digestion)	Kroorakosht ha (absorptive tract)	Vataprakriti (heena)
Pitta	Teekshnagni (rapid digestion)	Mridukoshta (secretive tract)	Pittaprakriti (madhyama)
Kapha	Mandagni (slow digestion)	Madhyakoshta (equally absorptive & secretive), but, prone to have mandagni & kapha symptoms	KaphaprakiritI (uttama)
Tridosha	Samagni (balanced digestion)	Madhyakoshta (moderate, most healthy)	Sannipataprakriti (sreshta)

1.5.9.2. Variations of dosha – possible gradation

As the doshas are highly dynamic in nature, they are always subjected to variations, influenced by many factors to which human body is exposed. Some of the variations are merely within normal limits but some others are potent enough to produce symptoms and/or diseases. Various possible variations are represented in the figure given below.

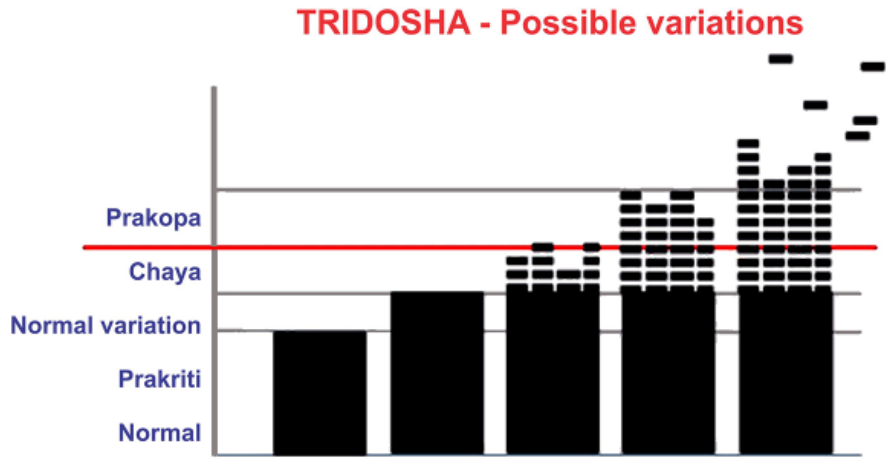


Fig. 1.5.9.3. Normal (physiological) variations of tridosha

Doshas has a dynamic equilibrium always till the body maintains health. Dynamic equilibrium means they can be subjected to variation by the influence of many factors, but that variation ranges to a limit where it does not cause diseases, but, shows vulnerability to predispose diseases or increase the severity of symptoms related to that particular dosha. The variations are mainly related to age, diurnal pattern, nocturnal pattern, stages of feeding etc.

Table 1.5.4. Normal variations of tridosha

Dosha	Factors promoting doshas			
	Age	**Daytime**	**Night time**	**Digestion**
Vata	Old age	Evening	Late night	Final stage of digestion (after aggressive anzymatic activity)
Pitta	Middle age	Mid-day	Mid night	Middle stage of digestion (stage of maximum enzymatic activity)
Kapha	Early age	Morning	Early night	First stage (before aggressive enzymatic activity)

1.5.10. Concept of Vata

1.5.10.1. Etymology

Vata is derived from the root *va* which means *gati* (means movement) and *gandhana* (means information, intimation and hint).[13] That means vata is the primary motive force behind all types of movements (cheshta) and knowledge (jnana). Sareeravayu (somatic motive force) shows similarity with the wind present outside (*lokavayu* - atmosphere or wind) with respect to the mobility caused by it. This mobility is the life sustaining force of the body when in normal limits; but becomes easily destructive when vitiated. In Vaiseshika system, it is well demonstrated that *prana* (sareeantassancharee prana) is the representative portion of Vayubhoota in living organisms.

1.5.10.2. Importance of Vata

In a statement Bhela explains that life exists as long as Vata lasts in the body. Movement in the body is indicative of life itself. The biological vata is not only mobile but keeps other elements (pitta, kapha, dhatus and mala) in motion. Being the controlling force, swift in action and strong, it can easily vitiate others also so that the range of complications due to the vitiation will be more when compared to other doshas.*

1.5.10.3. Physical properties of Vata

We generally describe the qualities of vata as rukshadi guna ie, dryness (ruksha), lightness (laghu), coldness (seta), roughness (khara),

minuteness (sukshma), mobility (cala) as described by Vagbhata.[14]We always stress on these qualities due to the following reasons:

Increase of vata in the body can be assessed easily through identifying the above qualities.

Application of the opposite qualities (snigdhadi) tends to pacify increased vata (application of samanya-visesha sidhanta). Even though these qualities are physiologically significant, some other qualities are essential to describe the real character of Vata. They are: Invisibility (amurtatva), Instability (anavasthitatva), Self-existence (svayambhu), Unexplainable activities (acintyaveerya), Endorsing nature (Yogavahi), Not perceivable but with well defined activities (Avyakta & vyaktakarma),

1.5.10.4. Normal activities of Vata

Activities of Vata in human body are explicitly explained in Caraka Samhita.[15] It is *tantrayantradhara* (Tantra means body ; yantra means machinery; Tantrayantradhara means controller of machinery of the body), It is the originator of every activities of human body, It stimulates and conveys all senses in the body, It is controller of mind and conductor of mental activities, It stimulates digestive fire, It regulates the circulation of tissue fluids and elimination of excretory materials, It dries up excess moisture of the morbid elements in the body, It divides and defines the channel systems in the body, Controls the formation of foetal organs, it controls functions like respiration (uchvasa-nisvasa), psychomotor activities (cheshta), proper functioning of

natural urges (vegapravartana), proper circulation of tissue nutrients (dhatugati) and proper acuity of sense organs (indriyapatava).[16] Enthusiasm (utsaha) is the typical activity of vata. Apart from these general functions, vata serve the body by performing specific functions at different sites by taking forms of five types like prana, udana, vyana, samana and apana.

1.5.10.5. Features contributed by qualities of vata to the body

While describing different *doshic prakritis* Caraka correlate the features of the *prakriti* with the qualities of the corresponding *dosha*. In the case of *Vata* it goes like the following.[17]

Table 1.5.5. Features contributed by qualities of *Vata*

Qualities	Features in the body
Ruksha	Dry, emaciated, malnourished body, obstructed flow less speech with feeble voice
Laghu	Lightness of body, inconsistent gait, inconsistent feeding habits
Cala	Lack of firmness in activities, thoughts, looseness of joints, unsteadiness of eyes, eye-brows, lower jaw, lips, tongue, head, shoulders and limbs.
Seeghra	Aggressive initiation of activities, aggressive attitude, acute emotional expressions, fast acquisition & easy loss of knowledge
Seeta	Inability to withstand cold
Parushya	Rough skin, hair, nail and dry mouth
Vaisadya	Cracking of skin and organs, crepitus of joints,

Table 1.5.6. Subdivisions of Vata

Name of Vata	Chief location	Functions	Remarks
Prana	Moordha (AH), Hridaya, nabhi (Sanrg.), Territories: Uras, Kantha, Vaktra (Su)	Dharana of buddhi, hridaya, indriya and chitta,control of sneezing, spitting, belching and deglutition	Initiation and maintenance of wakefulness, vasomotor functions, control of sensory and cognitive system, respiration and reflexes
Udana	Uras, Nasa, nabhi, gala	Verbal expression (vakpravritti), effort (prayatna), stimulation (urja), vitality (bala), complexion (varna), memory (smriti)	Process of phonation, functioning of lungs, related vitality etc.
Vyana	Hridaya, Whole body	Motion (gati), extension (prasarana), withdrawal (akshepa), blinking of eyes (nimesha), proper ejection of rasadhatu in the body (C.S), (Su), yawning (jrimbha), perception of taste (annasvadana), cleansing of channels etc.	Controls psycho-motor activities (voluntary) and involuntary activities like circulation.
Samana	Adjacent to agni (AH), Channels of sveda, dosha & ambu Entire koshta (AH), Amasaya & pakvasaya (Su)	Stimulation of agni, separation from nutrients from residue (sara-kittavibhajana), receiving, digesting, separating, releasing food during digestion.	Controls the muscular activities and movement of digestive principles which assists the activity of agni.
Apana	Lower abdomen (apana)	Defecation, micturition, menstruation, ejaculation, parturition	Control natural reflexes of the lower part of the body.

1.5.10.6. Subdivisions of *Vata*

Even though *vata* pervades all over the body, functionally it is subdivided into five pertaining specific centres and functional domains. It is to describe the precise specific functions of vata related to different regions of body. They have functional integrity and mutuality in all respects; better to say, the co-ordinated activity sustains life.

1.5.11. Concept of Pitta

1.5.11.1. Etymology

The term pitta is derived from the root *tap,* which has three meanings: heating (*santapa*), combustion (*daha*), and divinity (*aisvarya*).[18] *Paka* generally interpreted as *parinama* is the effect brought about by pitta in a living organism. In short, pitta is said to be the factor behind metabolism in human body.

1.5.11.2. Importance of pitta

The theories of digestion and metabolism in Ayurveda are based on concept of pitta. Pitta represents the fire principle in human body.[19] But the properties of pitta is substantially different from that of the fire outside by way of adopting bio-sustainable qualities like drava (liquidity), snighda (unctuousness) etc. This difference primarily indicates that such principles in human body which represent the corresponding principles outside works in human body through some biological modifications so that they are not becoming as destructive outside. Fire outside, even though causes *paka*

(combustion), often brings out highly destructive changes to whatever subjected to it. That much destructivity is not shown by the digestive principles inside the body. So, the biological version of fire, ie, pitta becomes hot (ushna) as well as liquid (drava-snigdha). This paradox makes the identity of pitta in human body.

1.5.11.3. Comparison with Agni

Being similar in ativity ie, *paka* and *daha* pitta is described as the fire (agni) present in human body. Chakrapani while commenting on the Agneyatva of pitta explains that the term *pittantargata* does not mean that pitta is the flaming fire in the body but it refers to the phenomenon of heat associated with pitta. While considering the differences between agni and pitta (see the table below) it can be concluded that pitta is an *agneyadravya* (a dravya with predominance of agni) but not agni itself. It is known as agni (jatharagni or antaragni) because of the similarity in activity. Moreover, as per Vaiseshika concept gastric fire (Audarya agni) is one among four types of Karya of agnibhuta.

Table 1.5.7. Comparison of Agni & Pitta

Character of Pitta	Character of agni
Snigdha	Ruksha
Fluidity (drava, sara)	Not fluid, not solid (to be precise plasma state)
Taste – Katu, amla	No taste
Smell of raw meat	No smell

Sometimes there can be suitable modifications to the character

of pitta to suit a desired activity. Take the following examples: Jatharagni (pachakapitta) has dominance of agneyatva and dormance of *dravasvabhava*.[20] This is for making itself suitable for the activity of digestion. Digestion in human being has two aspects: *paka* (combustion) and vivechana (segregation). Paka is brought about by *Ushna* property and *vivechana* by *teekshna* property. When the teekshan property has to prevail in pitta naturally drava-saumya properties should be in a dormanty state. That is why pachakapitta is said to be *tyaktadrava svabhava*. So, pitta is broadly classified into: *Sadravapitta* & *Nirdrava pitta*.[21] Pitta is having snigdha property. When this property is lost and ruksha property prevails, (that means, it becomes more similar to the external fire) that situation is causing *jvara*. (*ruksham hi tejo jvarakrit*)

1.5.11.4. Physical properties of *Pitta*

Pitta is said to have the following properties: (Pitta is more formed *(moorta)* than Vata so that their physical properties are more appreciable directly)

Table 1.5.8. Physical properties of *Pitta*

Character	Vagbhata	Susruta	Caraka
Colour	Any colour other than red and white	Blue, yellow (blue in ama state and yellow in pakva state - Dalhana)	
Taste	Katu, amla	Katu in normal taste and amla in vidaha state	Katu, amla
Smell	Smell of raw meat (visra)		
Consistency	Fluid (drava)		
Other qualities	Unctuous (snigdha), sharp (teekshna) hot (ushna), light (laghu), flowing (sara)	Ruksha, vaisadya	Same as Vagbhata

1.5.11.5. Normal activities of Pitta

Susruta explains the following activities of pitta.[22] Vagbhata explains the types of pitta by considering these activities.

Table 1.5.9. Normal activities of Pitta (Susruta)

Sl No	Activity of pitta as explained by Susruta	Name suggested by Vagbhata
1	Aids in the production of normal colour and complexion (ragakrit)	Ranjakapitta
2	Helps in the process of digestion and metabolism (paktikrit)	Pachakapitta
3	Assists the production of ojus (ojokrit)	
4	Facilitate vision: perception of colour and light (tejakrit)	Alochakapitta
5	Control the production of body heat (ushmakrit)	Bhrajakapitta
6	Help to maintain intellectual functions (medhakrit)	Sadhakapitta

1.5.11.6. Features contributed by qualities of Pitta to the body

Pitta causes the following effects in the body when it is under normal limits : digestion (pakti), eye sight (darsana), adequate digestive power (matratvam ushmanah), normal complexion and lustre (prakritivarna), valor (saurya), pleasure (harsha) and positivity (prasada). And on the other side when crosses the limit it causes the opposite effects such as poor digestion (apakti), loss of vision (adarsana), inadequate digestive power (amatratvam ushmanah), discoloration (vikritvarna), fear (bhaya), anger (krodha) and confusion (moha).[23] While describing different *doshic prakritis* Caraka correlate the features of the *prakriti* with the qualities of the corresponding *dosha*. In the case of *Pitta* it goes like the following.[24]

Table 1.5.10. Features contributed by qualities of Pitta to the body

Properties of Pitta	Features contributed by the property
Ushna	No tolerating hot things/climate, hotness of body, many moles, spots on the skin, excessive thirst and hunger, excessive wrinkling of skin, greying of hair, brownishness and lack of thickness of hair
Teekshna	Aggressiveness and valour, teekshnagni, excessive intake of food & drink, not withstanding troubles,
Drava	Looseness & softness of muscles & joints, excessive quantity of sweat, urine & faecal matter
Visra	Foul smell of body, mouth, axilla etc.
Amla, Katuka	Less quantity of semen, libido & reproductivity

1.5.11.7. Subdivisions of pitta

As mentioned above, Vagbhata classifies pitta into five as the functional divisions located in different centres suitable for corresponding activities.

Table 1.5.11. Sub divisions of *Pitta*

Name of pitta	Chief location (Mulasthana)	Functions	Remarks
Pachakapitta	In between Amasaya & Pakvasaya or Pittadharakala or Grahani	Proper digestion of food, segregation of food into sara & kitta, nourishment of other pittas	Activity of digestive enzymes
Ranjakapitta	Amasaya (AH), Yakrit pleeha (Su)	Colouring of Rasa to produce rakta	Hemopoeitic activity
Bhrajakapitta	Tvak	Making skin lustre, digestion of lepa, abhyanga, etc. applied on the skin (AS, SS)	
Sadhakapitta	Hridaya	Achieve the objects intended by buddhi, medha & abhimana	Psycho-modulatory principles (chemical activities)
Alochakapitta	Netra	Power of visual perception	Electrochemical changes responsible for vision

1.5.12. Concept of Kapha

1.5.12.1. Etymology

The term slehsma is derived from the root *'slish'* which means *alingana* (to embrace) or to put things together. In that sense kapha is taken as the factor behind the accumulation of different principles in the human

body. In another words, all the functions of Vata & Pitta conducted in the body gets the corporeality (moortatva) due to the presence of Kapha. The term Kapha has another word meaning – *kena jalena phalati iti kapha* (that which is the product of water).

1.5.12.2. Importance of Kapha

The above definition explains the basic relation between kapha and water, both stand as biological principle behind unctuousness (*snigdha*) and binding. The ultimate effect brought about by *Kapha* is body is its capacity to grow and to preserve things inside the body. In that sense, kapha stands for protection, preservation and integration of bodily functions. Most of the time, in normal conditions kapha is explained as *bala* (immunity) and *ojus* (*apara ojus*) which directly implies the protective activity shown by it. *Kapha* is the *soma* principle present in the body, which when normalised and vitiated produce healthy and harmful effects in the body respectively. Under normal conditions, Kapha is responsible for firmness (*dardhya*), growth (*upachaya*), enthusiasm (*utsaha*), fertility (*vrishata*), knowledge (*jnana*) and intellect (*buddhi*). Whereas under abnormal conditions kapha becomes responsible for slackness (*saithilya*), emaciation (*karsya*), laziness (*alasya*), infertility (*kleebata*), ignorance (*ajnana*) and confusion (*moha*).

Table 1.5.12. Physical properties of *kapha*

Character	Vagbhata
Colour	Whitish and transparent
Taste	Madhura
Touch	Cool (seeta), soft and yielding (mridu & mrtsna), unctous (snigdha), slimy (pichila – in sama condition), viscous (vijjala), and smooth (slakhsna)
Consistency	Firm (sthira), dense & compact (sthira)
Other qualities	Heavy (guru), inactive (manda)
Quantity	Six anjali s (CS)

1.5.12.3. Normal activities of kapha

Susruta explains five main functions for kapha. They are:

1. Keeping together and lubrication of joints (*sandhisamslehsna*)
2. Promotion of the unctuousness of body (*snehana*)
3. Promotion of healing (*ropana*) due to *saumyaguna*
4. Conservation of nutrients (*poorana*) due to the qualities of abundance (*bahutva*) and corporeality (*murtatva*)
5. Promotion of strength and resistance to delay and confers stability and firmness to the body particularly at the trikasandhi (*sthairyakrit*)
6. Dalhana states that tissue building (brimhana) or satisfying (tarpana) are also added to the the function of kapha by some acharyas. According to Vagbhata, kapha promotes activities like Stability and sturdiness (sthiratva), unctuousness, binding together (bandha), compactness of joints (sandhibandha), fertility (vrishata), forbearance (kshama), intelligence (dhee), and fortitude (dhriti).

Table 1.5.13. Functions of Kapha – Summary

Biological	Psychological
Unctuousness, Binding	Forbearance, fortitude, greedlessness, Stability, firmness, sturdiness, Sexual enthusiasm, intelligence stamina & fertility, Immunity, Healing

Table 1.5.14. Effects of qualities of Kapha in human body

Properties of Kapha	Features contributed by the property
Snigdha	Oily skin (snigdhanga)
Slakshna	Smooth skin (slakshnanga)
Mridu	Fare in appearance and complexion
Madhura	Increased fertility & vigour (prabhutasukla)
Saara	Stout, well built and firm body (saara-samhatata-sthira sareera)
Sandra	Well grown, well structured (upachita-paripoorna)
Manda	Slowness in activities, eating & other movements (mandacheshta-ahara-vyahara)
Stimita	Delayed initiation of activities (aseeghrarambha)
Guru	Stout body, firm steps (avasthitagatayah‘)
Seeta	Less appetite, thirst, heat & sweat (alpakshut-trishna sveda)
Vijjala	Well structured joints (suslishtasaraandhibandha)
Acha	Pleasant facies (prasannadarsana)

Table 1.5.15. Sub-divisions of Kapha

Name of subdivision	Location	Functions
Avalambaka	Chest	1. Supports trika with inherent power (atmaveerya)
		2. Supports heart by annaveerya
		3. Supports the other kaphas by ambukarma
Kledaka	Amasaya (Vagbhata)	1. Liquefaction of food in amasaya
	Upper part of amasaya (Chakrapani)	2. Benefits the remaining kaphasthanas (Su)
Tarpaka	Head	Nourishes and soothens the sense faculties in the head
Bodhaka	Tongue	Enables taste perception
Sleshaka	Joints	Lubrication of joints.

1.5.13. Tridosha In Health

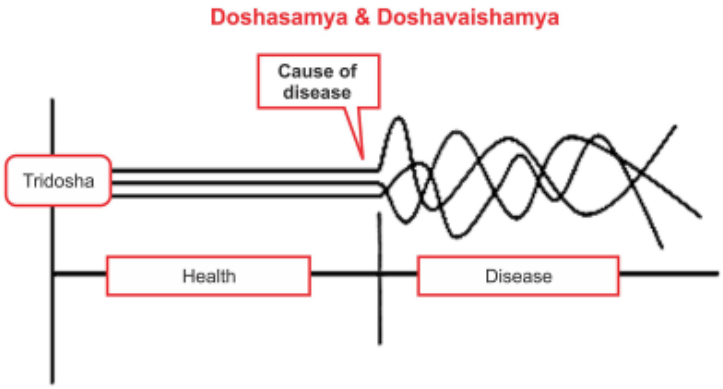
The basic minimum definition of health in Ayurveda is “health is the harmony of doshas”.[25]The definition of svastha given by Susruta explains that the harmony pertains to dosha, agni, dhatu, mala, atma, indriya and mana.[26] That means health is multi-factorial. But all the factors converge at tridosha because all of them cause health or ill-health as they are mediated

through the platform of tridosha in human body. Even though doshas are mutually contradictory in characters, they are co-existing without mutual interaction as in the case of triguna existing in the universe.

1.5.14. Tridosha in Diseases

Tridoshas are the material cause (*upadanakarana/ samavayeekarana*) of health and diseases. We get three famous examples to explain how they take part in the process of disease manifestation:

As if a bird flying the whole day here and there never goes apart from its shadow, all the diseases cannot be apart from the influence of doshas in anyway. The clouds present in the sky (present always but, not causing rain & lightning always), produce rain and lightning triggered by some causes (say wind). Likewise, doshas are always in the body, but, they develop a disease triggered by sufficient and suitable causes. The water in the sea, present always, develops waves and froth only when agitated by wind. Likewise, doshas present always in the body, presents into diseases when agitated by some causative factors. Also, waves in the sea is

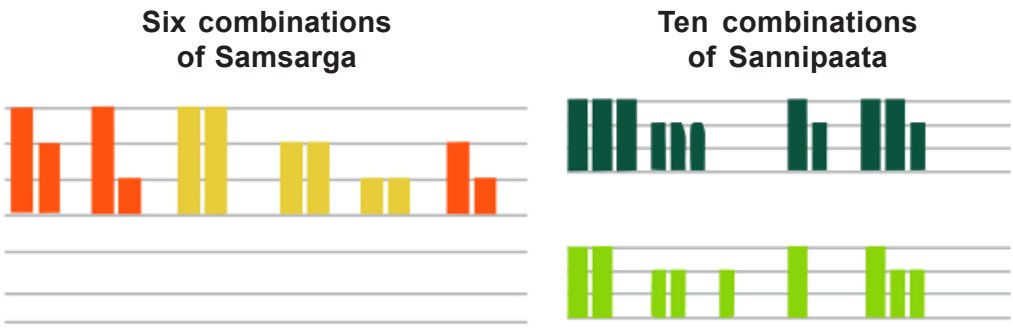


not another *thing*, but, another form of water, likewise, disease in the body is not another product but another form of the same dosha.

1.5.14.1. Disharmony of doshas (doshavaishamya)

Varieties of doshavaishamya

If health is explained as the harmony of tridosha, definitely disease is their disharmony. This disharmony happens in two ways: decrease (*kshaya*) and increase (*vriddhi*). In an abnormal status they are capable of vitiating other factors so that they can give rise to a morbid atmosphere inside the body.



Moreover, in a state of dis-harmony they can become mutually interactive (*anyonyamoorchana*) which results in a morbid status of the internal environment. Combination of two doshas in vitiated status is called *samsarga*, stage where three doshas are involved is called sannipata. They in turn can happen in three degrees – *utkarsha, madhya* and *alpa*. The samsarga can happen in six ways and sannipata in ten ways. Total number of combinations of dosha (doshavikalpa) will be sixty three considering single and combining status of doshas.

1.5.14.2. Causes of doshavaishamya

There are three basic causes for doshavaishamya. They are otherwise called instrumental causes (nimittakarana). They are otherwise called the predisposing causes, triggering causes or immediate causes. The material cause (samavayikarana) for any disease is tridosha and the formal cause is doshavaishamya. The nimittakaranas are: Seasonal variations (kalaparinama or simply parinama), Faulty use of sense organs (asatmyendriyartha samyoga) & Improper physical, mental and verbal activities (prajnaparadha). The three nimittakaranas are again of three varieties in terms of excessive exposure (atiyoga), inadequate exposure (heenayoga) and improper exposure (mithyayoga). Their optimum exposure is said to be the cause for health. That means which ever agents contribute to the healthy status of a living organisms, the same factors in an altered or perverted status bring out disease.

1.5.14.3. Stages of doshavaishamya

As stated doshavaishamya can happen in two ways – increase (vriddhi) or decrease (kshaya). Among these two, doshavriddhi is said to end up in the occurrence of disease because it can develop into different stages of disease. Doshakshaya, instead, cannot develop disease, because it cannot progress into various stages. They can only exhibit symptoms related to the corresponding decrease of dosha. Aggravated doshas manifest signs and symptoms depending on the degree of variation. The aggravated doshas are also the causative factors of a disease. Caraka School and Susruta School show marked difference in describing different stages of doshavaishamya.

Caraka (and also Vagbhata describe doshavriddhi in two stages. Chaya and prakopa. Chaya is the accumulation of the dosha in its own place. This stage is characterised by vague symptomatology such as dislike for the factors responsible for the increase of doshas and desire for the factors which are opposite to the doshas involved. Prakopa is the stage in which, doshas in chaya state being further excited by appropriate causes, begins to circulate to other parts of the body (anyamargagamana). This is known as prakopa precipitated after chaya (*chayapoorvaka*). Sometimes some potent causes can bring doshas directly to the state of prakopa, such a stage is called *achayapoorvaka*. In *prakopa* actual occurrence of symptoms, uneasiness and manifestation of disease occurs.

Susruta, who belonged to Dhanvantareeya School of surgeons, had to deal with diseases of surgical importance, which have distinct and well defined stages of pathological development of diseases. Therefore, to explain the different stages of *doshavriddhi*, he has described six stages of *Kriyakala*. The concept of *Kriyakala* not only describes the well defined stages of in the development of diseases but also appropriate measures to correct the doshic disturbance and to prevent or check further progress of the diseases. The stages are:

Stage of accumulation (*Chaya*), Stage of provocation (*prakopa*), Stage of circulation (*prasara*), Stage of localization (*sthanasamsraya*), Stage of manifestation (*vyakti*) and Stage of resolution (*bheda*).

1.5.14.4. Status of doshas in diseases

Signature features (atmaroopa)

Atmaroopa is mentioned in Caraka Samhita as the sure indicators of particular dosha in a pathological condition. They are the features of doshas by eliciting which (completely or partially) one can assume the sure presence of that particular dosha. At the stage of *sthanasamsraya*, these *atmaroopa* can produce different activities thus exhibiting corresponding symptoms at the site.These features when localised in various sites makes various symptoms related to the disease.[27]

Table 1.5.16. Signature features (atmarupa) of Tridoshas

Vata	Pitta	Kapha
Raukshya	Aushnya	Sneha
Saitya	Taikshnya	Saitya
Laaghava	Dravatva	Sauklya
Vaisadya	Anatisneha	Gaurava
Gati	Suklaarunavarjya-varna	Maadhurya
Amoortatva	Visragandha	Sthairya
Anavasthitatva Saratva	Katukaamlarasa Maartsnya	Paichilya

1.5.14.5. Symptoms of aggravation (vriddhilakshana)

Vriddhilakshanas are the general indicators of the role of a particular dosha in the process of pathogenesis. Even though they are

indicators of a particular dosha, they are not disease specific. They can be taken as a students guideline for assessing clinical conditions, but, not a practitioner s guideline. Sometimes they help in differential diagnosis or to put a hypothesis regarding a disease in the situation of disputed diagnosis.

Table 1.5.17. Vriddhilakshana of doshas

Dosha	Symptoms of aggravation
Vata	Emaciation (karsya), Cyanosis (karshnya), Desire for heat (ushnakamitva), Tremor (kampa), Distension (anaha), Constipation (sakritgraha), Altered states of strength, sleep, sense faculty (bala-nidra-indriyabhramsa), Disoriented speech (pralapa), Giddiness (bhrama), Weakness (deenata)
Pitta	Yellowish discoloration of skin, eyes, urine & stool (peetavinmootranetratvak), Excessive thirst and hunger (khut-trit), Burning sensation (daha), Loss of sleep (alpanidrata)
Kapha	Coldness (saitya), Palor (swaitya), Looseness of body (slathangatva), Breathing trouble (swasa & kasa)

1.5.14.6. Morbid activities of doshas (vikrita/ prakupita karma)

The vikritakarmas are the indicators of the pathological processes initiated at the different sites. That means they are important at the stage of sthanasamsrya of a disease. They explain the basic mechanism of dosha action at different sites. The same activity can produce different

effects in a disease pathology according to the peculiarity of the site (tissue) affected. For example the *sramsa* activity of *vata* can result in many results like prolapses, intussusceptions, ptosis, hernia etc. according to the site affected.

Table 1.5.18. Morbid activities (Prakupitakarma) of doshas

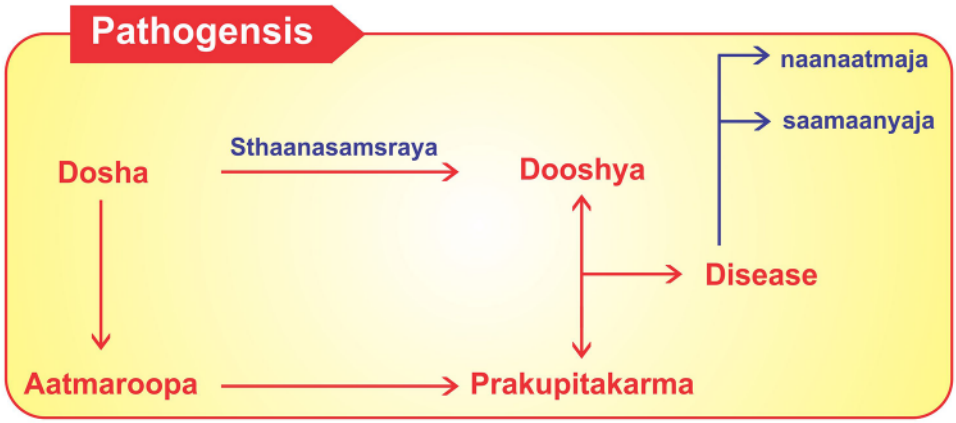
Vata	Displacement (sramsa), dialatation (vyasa), churning pain (vyatha), numbness (svapa), weakness (sada), pain (ruk), throbbing pain (toda), cutting pain (bhedana), obstruction (sanga), body pain (angabhanga), constriction (sankoca), hoorripilation (harchana), blockage (stambha), roughness (parushya), porosity (saushirya), wasting (sosha), fasciculation (spandana), astringent taste in mouth (kashayarasata)
Pitta	Burning sensation (daha), reddishness (raga), rise of temperature (ushma), suppuration (paita), sweating (sveda), oozing (kledasruti), gangrene formation (kotha), languor (sadana), fainting (murchana), intoxication (mada), sour-pungent taste in mouth (katukamlarasa). Colour other than pale & red (pandurarunavarjita varna)
Kapha	Excessive unctuousness (sneha), hardness (kathinya), itching (kandu), coldness (seetatva), heaviness (gaurava), obstruction (bandha), coating (upalepa), inactivity (staimitya), swelling (sopha), indigestion (apakti), excessive sleep (atinidrata), palor (svetavarna), sweet, salt taste in mouth (svadulavana), chronicity (cirakarita).

1.5.14.7. Morbid activities induced in tissues (dhatugatakarma)

Dhatus are otherwise called *dushyas* because they are the sites of acivities of vitiated doshas. Even when the diseases manifested in dhatus are called dhatugatavyadhis, originally they are due to the vitiated doshas at that particular site. It is only like burning with hot ghee (ghritadaha) that means, even though the burning is caused by ghee, actually the hotness of ghee is the real cause for burn, ghee always does not cause burn. In some diseases like jvara, kushta, etc. specific symptoms of dhatu involvement (dhatugata avastha) are mentioned.

1.5.14.8. Interrelationship between different status of Dosha

Diseases are of two types based on the degree of freedom of involvement of doshas in the pathology. They are in nanatmajavyadhi and Samanyajavyadhi. Nanatmaja diseases occurs when the localisation at different sites happens by involving a single dosha. Such diseases are enlisted for vata – 80 diseases, Pitta – 40 diseasesand Kapha – 20 diseases. In

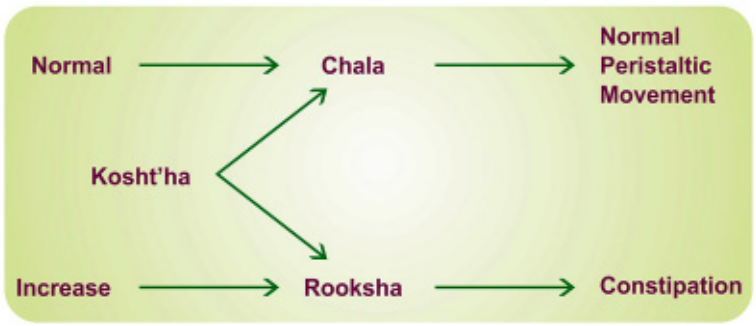


Samanyaja vyadhi sure involvement of all the doshas happens invariably. Some of the diseases like gridhrasi, pakshaghata etc. can have both the varieties. Almost all the nanatmajavyadhi show local pathology. The relationship between signature features (atmaroopa), morbid activities (prakupitakarma), and diseases can be illustrated in the following fashion:

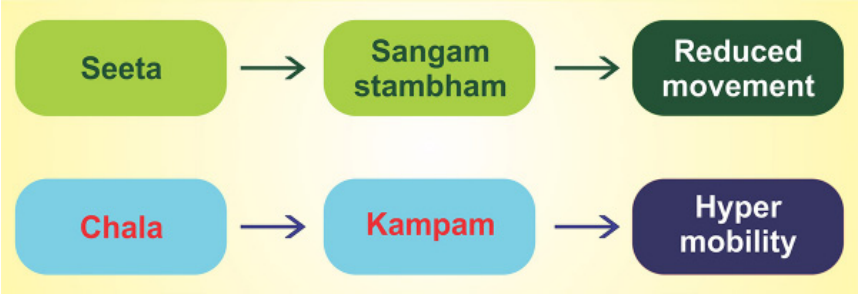
1.5.15. Critical comments on theory of Tridosha

1.5.15.1. Different rules derived about the Gunas of Doshas

Rule 1: All the qualities of doshas are not dominant always. Qualities dormant in normal state may become dominant in abnormal state. For example, if you consider the normal activities of Vata, like utsaha, uchawasaniswasa, cheshta, vegapravartana etc. the predominant quality behind all these activities is mobility (chala). But, when vata becomes increased features like stambha, malagraha, ushnakamitva etc. derive from seta, ruksha, seeta respectively which were dormant in normal state.



Rule 2: Quality dormant in one activity may become dominant in another activity in the same state of dosha. For example, take two abnormal activities of vata – kampa & stambha. They seems to be mutually opposite. It



happens in such a way that, kampa is contributed by cala guna and stambha by seetaguna.

Rule3: Quality dominant in one site/situation may be dormant in another site/situation. For example, ushna/teekshna guna of pitta is prominent when it contributes to teekshnagni (site is agni) whereas, at another site say, kosht ha, the sara/drava property is prominent ; thus making the kosht ha mridu. Take the other states of agni & kosht ha in the same way.

Rule 4: The subdivisions of doshas generally shows the predomianace of one or two qualities mentioned for the dosha.

1.5.16. Conclusion

1. Tridoshasidhanta is a theory which possibly explains the relationship between almost all variables to which human body is exposed.
2. Being based on fundamental natural observations, this theory does not need any alterations. By its nature it can extend itself to all possible phenomena occurring in human body.

3. Tridoshasidhanta satisfies the scope of

   a. A theory explaining the variability of factors

   b. A theory explaining multiple causation of health and diseases

   c. A theory explaining bio-dynamics in maximum precision.

Part - II

METHODOLOGY

Chapter - 1 **Methodology of Literary Comparison**

Chapter - 2 **Methodology of development of the new model**

Chapter – 3 **Methodology of the Experimental Part of the Study**

Chapter - 1

METHODOLOGY OF LITERARY COMPARISON

2.1.1. Introduction

The scholar himself, being a teacher having more than ten years experience in transacting basic principles of Ayurveda, confronted with many hardships in handling the classes for learners who are coming from a totally different learning premises. The scholar was used to collect teacher evaluation proforma from the students, seeking opinion of the students about the classes and quality of teaching. From the feedback of the students, and recollecting scholar's own feelings during the days he himself started learning Ayurveda, he could trace out some important missing links, which caused alienation from the concepts being transacted at the beginning. Open suggestions were also invited from students as a part of feedback. Almost always students mentioned about the feeling of gap between what they learnt so far and what they learn in Ayurveda curriculum. The gap was natural, since the learners are never properly introduced to Ayurveda prior to their admission to Ayurveda, the case is different with other medical streams like MBBS and BDS, since such courses keep continuity with the method in which they learnt before. The scholar considered the formative period of the new learners to

be very crucial in determining total quality of the learning experience. Abrupt transition from previous learning experience was counted to be the most noteworthy challenge to be handled by teachers during the stage of induction. It was this critical juncture the scholar sensed the necessity of a new model in transacting Ayurveda concepts. Tridosha was selected as the content of such experimentations considering the usefulness of the same in lifelong practice of Ayurveda.

The scholar also got some opportunities to deliver lecture classes to students in general education stream, +2 and high school stream; he adopted different methods to make an easy and convincing entry to the core concepts like Tridosha sidhanta. Even though such lectures were meant for sensitizing different groups of students, such experiences made the scholar convinced about some new methods which can bring out easy transaction of core concepts. Even then, such experiments were not capable of deriving conclusive and categorical inferences, because they were not supported by any of the educational theories or approaches. Lack of orientation on philosophies and methods of teaching was a main impediment. After discussion with educational experts, and after visiting different institutions performing Educational Research, the scholar developed good aptitude in teaching methods. Also, he attended many training programs and workshops which focussed on discussions regarding teaching reforms and teaching methodology. The idea of preparing modules having specific learning outcomes was a result of such trainings. As a part of updating the knowledge

of teaching methods, he visited reputed teacher training centres including Regional Institute of Education, Mysore (under NCERT) and collected relevant materials and had discussions with experts there.

During discussions with Research Guide, the scope of comparison of ancient teaching methods with contemporary teaching methods was one among points pondered. There were some worthy studies which compared the instructional methods in Upanishats with presently employed methods. Also, extensive works were available regarding ancient teaching methods, described with historical and philosophical insights. Even though Ayurvedic textbooks, especially Caraka Samahita explicitly described the methods of instruction suitable for medical teaching, such methods were not specifically examined for their relevance in the present era. So, along with the experimentations related to development of modules for transacting Tridosha sidhanta, critical review on the teaching methods described in Ayurveda Samhitas, especially Brihattrayee, also was selected as a topic for discussion in the present study. During an initial attempt to review such teaching methods, scholar as well as guide was convinced about the comparability of ancient teaching methods with contemporary teaching. This was the circumstance of deriving the main objectives of the studies, such as, a literary comparison about ancient and modern teaching methods and an experimental part to compare the efficacy of a newly developed model with conventional teaching.

2.1.2. Methodology of comparative study

2.1.2.1. Objectives

1. To make a critical analysis on Ancient Indian Methods of Instruction explained in Vedic sources, Buddhism and *Brihat-trayee*
2. To make a general comparison on the systems and methods of instruction available in the above sources.
3. To compare the methods mentioned in *Brihat-trayee* with those in contemporary teaching and learning.

2.1.2.2. Hypothesis

Basic elements of ancient teaching is similar to the principles and practices of contemporary teaching

2.1.2.3. Methodology

The comparison was made between Ancient Methodology of teaching and Contemporary Teaching. Ancient methods were taken in three distinct headings: (1) Those available in Ayurvedic literature represented in Brihat-trayee(2) those available in other sources related to Vedic tradition (3)teaching methods in Buddhist tradition. Such a distinction was made to evaluate how learning Ayurveda is different from the other two in content and construct. To get a historical outline on the nature of transition of education system during different periods, like medieval and modern ages, a rough evaluation on their merits and demerits was also made.

Finally, comparison was done between Ayurveda Teaching and Contemporary teaching by identifying items of comparison. Rough outline of comparative study is given below:

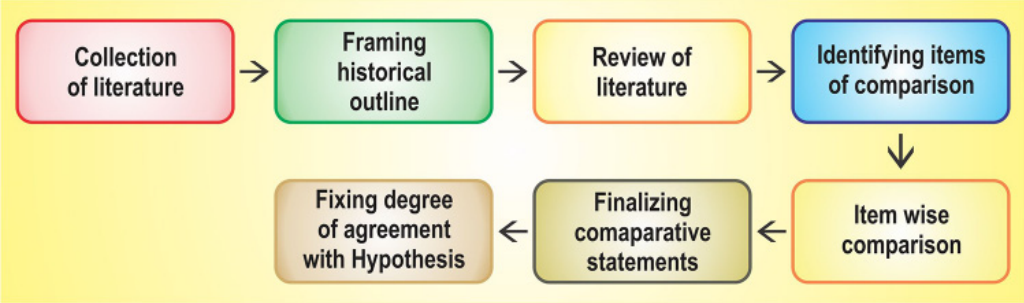


Fig.2.1.1. Methodology of Literary comparison

2.1.2.3.1. Framing a historical outline

Exploration of Ayurvedic teaching methodology would not be ideal without relating it with other preceding systems like Vedic, Upanishat, Buddhist traditions and changes during succeeding period viz. medieval and modern periods. The nature of teaching practices pertaining to each historical context may vary according to many influential circumstances related to the political and cultural state of affairs. As the present study attempts to compare teaching methods of widely different historical contexts, evaluating such systems would definitely throw insights in conceptualizing a new model. So, such an analysis is well necessitated. Historically the following stages were identified to make comparison of the system of teaching and learning:

1. Vedic / Upanishat Phase (2000 BC – 1000 BC)
2. Buddhist phase (1000 BC – 600 AD)

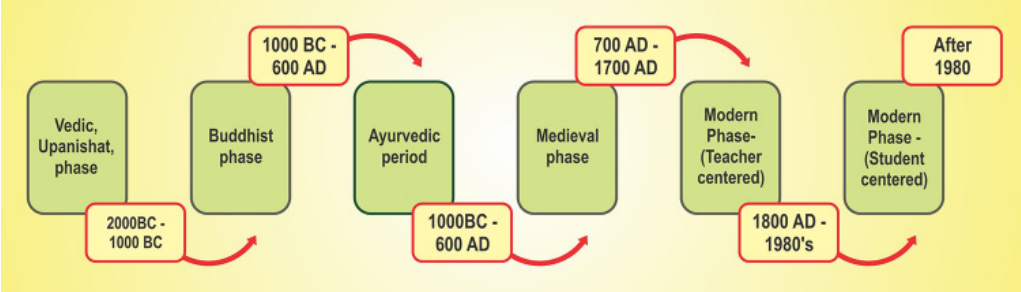


Fig.2.1.2. Time Frame for comparative study

3. Ayurvedic Phase (1000 BC – 600 AD)
4. Medieval Phase (700 AD – 1700 AD)
5. Modern Phase - Teacher centered (1800 AD– 1980 AD)
6. Modern Phase - student centered (After 1980).

2.1.2.3.2. Collection of material

Details regarding Vedic, Upanishat and Buddhist tradition were collected from available sources including internet. Details of Ayurvedic tradition of teaching were collected directly from Brihat-trayee with the help of presently available editions of textbooks, their commentaries and translations. Ayurveda tradition of teaching was traced mainly through three methods:

i. Compiling the direct explanation related to teaching, learning, system of teaching etc. from Brihat-trayee in the corresponding chapters where such details are available. The chapters are:

   1. Caraka Samhita – Vimanasthana 8th chapter – Rogabhishagjiteeya

2. Susruta Samhita – Sutrasthana – 1,2,4, 9 Chapters
3. Ashtanga Sangraha – Sutra – 2 - Sishyopanayaneeya

ii. Collecting the references which reflected methods of transaction indirectly.

iii. Exploring the whole textbooks to fix a probable sequencing of transaction considering them as a product of transactions between Guru and Sishya.

Collection of instructional principles of contemporary teaching was made from available sources including internet.

2.1.2.3.3. Identifying domains for comparison

After collection of materials, they were subjected to thorough examination to derive specific domains for further comparative analysis between methods of instruction in Brihattrayee and contemporary teaching.Finally the domains were fixed as follows:

a. System of education
b. Philosophy of education
c. Principles and Process of learning
d. Methods of transaction.

2.1.2.3.4. Comparison

1. Comparison based on systems of education: It was done based on ten points (as given below) where each point was compared with

reference to different phases of education as mentioned in the heading "framing the historical timeline" above. The ten points were:

i. Nomenclature of system of education

ii. Aims of education in each system

iii. Nature of curriculum

iv. Relation to social structure

v. Stages of education

vi. Nature of Guru-sishya relationship

vii. Role of student and teacher in transaction

viii. Students' autonomy

ix. Scope of collective thinking

x. Scope of interdisciplinary approach

After performing the above comparison, gross listing of merits and demerits of the teaching in different phases was also done.

2. Comparison based on philosophy of education was done between Ayurvedic teaching methods based on descriptions available in Brihat-trayee and contemporary teaching. Most important eight ideas related to educational philosophy in contemporary teaching were selected and taken as the baseline reference. Sample references/concepts which appears to be comparable with the above ideas were identified from Brihat-trayee and were compared.

3. **Comparison based on Principles and process of learning:** Principles and process of learningas explained in Brihat-trayee and relevant ideas from Darsana were taken and compared with comparable ideas from contemporary theories related to process of learning.

4. **Comparison based on methods of transaction**: General comparison of teaching strategies adopted from Vedic period upto present day teaching was done. Item wise comparison was done putting constructivist teaching methods as baseline reference.

5. **Specific comparison** was furnished between Principles and practices of Ayurvedic teaching and Constructivist teaching practices.

2.1.2.3.5. Finalizing comparative statements

Statement of comparison was finalized by incorporating conclusions from the comparison.Agreement with hypothesis was stated thereafter.

Chapter - 2

MMETHODOLOGY OF DEVELOPMENT OF THE NEW MODEL

2.2.1. Method of development of the new model

One of the main objectives of the present study is to develop an innovative teaching model in the form of a teaching module, comprising of key principles of traditional and contemporary teaching, especially constructivist approach. The following steps of formative evaluation under Evaluation Research were adopted in the development of the innovative teaching model.

2.2.1.1. Needs assessment

This process determined who needs the program, how great the need is and the possible methods to meet the need. Brainstorming sessions among undergraduate and post graduate scholars was performed for this purpose. The sessions were conducted separately among UG students and PG students. The session was based on two questions:

1. What are the main problems in learning concepts of Ayurveda?

2. What are your aspirations on an ideal teaching Tridosha sidhanta?

Students were given chance to express their ideas freely. The cardinal points were consolidated and considered while preparing guiding principles of the new model.

2.2.1.2. Evaluability assessment

This was conducted to determine the feasibility of the model and how the stakeholders can help shape its usefulness. A survey was conducted among teachers of Ayurveda College through a structured questionnaire (appendix-1).The questionnaire was aimed to draw up opinions of the teachers regarding need of a new model, nature of new model, value of conventional model, topics to be covered in an introductory phase, preference and weightage of topics in the new module, teaching strategies to be opted, expected skills to be attained by the learners after transaction, time structure of the new module, suggestions on suitable set induction and nature of assessments. Furnished questionnaire were collected, information were tabulated and gross suggestions were considered while preparing guiding principles of the new model.

2.2.1.3. Structured conceptualization

This was conducted to help stakeholders define the program of technology, the target population and the possible outcomes. A Focus Group Discussion was conducted to formulate the nature of new model. The

participants of Focus Group Discussion were selected by representing different aspects related to the development of new model. Subject experts (Ayurveda), Clinical teachers (Ayurveda), educational expert (outside Ayurveda), expert in developing new models, students' representatives (UG & PG Ayurveda) and Research methodologist constituted the panel of discussants. The discussion moderated by a research methodologist was pondering on cardinal points like concept and structure of teaching module, role of activity oriented modular teaching in enhancing process of learning, feasibility of modular teaching in Ayurveda, Concerns on developing module for transacting new and abstract ideas for a beginner in students' psychology point of view, feasible study design related to the present study, designing the content of module for transacting Tridosha Sidhanta for a beginner, designing the duration of implementation considering practical implications, designing the teaching strategies suitable for different subtopics of the content, designing strategies for outcome assessment and expected hurdles during module implementation (in terms of biasing, practical stringencies etc.). The guidelines and main report of FGD consisting of background, guidelines, details of participants, report and summary is attached as appendix 2.

2.2.1.4. Implementation evaluation

This was performed to monitor the fidelity of the program delivery in a real life scenario. A pilot trial was conducted among school children of class 12 and BAMS students. For this purpose a miniature module for transacting Tridoshasidhanta was prepared based on constructivist approach

and activity oriented learning (appendix-3). The module for three hours was aimed at familiarising the way in which Ayurveda approaches human being, understanding Tridosha as the basic physio-psychological principles which govern basic mechanisms of any living organism, formulating a statement for Tridosha sidhanta, identifying Gunas of Tridosha, easily by heart slokas corresponding to Tridosha sidhanta and Gunas of Dosha. The module adopted class room bound interactive approach consisting of teaching strategies like game, group discussion, proforma filling, tabulation activities etc. At the end of the class feedback from the learners were collected through a questionnaire to assess on perception of the learners towards the newly introduced concept, quality of teaching methods adopted, change in attitude towards Ayurveda, perception on teaching methodology.The results were analyzed and published as an article (appendix-4).

Table 2.2.1. Abstract of Pilot Trial

Purpose of the trial	To look into the feasibility of designing and constructing a new model to transact Tridosha Sidhanta to I BAMS students, incorporating scopes of Activity Oriented Learning.
Participants	(1) Group – 1: +2 students of Govt. Rajahs Higher Secondary School, Kottakkal (2) Group – 2: I BAMS Students of PNPS Ayurveda Medical College, kanhangad, Kerala
Objectives of the module	(1) To familiarize the way in which Ayurveda approaches human being

	(2) To build up Tridosha approach based on the Prakriti concept in Ayurveda (3) To learn characteristics of Tridosha in a constructivistic approach (4) To simplify learning of Sloka
Method of trial	The module for 3 hrs was implemented in two groups in class room settings and assessment was done through a feed back proforma.

Activities in the module

1. **Activity-1**: Learners were instructed to assess their Prakriti through simplified proforma prepared for this purpose. They were allowed to mutually interact to identify the features which need external apprehension, like color of hair, physical appearance, behavior etc. The features were given in the proforma in three columns representing each dosha separately without connoting their names.
2. **Group Discussion**: Learners were then divided into five groups to discuss and classify the items in the proforma to different domains identified as Physical, Psychological and Social. By this discussion they were expected to be convinced about the way in which Ayurveda approaches a normal human body. This idea was correlated with the famous definition of health by WHO.
3. **Activity-2**: Based on the Proforma given, the learner groups were then instructed to identify the key features in each column (representing one Dosha each) with the help of table supplied as study material. It was expected that they would classify 20 terms enlisted in the table (viz. mobility, stability, hotness, coldness etc.) into three classes each representing Vata, Pitta and Kapha.

4. **Brainstorming**: A brainstorming session followed was meant to elicit the distinguishing features of living organism from non-living beings. After enlisting the features, the Instructor led the discussion to identify three key principles governing all the physiological processes in a living organism – Viz, Movement, Metabolism and Growth.
5. **Lecture Discussion**: The three features were then etymologically connected to Vata, Pitta and Kapha, thus establishing them as the key principles of all physiological activities in a living organism. Through the above two steps it was expected that the learners would identify Doshas as biological entities in any living organisms, without compromising their present understanding of biology.
6. **Derivation of Sloka-1**: A statement for Tridosha sidhanta was derived after discussion "equilibrium of Doshas leads to health and disequilibrium to disease". With the help of Instructor the learners constructed Sloka describing the above concept (as depicted in Ashtangahridaya Sootrasthana).
7. **Derivation of Sloka-2**: The table prepared in step-3 was then subjected to further discussion to derive key characteristics of Tridosha (*Guna*) as described in Ashtanga Hridaya Sootrasthana. After enlisting the Gunas, guided by the Instructor, they were allowed to construct Sloka as depicted in Ashtanga Hridaya Sootrasthana.

Assessment

After completing the session, learners' feedback was recorded with the help of a structured feedback questionnaire. Feedback questionnaire was prepared so as to get an assessment on perception of the learners regarding Tridosha sidhanta, Teaching

methods adopted and attitude towards Ayurveda. General perception on the topic transacted also was considered. Perception on teaching methodology was assessed using five level Likert's scale.

2.2.1.5. Process evaluation

Process evaluation is the stage where the program is getting defined for its concept, content and form. This stage contains a long process starting from formulating the guiding principles, fixing the content and construct with their rationale, writing the model as a document, inviting expert comments from experts in the field and the implementation of the program through a trial. The above components are described below:

a. *Framing the guiding principles:* The ideas about the true nature of the new model, derived from the previous steps, are enlisted as guiding principles, with the help of guide and educational experts. These principles are kept as the blue print of the model to be evolved.

b. *Fixing the content and construct:*This phase was done through fixing the content, selection of teaching strategies, incorporating ideal construct of a teaching model and fixing the assessment tools.

    i. *Content* was fixed considering the suggestions from the previous steps. Distribution of the whole content into different units was done considering the previous experience of the scholar in dealing the subjects in the class as well as by

inviting suggestions from subjects in his department. The duration of the module was fixed considering the syllabus and time structure of BAMS I year by CCIM.The time frame and schedule of the content delivery was fixed adhering to the prevailing time table available with Kerala University of Health Sciences.

ii. *Teaching strategies* were fixed in consultation with educational experts by considering the nature of the content and suitability of different strategies in ideally delivering the content.

iii. *Construct* of the teaching model was systematized by preparing a flow chart describing the sequence through which the new concept is to be introduced in beginner learners, in consultation with educational experts. The structure of an ideal model as described by Joyce and Well (1972) was also followed to make the construct of the model.

iv. Preparation of *assessment tools*: Assessment was done as pretest and post- test for each module as well as for summative assessment of the whole package. For each unit 10 marks questionnaire consisting of 10 each one word answers were prepared to test the knowledge attained through the classes. Questionnaire for the whole package consisted of three parts – Part-1 (40 marks), 40 multiple

choice questions, intended to assess the knowledge attained through the total package. Part-2 (10 marks) was to assess the learners' capacity to memorize sloka from the portions specified. Part 3 (50 marks) contained questions to assess the understanding and application aptitudes attained through the model. The unit wise (10 marks) question was prepared by the scholar in consultation with subject experts. The summative questionnaire was prepared in consultation with educational experts and was reviewed by five subject experts using a structured review proforma. (appendix - 5)

c. *Writing the model as a document:* The new model was prepared as a written document in English describing the total content into different units (modules) each with its own learning objectives, note to the instructors, teaching strategies, narration of the idea to be delivered with the help corresponding slides, necessary slokas from Ayurvedic classics, assessment tools and evaluation proforma. The document was conceived as a self implementing plan through which another instructor can deliver the content by following the instructions in the document. The model was presented along with the background, methodology of development and rationale, so that it can be read and understood as an independent document also.

d. *Review by experts:* The written document was submitted for review by three experts including guide. One expert was from the field of

Educational Research, the other one a subject expert in Tridosha teaching. The corrections suggested by them were incorporated before setting the trial.

e. *Trial:* The new model was opened for a trial among I BAMS students. The methodology is explained elsewhere.

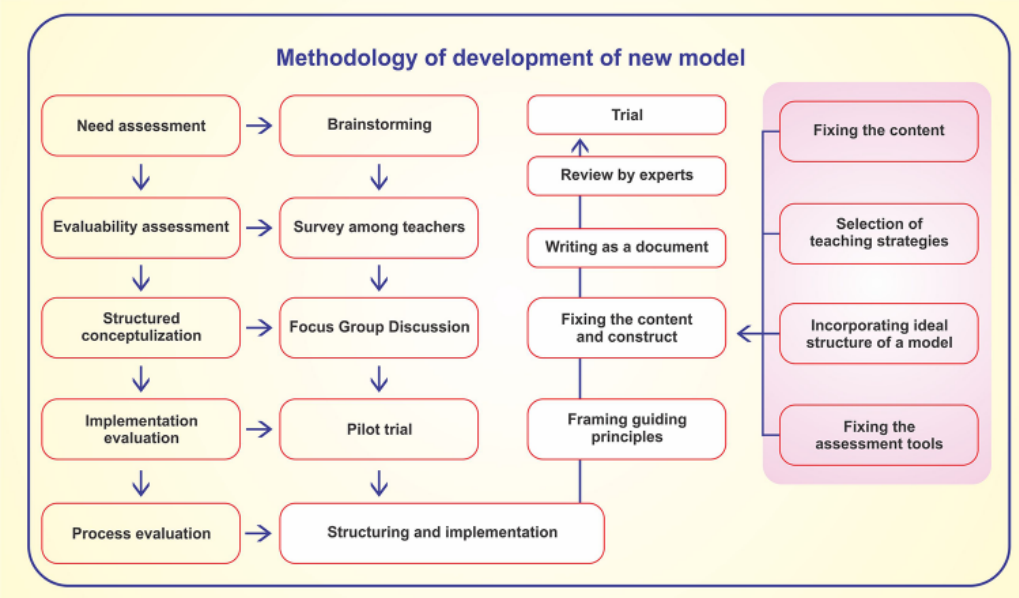


Fig. 2.2.1. Methodology of development of new model

Chapter - 3

METHODOLOGY OF THE EXPERIMENTAL PART OF THE STUDY

2.3.1. Methodology of the experimental part of the study

The experimental part of the study was done for comparing the effectiveness of Innovative Model with Conventional teaching. The newly developed Innovative Model was implemented in a batch of 1st BAMS students, within three months of their admission to BAMS at the scholar's institute and the effects were assessed. This was compared with two corresponding batches of two Ayurveda Colleges in different parts of Kerala where the teaching was conventional.

2.3.1.1. Aims and Objectives

1. To compare the effectiveness of the Innovative Model with Conventional Teaching for transacting Tridosha-sidhanta
2. To probe on the feasibility of developing a transitional curriculum for beginner learner in Ayurveda graduation course

2.3.1.2. Groups for comparison with Settings

Group – 1 : Case - Instructed through The Innovative Model, 1st BAMS students admitted in VPSV Ayurveda College Kottakkal in 2016 within three months of their admission

Group - 2 : Controls - Students who received instruction through Conventional Teaching at three Ayurveda Colleges in Kerala

Control-1 : Govt. Ayurveda College, Thiruvananthapuram

Control-2 : Pankajakasthuri Ayurveda Medical College, Thiruvananthapuram

Control-3 : PNNM Ayurveda Medical College, Cheruthuruthy, Thrissur

2.3.1.3. Sampling Methods

Convenient sampling

2.3.1.4. Sample size

1. Sample size for the innovative model was taken as all students of VPSV Ayurveda College Kottakkal in 2016 batch within three months of their admission, which was 50. 45 students attended all the classes where considered for assessments (n=45).
2. To avoid selection bias, the control group was selected on a 1:3 ratio from 2016 admission batch of three Ayurveda

Colleges in Kerala, the sample size was 166.

3. Total sample size was 211.

2.3.1.5. Implementation

Group 1 - Case :- casethe new package was implemented in 2016 admission BAMS batch of VPSV Ayurveda College Kottakkal abiding the current time table during the hours scheduled for the subject, MaulikaSidhanta and Ashtangahridaya. Formal approval was obtained from Institutional Ethics committee (IEC/CI/02/13 dated 26.07.2013, appendix-6,10) Classes were delivered by the scholar himself with audio-visual assistance. Classes were documented by video and audio recording. Unstructured reports on each class were prepared by randomly selected participants and were read in the next class. Almost all the classes started with a pre-test and concluded with a post test. Participants furnished structured feedback proforma at the end of each class as well as at the end of the whole package.

For **Group 2 - Control:-** only summative assessment was done in the form of pretest and post test. The tests were conducted at the respective centers with assent from Heads of Institution(appendix- 7,8,9). The tests were administered by the teachers in respective centers. Pretest was done before starting the portions prescribed in the new model and post test after completing it. The teachers were instructed not to make any change in the style of instruction and continue on which ever style they adopt to transact the portions. It was taken as conventional teaching.

Table 2.3.1. Teaching Schedule for case (full schedule given as appendix - XV)

Class No	Unit No	Title	Duration	Date	N	Teaching strategies	Main ideas conveyed	Assessments
		Pretest	1 hr	13.01.2017	45			Pretest Questionnaire
1	1	Change your perspective	1 hr	17.01.2017	48	Ice breaking – Game Picture puzzles Lecture discussion Group Discussion Case Simulated Learning Sloka learning	Learning Ayurveda Needs "out of box" thinking	1. Participants' Feed Back proforma
2	2	Man as the epitome of universe	1 hr	20.01.2017	46	Lecture discussion	Man is an epitome of universe	1. Spot assessment (10 marks)
						Brainstorming	Concept of Visarga-Adan-Vikshepa in cosmic and physiological parlance	2. Participants' Feed Back proforma
						Sloka learning		
						Powerpoint presentation		
3	3	Guna spectrum part – 1	1 hr 30 minutes	21.01.2017	47	Game	Introducing 20 Gunas through lecture discussion	1. Pretest-post test
						Lecture discussion with PPt		2. Participants' Feed Back proforma
						Sloka learning		

4	3	Guna spectrum part – 2	1 hr	24.01.2017	44	Activity (Guided Quiz) Lecture discussion	Identifying Guna in various lifestyle factors	1. Spot assessment 2. Participants' Feed Back proforma
5	4	Building Tridosha Approach to human life – Part – 1		31.01.2017	43	Brainstorming Lecture Discussion Activity (Classification of items)	Introducing Tridosha as basic physiological principles with etymological derivation	1. Spot assessment (Pretest-Post test) 2. Participants' Feed Back proforma
6	4	Building Tridosha Approach to human life – Part – 2		02.02.2017	45	Activity (Guided Quiz) Lecture discussion Role play (dynamic equilibrium) Video display Sloka learning	Identifying Tridoshas behind any activity in human body Identifying the dynamic equilibrium among Doshas	1. Spot Quiz 2. Participants' Feed Back proforma

2.3.1.6. Outcome Variables

2.3.1.6.1. Independent Variable:

1. Group – 1: Instruction through innovative model
2. Group – 2: Instruction through conventional teaching

2.3.1.6.2. Dependent variable

1. Scores from summative assessment test (appendix-11)
2. Scores from formative assessments (as given in the new model)
3. Students feedback proforma for the innovative model as well as individual units of the model (as given in the new model).

2.3.1.7. Statistical analysis

Descriptive statistics was done for all demographic variables such as age, gender, income of parents, rank in entrance test, socio-economic status of students in both the groups. Summative assessment test, pretest and post test analysis of each group was done using a within group paired students t test. Summative assessment test was sub grouped and analyzed using paired t-test in three segments – descriptive memorization, sloka learning and understanding level questions. Between groups analysis of post test summative assessment was done using unpaired Welch's t-test. In the innovative model group, within group analysis of formative assessment for each individual module was done pre-test and post test using paired t-test and quiz, proforma building and assignments were also assessed.

Part - III

OBSERVATIONS & RESULTS

Chapter - 1 **Observations on comparative study – Ancient and Contemporary Teaching**

Chapter - 2 **Results & Observations on Development of Innovative Model**

Chapter – 3 **Innovative Model for Transacting Tridoshasidhanta**

Chapter – 4 **Observations & Results of Experimental Study**

Chapter - 1

OBSERVATIONS ON COMPARATIVE STUDY – ANCIENT AND CONTEMPORARY TEACHING

3.1.1. General Comparison of teaching among the different phases

3.1.1.1. Nomenclature of system of education

The system followed commonly in Vedic, Upanishat and Ayurvedic phase was Gurukula. In Buddhist tradition, even though the system was similar to Gurukula it was customarily known as Sangha, which was structurally and functionally different from Gurukula. Buddhist structure later developed into establishment of different Universities like Nalanda and Takshasila. In medieval period, Gurukula system was sustained along with emergence of Pathasala system, especially during later period. Medieval period also witnessed establishment of Maqtabs and Madrassa during Islam reign, almost similar to Pathasala. Arrival of overseas systems like Dutch and Portuguese made transition in the system in this phase. Modern, Teacher centered phase was introduced during the colonial phase of Indian history where Gurukula system gradually declined and there emerged Pathasalas and Colleges. Modern

Student centered system was introduced in general education after 1990's, which practically was not adopted properly in Ayurveda Colleges.

3.1.1.2. Aim of Education

Vedic educational pattern, greatly structured and conceptualized during the Upanishat period, aimed at total development of a person. Empowerment of knowledge base and acquirement of practical skills were equally important. In the initial phase of Vedic era, formal education simply aimed at gaining knowledge and skills on the ritualistic practices related to Yajna, Yaga, Homa etc. At that time, Karma was dominant over Jnana. Upanishats put the reverse order in education. Jnana became the center of attraction. Jnana itself proliferated to two varieties: the Ultimate knowledge (Para) and the Technical knowledge (Apara). The ultimate aim was confirmed as attaining permanent freedom from the miseries, conceptualized as Moksha (liberation). Realization of real nature of the universe was deemed as the way to attain Moksha. Upanishats created an atmosphere to flourish different systems of philosophies; the aim was reinforced to be attaining Moksha by designating themselves as Mokshasastra. Role of control of desires in attaining knowledge was posed with maximum importance. Dama (control of mind), Uparati (control of sensory input), Sraddha (dedication), Samadhana (faith) etc. were considered to be the capacities built up during ideal process of education.

Buddhist ideology merged the pure aim of its propagation, ie,

Nirvana with mundane problem solving attitudes, vocational training and issue based remedies. Morality based education was mostly propagated then.

Ayurvedic education, practically aimed to produce qualified and proficient Medical Practitioners, always made it clear about the quality, morality, social commitment, ethical integration and spiritual vigilance of a person, as a human being. In that sense, the aim is total development of a person, destined to behave as a model human being. Becoming as skilled physician/ surgeon can be taken as the objectives under the broad aim mentioned above.

In medieval period also, theoretically the aim of education was same, though was not defined separately.

Modern education defines the ultimate aim of education as the total development of a human being. In the psychological point of view it brings out change in behavior.

3.1.1.3. Nature of Curriculum

In Gurukula system of all phases the curriculum was designed by Guru. In Vedic education especially that related to Mantra chanting the curriculum mainly dealt with the learning of Mantras in Veda, their rendering and interpretation. During later stage of Vedic education, especially Upanishat phase of it gave more importance to the enquiry on realization on self and the Universe. The system developed more subjects in the curriculum including 18 Sastras, 64 Kalas, 3 Vidyas etc.

In Buddhist monasteries, the curriculum was more structured; it became the lifestyle of the disciple based on specific moral and social principles. Vocational training, including medical practices, were given more stress in Buddhist monasteries. Buddhist structure offered more systematic way in designing curriculum for meeting practical needs of the society. In Universities like Nalanda and Takshasila, curriculum was more structured, varied and multi-disciplinary. Almost all systematic knowledge including Medical System was learnt in such Universities.

In Ayurveda, structure of the curriculum was ideally related to Medical Practice, though the same training imparted moral and humanistic coding related to the society. As evidenced from the available textbooks, different traditions like Atreya tradition, Dhanwantari tradition, Kasyapa tradition etc. gave stress to specific areas of the system like Kayachikitsa (General Medicine), Salyatantra(Surgery) and Kaumarabhritya (Pediatrics) respectively. The curriculum was developed based on specific learning outcomes by laying down specific speculations on the standards of a person after completing the study.

In medieval period, even though the dominance of Buddhist tradition failed to sustain, the remnants of that culture prevailed in Pathasalas, especially after 12th Century AD. There was a chance to learn multiple disciplines under a group of teachers, though the curriculum was loosely structured.

3.1.1.4. Relation to social structure

In Vedic period, education was firmly conformed to the then existed social structure, based on the class system (Chaturvarnya). Brahmanas remained the authority of teaching, Kshatriyas and Vaisyas received the education from Brahmana and more often Sudras were isolated from educational activities.

Buddhism greatly challenged such a social system and promoted socialization of education. Early democratization of education was seen in Buddhist period.

In Ayurveda also, due to the positive influence of Buddhism, the social restriction was curtailed so that Sudras also could receive training. But, later after 9th Century AD, Buddhist tradition got an acute decline and in medieval phase, the old system was continued without much change.

Democratization of education was the hall mark of modern age. It reflected in Ayurveda also. Pathasalas and Colleges allowed all the communities to take benefit of education. In modern phase, due to the aggressive and sensible activities of Social Reformatory Organizations, education was totally liberated from the restrictions offered by social discrimination.

3.1.1.5. Stages of education

In Vedic and Upanishat phase, four ashrams (Brahmacharya,

Grahasthya, Vanaprastha and Sanyasa) the 16 Samkaras (rituals marking developmental milestones of a man) marked different phases of learning. Upanayana was the ceremony marking formal inception of education. Prior to Upanayana, at the age of 5, Vidyarambha opened a child to the world of letters. For different communities age for Upanayana was fixed in different ways. For Brahmins Upanayana was done in 8 years, for Kshatriya – 11 years, and Vaisya 11 years. Ayurveda also followed the same structure. Different phases of education were distinctly designated. Pre schooling phase was known as Vatu, After Upanayana the same child was known as Sishya. Upto the age of 24, he/she was designated as Vasu, then Rudra upto 24 years and later Aditya upto 36 years.

In Buddhism, even though the age was the same, the function of initiation was customarily known as Pravarjya or Pabbaja. Minimum number of years to be educated was fixed to be 12 years. There were different grades of education according to the years completed, similar to the different Graduations in modern education.

Ayurveda does not make different rules related to age and completion of education. The specific stipulation available in Ashtangasangraha was related to a stage of bridging, period of six months (Shanmasaanushitah), when the learner was observed by the Teacher to decide whether he/she has aptitude towards the subject he want to learn. Medieval system also followed the ancient tradition.

In modern age, caste related rituals like Upanayana etc. were followed by different castes, which were highly restricted to the familial settings, not as a public or official ceremony. Age of formal education was fixed to be 5 years, with different levels, designated in different ways – Pre-school, Primary, High, Higher secondary, Higher education, as of now. Nationally uniform age restrictions stipulated by Government is followed as such.

In Upanishat tradition, the ceremony related to completion of education was known as Samavartana. In Buddhist tradition it was Upasampadana, where a disciple becomes permanent member of the Sangha, after 12 years. In Ayurveda, the entry of a Medical Graduate to medical profession was termed as Visikhanupravesana, (Visikha=Medical Profession). Medieval phase did not attempt any change in the age restrictions. In modern age, colonial phase stipulated different levels of courses of different durations, continuously reformed from time to time, according to the need of the society. In Ayurveda also, from Pathasala onwards, different titles were offered with differing durations, then advanced to diploma (3 years), degree (5 years), post-graduation (3years etc.). Initially, during 19th Century, the content and structure varied in different states. After establishment of CCIM the patterns are uniform on a national base.

3.1.1.6. Nature of Guru-Sishya relationship

During Vedic period, in Gurukula system, Guru was an un-argumentative authority. He was Jnani (adored with perfect knowledge) and

Tatwadarsi (one who sees the ultimate reality).Sishya, the disciple ideally possessed Pranipata (one who totally surrender), then Pariprasna (asking sensible questions after learning) and Seva (serving to the needs of the Guru). Sishya lived with Guru as an apprentice and the later became mentor of the former in all aspects. Sishya, away from his home, was expected to consider Gurukula as his own home. During the Upanishat tradition, though the custom remained the same, there were more chances for mutual interaction, in the form of question-answer session (Prasna) and Discussion (Parishath).

In Buddhist tradition, the student is a member of a big community (Sangha) where he learns things as an integral part of the society. Student was sent to the Sangha, and lived in the Sangha as his own home. Formally, for a monk to become a teacher, he should follow Sangha living for at least ten years. Teacher was morally and practically a model to the students.

In Ayurveda, the education was styled more as Guru-sishyaparampara, that means, the education did not curbed to a set of teachers and disciples, but, long lineage of Gurus and Sishyas. Such a lineage was described as different Sampradayas in Ayurveda. Among the Sampradayas, familial tradition (Kulaguru) and tutorial tradition (Gurukula) prevailed with almost equal significance. Sishya was almost like an apprentice of Guru. Practical skills were attained through early exposure to different activities like preparation of medicine, nursing of patients etc. Guru often tended to raise the self-esteem of the student by addressing him as “Son (Vatsa)”, “the bright minded (Dheeman)” and even by addressing by name (Susruta, Agnivesa etc.). Even

when Sishya is entitled to behave like an assistant of Guru in all means, chances of interacting with Guru in the form of question-answer sessions are evident from the description available in Brihat-trayee.

In medieval teaching, the system sustained was that in Gurukula. But, during the advent of Pathasala and Madrassa culture, Sishyas came to learn from his/own home, eventually the Guru-sishya pattern changed in content.

In modern age, Guru-sishya relationship was greatly subjected to change. The teacher was retained as an authority, but, role of teacher as a mentor became less evident. This was because, student retained in home except in school hours. Finally, Guru became a teacher alone. During later phase of modern age, the Guru-sishya participatory system was greatly evaluated for their merits and demerits and reached in a final approval on the merits of such a system. The mentor-mentee system, residential system and apprenticeship system etc. are conceived as the revival of the old Guru-sishya pattern in education.

3.1.1.7. Role of the teacher and student in transaction

Gurukula of Vedic age was typically teacher centered. Student was merely like a shadow of the teacher in such a system. What even taught by the teacher was simply repeated and assimilated without much questioning. On a later phase, Upanishat tradition, even though the system did not modify itself significantly, students got more opportunity to interact and question the preaching of the teacher.

In Buddhist tradition, the Sangha was little more participatory, the aptitude and temperament of the learners were significantly considered.

In Ayurvedic education, the transaction was more interactive, assimilative and affirmative. Student was not a passive listener. Students got chances to be part of practical training, to raise questions and to interact with peers and other masters.

Medieval teaching also was prominently teacher centered both in Pathasala and Gurukula. Even the students were over burdened with house hold duties and responsibilities, apart from the actual deeds related to learning and teaching. On a later period, especially during 19th century AD, Gurukula system was seriously blamed for the physical and psychological distresses offered by stay in the Gurukula.

During modern period, typically Colonial System re-established the authoritarianism of teacher in class room settings. Students again became mere mimickers of teacher. But, on a later period, especially after 1980, New Curricular Framework attempted to set a student centered atmosphere in public education. Role of a teacher changed from authority to facilitator. It was not well addressed in Ayurveda pedagogy.

3.1.1.8. Students' autonomy

Students' autonomy was not well established during the Grurkula tradition in Vedic age. But, in Upanishat teachings, teacher had put students

to such situations problematically to take themselves convinced about the course of teaching he ought to follow. Buddhist system also did not agree with the autonomy; the student becomes decisive in selecting his/her own priorities. In Ayurveda, as evidenced from Caraka Samhita, the learning process begins where the learner after introspecting his/her own merits and demerits go for selecting the discipline which suits for them. Evaluation of the discipline (Sastrapareeksha) was done in a systematic way, putting some criteria (Sastralakshana). It was after this selection, teacher comes to the scenario. In medieval period, this freedom was not much vested to the learners. Modern period also continued to be the same. Recent advancements in the concept of student centeredness proclaim their autonomy to decide their own aptitudes, apart from the mandate of parental figures including teachers and parents. In the present scenario, the career advancement programs, course counseling, course selection etc. agree with students' autonomy to a better extent.

3.1.1.9. Scope for collective thinking

Early phases of Vedic education did not find collective thinking as a method in learning process. Only collective recital of Vedic hymns happened in this direction, though the same had nothing to do with proper understanding of the content transacted. Later phase of Vedic education, especially during Upanishath period, different Sakhas, Charanas and Parishats came into the scene. During the later phase of emergence of the Nyaya system in India, there came the golden age for collective thinking – Tarka, Vakovakyam,

Parishath, Vada etc. became the hallmark of Indian epistemology during that period. This background, along with the collectivity sustained by Buddhist tradition paved way to the rich tradition of collective thinking in the golden age of Indian scientific heritage. It was then, Ayurveda developed with independent scientific content. As evidenced from Brihattrayee, Ayurveda was a product of collective thinking in the form of Parishats, discussions, inquiries, colloquia etc. During medieval period, as a result of decline in the above spirit, scope of collective thinking set to an end. This was the age where concealment and mystification of scientific truths became eminent. It continued till the modern age, where after renaissance the scene slowly changed. During the later phases of modern age, scope for collective thinking in the form of Seminars, Symposia, Discussion forums etc. prevailed with augmented spirit.

3.1.1.10. Scope for interdisciplinary approach

Even though the Gurukuka of the initial age focused on Vedic education in the form of chanting and reciting of Mantras etc, later phase was witnessed emergence many systematic knowledge for a including arts, commerce, humanities, medicine, architecture etc. Instead of teaching specific subjects to specific groups, initially the tradition was to give preliminary knowledge about all possible disciplines with the baseline knowledge of Sanskrit literature. Such a scenario was the beginning of interdisciplinary approach in Indian tradition. This tradition was enriched by the establishment of ancient Universities during Buddhist era. In Ayurveda, the multi-disciplinary approach was specifically addressed and nourished in all the Samhitas and

even proclaims that it is worthless to become skilled in a single discipline. Search in contemporary sciences as made mandatory for dynamic sciences like medicine. Being an applied science, health science need the assistance of all the basic sciences like Mathematics, astronomy, botany, biology, meteorology, material science, psychology and even architecture etc. for worthy application in human beings. Such interventions are mentioned to be the powerful aid for fruitful outcome of medical applications. Even though Ayurveda proliferated with branching of specialties like Kayachikitsa, Balachikitsa etc., on a later phase, as initiated by Vagbhata, the comprehensive approach came back, with a discipline dealing with all the branches under one umbrella. During medieval period, the Gurukulas and Pathasalas sustained the comprehensive approach in transacting all the above disciplines to a single incumbent, being streamlined by knowledge in Sanskrit. The colonial phase of Modern period in a way trashed the spirit of integrative and interdisciplinary approach system of India and substituted it with more sectorized, disintegrated pieces of knowledge systems to produce specialists undertaking specific tasks in colonial rule. The same system was sustained later in higher education, where specialization and branching of subjects ruined holistic notion of knowledge. In Ayurveda, recently the issue of interdisciplinary approach is again being discussed, even in the policy making platforms, for how to define the extent and nature of interdisciplinary attempts.

Table 3.1.1. Gross comparison based on merits and demerits

System of education	Merits	Demerits
Gurukula system	♦ Less number of students, chance for individual care· ♦ Early exposure to practical training· ♦ Training as an apprentice to Guru· ♦ Practical training in its natural course· ♦ Spontaneous chance for overall development as a human being and physician	♦ Hardships of Gurukula life ♦ No structured curriculum ♦ Guru's likes and dislikes affect quality of education ♦ No chance for universal education ♦ Monopoly of families and Guru's
Pathasala system	♦ Presence of many Masters ♦ Attempted to prescribe a curriculum ♦ Comprehensive and multidisciplinary learning ♦ No hardships related to Gurukula life ♦ On a later period provided universal education	♦ More theory oriented, less practical oriented ♦ Teachers were scholars in Sanskrit, less efficient in practice of Ayurveda ♦ No unified structure for curriculum ♦ Ayurveda learnt as one among many subjects
College system	♦ Provided universal education ♦ Ayurveda taught by Vaidyas only ♦ More structured curriculum ♦ More structured practical training ♦ Integrated with contemporary science	♦ Dominance for lecture method ♦ New pedagogical reforms not implemented in Ayurveda ♦ Load of syllabus increased ♦ Unified syllabus ignored regional traditions

3.1.2. Comparison of Philosophy of Education – Ayurvedic and Contemporary

The Philosophy of education, in its technical meaning, as the philosophy of the process of education, is the part of the discipline in the sense of being concerned with the aims, forms, methods, or results of the discipline. There are many theories related to the philosophy of education contributed by different masters at different points of times, followed in different contexts even now. Main such theories considered here are: Idealism, Naturalism, Realism, Scholasticism, Pragmatism, Existentialism, Critical pedagogy, Progressivism. Even though such well-structured theories were not available separately for education, ancient Indian philosophies pondered over process of learning as a part of epistemology, which was a main concern of discussion in almost all systems of philosophies. Here it is attempted to find out the extent and nature of such theories in the background of teaching-learning methods explained in Brihat-trayee. In Ayurveda, theories related to epistemology were adopted from different systems of ancient Indian philosophy, not a single one.

3.1.2.1. Idealism

Focus of idealism is itself-realization. Also it speaks about moral values to be addressed in any sort of educational activities. It resembles the subjective approach of Philosophy (“I think, therefore I am”) contributed by Descartes. The primary notion of the subjective approach is the agreement on internal initiation of cognition. That means, realization starts from inside.

In Ayurveda, term Atmajnana denotes this process. Prayatna (initiation) is the property of Atma and the process of cognition starts when Atma initiates knowledge from inside. The term Jnana is synonymous to atmajnana, where-as Vijnana is synonymous to Sastrajnana (Scientific knowledge). While treating mental afflictions, the foremost step is to adopt Jnana[1]. Caraka Samhita explains the Yoga, cessation of the initiation from Atma, termed as Anaarambha, as the state where all sorts of miseries perish[2]. For preventing any sort of diseases, Atmajnana is the prime method, as explained by Vagbhata[3]. Description about Atma and its attributes in Katithapurusheeya[4] chapter aims to build up right knowledge about the characters of self. Moral aspects of human existence are discussed with its health related issues in Caraka Samhita. During the discussion of epidemics in Janapadoshwamsa, the root cause of such epidemics related to environment, water, air and season is described to be loss of morality[5].

3.1.2.2. Naturalism

Naturalism proposes the idea of three teachers – Man, Nature and things. The learning premises are so natural that when human beings are exposed to nature he inherently starts to learn things. The statement in Caraka Samhitaie, “for wise man, nature itself is the teacher” can be taken as the leading statement to prove naturalist approach of Ayurvedic transaction[6].Ayurvedic principles themselves are reflections of this understanding. The analogical framework which puts man as an epitome of universe is the prime source for formulating almost all scientific understanding

of Ayurveda. Whatever features the nature contains, that much entities a human being bears in its biological sphere[7]. Also, Ayurveda is the most naturalistic medical system, claiming eternity due to its inherent relationship with nature (Swabhavasamsiddhalakshana)[8]. Observing and analyzing natural phenomena and applying such principles in human body are essentially integrated to the scientific content of Ayurveda.

3.1.2.3. Realism

In a realistic perspective, abstract principles of a science should be equally explained through realistic and tangible practical explanations. Ayurveda, as a practical science, was developed from previously existing providential treatments (Daiva-vyapasraya), by applying repetition based logical applications (Yukti) established through observable evidences (Hetu). While defining the term “theory” (Sidhanta), Caraka ascertains the importance of experimentations by multiple experts based on evidences[10]. It was reinforced through categorically declaring that experimental attitude brings out excellence in scientific applications[11]. Abstract principles explained in different philosophical schools are accepted in Ayurveda by converting them to tangible principles to render successful treatment outcomes.While explaining the specific properties of Panchabhuta (asadhaarana-linga) Caraka enlisted tangible characteristics such as roughness (khara), fluidity (drava), mobility (chala), warmth (ushna) and void-ness (aprateeghatatwa) which are readily appreciable through skin[12]. This model was never described in other philosophical systems where concept of Panchabhuta was originally

sprouted.Principles related to structural and functional make up of human body such as Tridosha, Dhatu, Ojus, Srotas etc. are example for such developments in Ayurveda.

3.1.2.4. Scholasticism

Scholastic method was adopted for learning and exposing scientific textbooks in a particular logical sequence. In the classroom and in writing, it often takes the form of explicit disputation; a topic drawn from the tradition is broached in the form of a question, opponents' responses are given, a counterproposal is argued and opponents' arguments rebutted. Methods of arguments and counter arguments seem to be the ancient form of scholasticism. Caraka explains this as a method of discussion termed as Sthapana and Pratisthapana[13]. Mainly the inferential and deductive reasoning based on discussions are meant for this. Methods like Tarka (logical deduction), Yukti (reasonable association), Vada (arguments establishing self and countering opponent) etc. can be taken as different forms of scholastic practices.

3.1.2.5. Pragmatism

In education, pragmatism considers activity as the basis of teaching and learning. It makes learning purposeful and infuses a sense of reality in education. Importance of application of what one learns was given prime importance in pragmatism. As per Ayurveda, one who has pure knowledge without sense of its application fails to confront with diseases, similar to a coward failing to confront with his enemy[14]. A famous proverb says, nobody, even a fool, acts without an aim[15]. Even if Ayurveda describes

the idealist and philosophical dimensions in life and application, the prime aim of learning Ayurveda is ascertained to be attainment of health[16]. Susruta, after explaining immense philosophical description on the cosmogony (adopting the Sankhya order of creation), categorically ascertains that there is no need of contemplating over such abstract principles than applying the idea of Bhuta while treating diseases[17].

3.1.2.6. Existentialism

Existentialists, in education, define education as a process helping learners to appreciate themselves as unique individuals who accept themselves to be completely responsible for their thoughts feelings and actions. Role of a teacher in such a premise will be to create an environment in which learners freely choose their own preferred way. A classical statement in Caraka Samhita goes like this: "A wise student, after an appraisal of the task whether it will prove heavy or light for him, of the rewards, the obligations, time and place, finds himself suited for the medical profession, should first of all select a treatise of that science[18].Advice on undertaking self-appraisal through specific points of references goes like: One should make self-analysis through seeking regular appraisal on one's own strength and weakness in relation to time, space, relationships and financial capacity[19]. Self-appraisal is the prime aim mentioned in the verse.

3.1.2.7. Critical pedagogy

Critical pedagogy challenged the conventional teacher-student relationship by identifying role of teacher as a student (a teacher who learns)

and student as a teacher (a student who teaches). In many instances available in Ayurveda classics, teacher considers student to be a wise person, even addresses him to be wise ("dheeman") and declares that teacher himself often gets motivated by the queries and statements which their students make. For example, in Caraka Samhita Sidhisthana, there are statements which denotes how the teacher is motivated by (prachodana) student's questions to think over it and explain[20].

3.1.2.8. Progressivism

Progressivism believes that students learn as if they were scientists, with a particular model of enquiry: Awareness on the problem, defining the problem, proposing hypothesis, evaluate the consequence and testing the likeliest solution. This method is similar to the syllogism (Pancha-avayava-vakya) mentioned in Nyaya system. In Caraka Samhita, the same method is explained in Vadamarga using terms like Sthapana, Drishtanta. Hetu, Upanaya, Nigamana, etc.[21]

3.1.3. Comparison of principles and process of learning

Theories of learning in ancient system are mainly related to the epistemology described richly in Darsanas which were later adapted to Ayurveda also. The term learning, in its broadest sense is related to Cognition (Jnajotpatti) in Ayurveda where the components like Sensory Objects (Indriyartha), Sense faculty (Indriya), Mind (Manas) and Soul (Atma) participate in the process. Sensory perception (Pratyaksha) and Reflective practices

like Inference (Anumana)are considered as two chief methods of acquiring knowledge. The knowledge thus acquired will be kept for further reference as impression (Bhavana) which later recollect as Smriti. There are many methods in which the recorded events are recollected enlisted as smriti-hetus[22].

There are mainly three categories of philosophical framework under which theories of learning fall. They are: Behaviorism, Cognitivism and Constructivism

3.1.3.1. Behaviorism

Behaviorist theory is based on three basic assumptions: Learning is manifested through the change in behavior, the environment shapes behavior, and third the principle of contiguity (how close in time two events must be for a bond to be performed). For behaviorism, learning is the acquisition of new behavior through conditioning. In toto, learning is a process leading to relatively permanent behavioral change or potential behavioral change. Behaviorism is a theory that operates on the principle of “stimulus-response”. While explaining the process of cognition, Caraka Samhita considers this dichotomy as well. The process of attaining knowledge starts from receiving stimulus of an external object (artha) by a sense organ (Indriya)[23]. There starts an internal process of evaluating the stimulus, deciding the response and executing the response. Among the two kinds of Indriyas, the Sense faculty (Jnanendirya) receives the stimuli and Motor faculty (Karmendriya) respond to the stimulus received. Terms used in Sankhyakarika such as Aharana (intake), Dharana (sustenance) and Prakasana (output) represents receiving the stimulus, internal process and

response respectively[24]. Behavior of a person is greatly influenced by the way how he/she responds to external stimuli. But, different persons respond to the same stimuli in different ways. This phenomenon suggests presence of some variables at the receiving end (that is mind). In the case of human beings (and all living organisms in general) as mind has the ability to react to objects with three basic emotions that is, pleasure, pain and confusion; the mind should have the receptors for these three affects. They are the variables which make different responses to the same stimulus. The basic responses from the above three will be desire (itcha), aversion (dvesha) and inertia (moha). As per Indian Philosophy and Ayurveda these principles are popularly known as 'three attributes' (Triguna) namely *Satva*, *Rajas* and *Tamas* respectively[25].Behavioral psychology in Ayurveda scatters around the concept of Triguna[26].

3.1.3.2. Cognitivism

Cognitivist learning is concerned with the internalization of mental processes, the ability to review a situation and act knowingly. It stresses on the internal mechanism which accomplishes the process of learning. Here the learner is viewed as an information processor. Mental processes are explained to be the core mechanism. Mind itself is basically meant for different types of contemplations [27]. The internal processes are again elaborated to have many aspects including Thought (Chinta), Analysis (Vichara), Deduction (Ooha), Meditation (Dhyana), Imagination (Sankalpa) etc.[28]Such processes are broadly classified into two: Deductive (Ooha) and Analytical (Vichara)[29].

Modern psychology defines 'psyche' as the part consisting of cognitive, conative and affective aspects of a person[30].

As per Ayurvedic concepts, thoughts are processed and affects are sensed by mind. Volition (prayatna) is the characteristic of soul. This volition can be either voluntary (modulated by desire and aversion) or involuntary (essentially physiological). The voluntary efforts come as a response to external stimuli (from outside body), and involuntary efforts as the response to internal (physiological) stimuli. Involuntary efforts constitute physiological activities like respiration, circulation, excretion sleep etc. Mind works as an instrument to soul for processing external stimuli which are received through five external sense faculties. In that way mind takes part in cognitive psychology as an instrument to link soul with the external world.

Structure of the internal instrument (antakarana) also plays a vital role in accomplishing the internal process. The tripartite internal instrument, composing of Manas, Buddhi and Ahankara brings out three chief functions (Anta-karana-vrittis). They are power of imagination (Sankalpavritti), Power of discrimination (Nischayavritti) and Possessiveness (Abhimana) respectively[31]. Each and every mental process primarily pertains to one or more of these three key principles.

3.1.3.3. Constructivism – in an Ayurvedic perspective

From the descriptions on teaching/learning methods (Adhyayana-adhyapanavidhi) in classical Ayurvedic textbooks, it is evident that learning in

classical age supported *inquiry model* (posing questions and getting motivated for finding out its answers) of learning. Caraka Samhita, in its form itself reflects the queries raised by a brilliant learner (Agnivesa) to his teacher (Atreya). Often the teacher illustrates cases, demonstrations, simulations etc. to facilitate learning process. The premises of learning described in Ayurvedic literature especially Caraka Samhita stand at par with constructivism in the following ways:

1. Interaction initiated by learners and motivated by masters seems to provide an important learning process as explained in classical literature. Among four types of Sutras enlisted by Chakrapani in Caraka Samhita, Ekeeyasutra and Sishyasutra refers to *discussions* initiated by learners and scholars[32].

2. The entire world is considered as Master for a wise learner (Caraka Samhita). Ample scope for discovery learning is meant here.

3. In Ayurveda man is explained as an epitome of Universe (Lokapurushasamyasidhanta). This basic understanding, in an epistemological parlance spread many hopes for simulation based learning. Tridoshasidhanta, one of the basic concepts in Ayurveda, is primarily established through such a simulation model by Susruta[33] .

4. Definitions of key principles like Tridosha (Vata, Pitta and Kapha) is not finite, as per the available literature. That means, a precise definition of such terminology is not available in the literature. Especially in

the case of Tridosha, the concept is typically formative. Learners are allowed to gather different aspects of the theory at different corners of the curriculum, and finality of the concept is not taught in the class room, but gets constructed by the learner by his/her own experiences through different illustrations. The construction lasts even after completion of the formal studies. This fashion perfectly fits with constructivist approach.

3.1.4. Comparison of Smriti with Process of learning

The process of recollection (Smriti) is given much importance in Ayurveda. Even, the errors in recollection (Smriti-bhramsa) is said to be a major cause for diseases[34].Memory is said to be the recollection of past experiences[35].

The definition of Smriti itself speaks about the recollection of things which are already learnt through visual (Drishta), auditory (Sruta) and experiential (Anubhuta) methods. Here experiential implies all other sensory perceptions chiefly kinesthetic etc. Such a recollection is facilitated by eight factors(Smriti-hetus), which, stimulates an internal mechanism which brings out proper recollection. In the process of learning those eight factors are said to be significant[36]. They are:

1. Recollection of effect from cause (Nimittagrahana)
2. Recollection of cause from effect (Roopagrahana)
3. Recollection based on similarity (Sadrisya)
4. Recollection based on dissimilarity (Viparyaya)

5. Recollection based on conditioning (Satwanubandha)
6. Recollection by repetition (Abhyasa)
7. Recollection by yogic memory (Jnanayoga)
8. Recollection through repeated hearing (Punasruta)

Even though the above descriptions are pertaining to memory (smriti), the details given imply different learning techniques as mentioned in modern theories of learning. The methods adopted in the above list can be well compared in the following ways:

Table 3.1.2. Smriti vis-a-vis modern theories of learning

Technique explained for recollection (Smriti)	**Techniques in methods as explained in modern theories of learning**
Things which are seen (Drishta)	Visual learning
Things which are heard (Sruta)	Auditory learning
Things which are experienced (Anubhuta)	Experiential learning; mainly kinesthetic
Recollection of effect from cause (Nimittagrahana) and cause from effect (Roopagrahana)	Associative learning
Recollection based on similarity (Sadrisya) and dissimilarity (Viparyaya)	Learning through exemplars and non-exemplars explained in concept learning,
Recollection based on conditioning (Satwanubandha)	Classical conditioning, operant conditioning, associative learning
Recollection by repetition (Abhyasa)	Rote learning
Recollection through repeated hearing (Punasruta)	Auditory rote

3.1.4.1. Associative learning (Satwanubandha)

Associative learning is the process by which a person or animal learns an association between two stimuli. In classical conditioning a previously neutral stimulus is repeatedly paired with a reflex eliciting stimulus until eventually the neutral stimulus elicits a response on its own. In operant conditioning, a behavior that is reinforced or punished in the presence of a stimulus becomes more or less likely to occur in the presence of that stimulus[37].

3.1.4.2. Exemplars comparison and contrast (Sadrisya & Viparyaya)

This method is adopted in the context of concept learning. An efficient way to learn new categories and to induce new categorization rules is by comparing a few example objects while being informed about their categorical relation. Comparing two exemplars while being informed that the two are from the same category allows identifying the attributes shared by the category members, as it exemplifies variability within this category. On the other hand, contrasting two exemplars while being informed that the two are from different categories may allow identifying attributes with diagnostic value. Within category comparison and between categories contrast are not similarly useful for category learning (Hammer et al., 2008), and the capacity to use these two forms of comparison-based learning changes at childhood (Hammer et al., 2009).

3.1.4.3. Rote methods (Abhyasa) Rote auditory (Punasruta)

Rote learning is a memorization technique based on repetition. The idea is that one will be able to quickly recall the meaning of the material the more one repeats it. Rote learning is widely used in the mastery of foundational knowledge. Examples of school topics where rote learning is frequently used include phonics in reading, the periodic table in chemistry, multiplication tables in mathematics, anatomy In medicine, cases or statutes in law, basic formulae in any science, etc. By definition, rote learning eschews comprehension, so by itself it is an ineffective tool in mastering any complex subject at an advanced level. For instance, one illustration of rote learning can be observed in preparing quickly for exams, a technique which may be colloquially referred to as “cramming”.

3.1.4.4. Types of learning styles

On the basis of the sensory perception involved there are mainly three types of learners: Visual, Auditory and Kinesthetic. In the process of smriti, importance of Visual (drishta), Auditory (sruta) and experiential (anubhuta). Experiential can be further specified as kinesthetic[38].

3.1.5. Comparison on methods of transaction (teaching strategies)

Method of transaction during an early Vedic period was mostly oral, where as advancing to the later period (Upanishat) the methods proliferated to interactive and participatory modes like illustrative method,

demonstration method, catechetical method, storytelling method, discussion method, enigmatic method, aphoristic method, etymological method etc. On the other hand, Buddhism enhanced the methods still more participatory where in Buddhist Sangha, ample opportunities for group discussions were generated. As a result of these advancements, Ayurvedic education, which aimed at practical training also, adopted more interactive methods and classified the whole process into three domains: Learning methods (Adhyayana), Teaching methods (Adhyapana) and methods of discussion (Tadvidyasambhasha). Among them the teaching methods are Oral method, Inquiry method, Discovery method, Discussion or dialectal method, Simulation or demonstration method, Synthetic method, Analogy method, Storytelling or mythological method, Temporizing method, Regressive method, Argument-counter argument method and Apprenticeship.

Oral method was considered as the prime method of transaction in all the ancient methods of teaching. The term Sruti to denote Veda proclaims the oral/hearing method. Sravana (hearning) becomes the prime method in the tripartite method of learning – Sravana, Manana, Nididhyasana. While referring Brihat-trayee also, the importance of oral method is well established by describing the style of pronunciation and recital of slokas, the method of its rendering etc. Reciting the sloka and its memorization was the chief method adopted in Vedic hymns. In Brihat-trayee, a convention of abridging the ideas conveyed in prose form to sloka form can be seen repeatedly. This can be seen at the end of chapters, *Atraslokah'* ("here are some slokas") which makes a synopsis of what explained earlier. This helps easy learning and memorization. Moreover,

composing of Ashtangahridaya as an abridged form of Ashtangasangraha was necessitated to make the learning easier when the ideas are conveyed in sloka form. This also supports the oral tradition of Ayurveda.

In the formal description of teaching methods in the chapters assigned for this purpose (Eg: Rogabhishagjiteeyam in Caraka Samhita), it comes as an easy impression that the prime method of teaching was the oral / memorization methods. Even then, from the impressions of other parts of the textbooks, importance of interactive and reflective practices becomes more and more evident.

3.1.5.1. Comparison of teaching strategies related to Constructivist Model

Teaching strategies, especially those relevant in constructivist teaching are compared below. Constructivism and other contemporary methods are usually defined and explored as systematic ways of instruction with their own specific means and methods. While comparing such methods with ancient teaching methods, the finer aspects cannot be ideally compared because they are defined and applied in two different historical and pedagogical contexts. Here the attempt is only to identify gross similarities between the strategies as evidenced from descriptions available in the literature.

The main features of constructivist teaching are:

1. Participation of learners, Encouraging learner's queries
2. Democratic environment

3. Student centeredness
4. Scope for experimentation

Specific approaches of constructivist teaching include

1. Constructionism
2. Guided instruction
3. Problem based learning
4. Inquiry based learning
5. Anchored instruction
6. Co-operative learning
7. Reciprocal peer teaching
8. Jigsaw teaching

Other strategies

1. Brainstorming
2. Group discussion
3. Audio visual teaching
4. Demonstration
5. Role play
6. Concept mapping
7. OTB activities

The main features of constructivist model are its **participatory nature and democracy** and scope for experimentation. In Ayurveda teaching as evidenced from Brihat-trayee, participatory and democratic nature of the transaction is well illustrated. Learners get ample opportunity to speak, raise

questions and interact.Many instances show that the transaction starts as the reply to the queries raised by disciples to the master. Democratic nature is well evidenced from the discussion forums (Sambhashaparishath) as reported in the textbook itself, especially in Caraka Samhita. The colloquia (parishath) are the best examples for reach in consensus among many masters regarding the finalization of concepts. As far as **student centeredness** is concerned**,** apart from the participatory nature and democratic environment, many times the master reinforce the content of the textbooks to be for the better understanding of the learner, not a well versed person. The construction of Ashtanga Sangraha, as stated in the textbook itself (Ref.…), was necessitated to help the learners by comprehending the vast knowledge of Vaidya in a single resort, avoiding unnecessary elaborations. Teacher (Guru) often takes the role of a facilitator in guiding the disciple (Sishya) to reach in a proper conclusion.

Scope of experimentation was well preserved in the teaching premises, where learners themselves can reach in their own conclusions by tracking an experiment. The best example was story of Jeevaka, who after completing his study went to Guru offering something as Gurudakshina. Guru simply asked him to bring a thing which has no medicinal value. The disciple went in search of such a material of no medicinal value and found nothing. He returned to his Guru with an empty hand, learning the truth that "nothing is there in the world without medicinal property". The method adopted here is experimentation. Also, it is categorically stated in Caraka Samhita that "whoever experiments will become wise[39]".

Specific approaches in teaching like **constructionism** allow the learner to construct some products by themselves. In Ayurvedic classical literature there are many instructions to construct specific arrangements for different purposes. The best example is cottage for performing Rasayana (Kutee)[40]. Likewise, special arrangements for performing surgery (Salyaagaara), kid's play zone (kreedagara) etc. are mentioned which allow the learners themselves to construct and implement. Different types of sudation techniques (swedakarma) need their own specific settings, which are to be constructed as per the detailed instructions given in classical textbooks[41].

Guided instruction is a learning approach in which the educator uses strategically placed prompts, cues, questions, direct explanations, and modeling to guide student thinking and facilitates an increased responsibility for the completion of a task. If we take a Samhita as a material providing proper guidance in successful completion of a task, especially treatment, the instructions and precautions mentioned in the course of the treatment, the questions raised to make clarity in the process of treatment etc. can be provisionally included as a method of guided instruction. The Chikitsasthana of Samhitas broadly adopts guided instruction as its prime method by posing specific clinical conditions and then instructing the learner to adopt a specific line of management suitable for such a situation.

Problem-based learning begins with an educator presenting a series of carefully constructed problems or issues to small groups of students.

A typical example of such a strategy is seen in the chapter Yajja-purusheeya of Caraka Samhita, where, the question raised was : "Do the diseases afflicting man arise from the same source as he himself is derived from or is it otherwise?" This problem was open for discussion and each participant of the group was ensured with freedom for expressing their own suppositions on the subject[42]. **Anchored instruction** is almost the same method in which in which the educator introduces an 'anchor' or theme in which students will be able to explore

In **Inquiry based learning,** students pose and answer questions individually and/or collaboratively in order to draw conclusions regarding the specific issues or scenarios. Apart from seeking answers from the Master, which is the usual method adopted in Caraka Samhita, the learner himself pose an answer and finally put a discussion with the teacher.

Cooperative learning focuses on individuals working together to achieve a specific learning outcome. The same can be seen in group discussions, parishaths etc. The famous quote on four quarters of learning, quarter from teacher, quarter from peers, quarter from experience and quarter by himself[43], one quarter (from peers) indicates scopes of co-operative learning. It is again reinforced that clarification of doubts during learning is well attained through collaboration with many masters[44]. Other structured methods of co-operative learning like Reciprocal Peer Teaching (RPT), Jigsaw are also implanted in the above methods.

Methods of discussions (Vadamarga) elaborately mentioned in Caraka SamhitaVimanasthana are methodically defined and structured to bring out effective and productive discussions. Glimpses of contemporary structured discussions like Brainstorming, group discussion, co-operative learning etc. can be well identified in such constructs described in Caraka Samhita. Demonstrations and simulations are typically used in Ayurveda as described in Yogyasootreeya of Susrutasamhita. Even though techniques like Concept mapping is not specifically elaborated in Ayurveda Classics, the techniques can be well utilized in teaching concepts in Ayurveda.

3.1.6. Final statements of Comparison

The comparison of ancient and modern teaching methods can be done in relation to four domains:

1. System of education
2. Philosophy of education
3. Principles and process of learning
4. Methods of transaction.

Comparison on system of education was done based on a historical outline by considering six stages in chronological order:

a. Vedic/Upanishat Phase ..... 2000 BC – 1000 BC
b. Buddhist phase ..... 1000 BC – 600 AD
c. Ayurvedic Phase ..... 1000 BC – 600 AD
d. Medieval Phase ..... 700 AD – 1700 AD

e. Modern Phase - Teachercentred ..... 1800 AD– 1980 AD

f. Modern Phase - student centred ..... After 1980

The main systems compared were Gurukula system, Pathasala system, and Modern system, with minor variants of each viz – Gurukula in Vedic period, Ayurveda, Buddhist period etc. Modern phase as teacher centered phase and student centered phase.

System of education was compared based on ten domains:

a. Systems followed

b. Aims of Education

c. Curriculum

d. Relation to social structure

e. Stages of education

f. Guru-Sishya relationship

g. Role of the teacher and student in transaction

h. Students' autonomy

i. Scope for collective thinking

j. Scope for interdisciplinary approach

Tabular statement of comparison based on system followed. (Table 3.1.3.)

Comparison on Philosophy of education: In modern educational theories there are many philosophies like Idealism, Naturalism, Realism, Scholasticism, Pragmatism, Existentialism, Critical pedagogy, Progressivism

and so on. Even though such ideologies are adopted at different contexts and some of them are mutually contradictory also, when comparing them to the teaching ideologies in Ayurveda, we can find out many examples through which modern ideologies mark their presence in Ayurvedic teaching methods. The comparison makes a conclusion that, as many ideologies were developed on a latter period, the sprouting can be seen in ancient methods. Also, Ayurveda, being a practical oriented life science, cannot stick on to a particular school of philosophy, but makes use of any philosophy, which it finds to be benefitted to transact its content.

Comparison on Principles and methods of learning: Three main approaches regarding principles of learning are Behaviorist approach, Cognitive approach and Constructivist approach. Presence of all these approaches can be well identified in theories related to cognition (Jnanotpathiprakriya) in Ayurveda. Behaviorist approach stresses on the external manifestation of learning process, Cognitive approach stresses on the internal mechanism involved in process of learning. Ayurveda accepts both the internal and external features related to learning, hence, adopt the principles of Behaviorism and Cognitivism together. Constructivist approach can also be well identified in Ayurvedic learning. Different methods and styles of learning like rote learning, associative learning, exemplars and non-exemplars, classical conditioning etc. can be seen in the context of explaining Methods of Recollection (Smriti hetus). Types of learning viz. Auditory, Visual and Experiential (Kinesthetic) are explained as three sorts of experience (learning) which later converted to memory (Smriti).

Table 3.1.3. Tabular statement of comparison based on system followed

Aspect compared	Vedic phase	Upanishat phase	Buddhist phase	Ayurvedic phase	Medieval phase	Modern Phase (1)	Post modern phase (2)
Name of the system	Gurukula system	Gurukula system	Sangha system (Vihara)	Gurukula	Gurukulaalnong with Pathasala	Pathasala along with Anglicized system	Colleges
Aims of education	Familiarity with ritualistic practices, later phase	Knowledge for Freedom from miseries	Freedom from miseries and vocational training	Creating proficient medical practitioner with overall development	Total development	Total development	Total development
Curriculum	Learning Mantra, their rendering and interpretation	18 satsras, 64 kalas, 3 vidyas	Lifestyle based on moral and social principles, vocational subjects like medicine, surgery etc.	Different branches of Ayurveda, their theoretical and practical knowledge	Different subjects with Sanskrit base	Different subjects and structure	Different subjects and structure
Relation to social structure	Strictly based on Chaturvarnya	Based on Chaturvarnya	More socialized	More socialized (even Sudra could get education)	Mostly chaturvarnya based	More democratic	Democratic

Aspect compared	Vedic phase	Upanishat phase	Buddhist phase	Ayurvedic phase	Medieval phase	Modern Phase (1)	Post modern phase (2)
Stages of education	Upanayana – age – 8 Different designations upto the age of 36 Stage of completion - Samavartana	Upanayana – age – 8 Different designations upto the age of 36 Stage of completion - Samavartana	Pravarjya at the age of 8, minimum period of education 12 years	No separate rules Upanayana, Viskhanupravesana are the two end points	Same as Vedic structure	Upanayana etc. according to the relevant caste, Uniform stages like pre-schooling, schooling eyc. starting from 5 years	Same
Guru-sishya relationship	Residential system Guru – unchallenged authority, Sishya under the service of Guru Later –	Residential system More scope for question answer mode	Student is member of a big group (Sangha), Residential system	Sishyas behave like apprentice of Guru, Residential system	Gurukula continued as the same, Pathasala – non-residential	Teacher authority, Sishyaobedient, non-residential	Guru-Sishya-participatory learning
Role of student and teacher in transaction	Teacher centered, students passive	Teacher centered, but students can interact	Teacher centered, students interactive	Teacher centered, students interactive	Teacher centered, student passive	Teacher centered, students almost passive	Student centered
Students' autonomy	No autonomy, teacher decides	No autonomy, teacher decides	Students can opt to study	Students can select Sastra through Sastrapareeksha	No autonomy, teacher decides	No autonomy, parents decides	Autonomy preserved
Scope for collective thinking	No collective thinking	Parishats&Charana – scope for collective thinking	Collective thinking, discussions etc. more powerful	More scope for collective thinking in the form of Parishats and Prasna	Less scope for collective thinking	Less scope for collective thinking	More scope for collective thinking
Scope for interdisciplinary approach	No scope for multidisciplinarity	many Sastras handled by same person – Scope for interdisciplinary approach	Enrichment of interdisciplinary approach	More scope for interdisciplinary approach	Many disciplines dealt in single Pathasala with a common Sanskrit base	Less scope for interdisciplinary approach, segmented subjects	Subjects compartmentalized, less scope for interdisciplinary approach

Comparison on methods of transaction related to constructivist approach: The main features of constructivist approach are Participation of learners, Encouraging learner's queries, Democratic environment, Student centeredness and Scope for experimentation. Such features are well identified in Brihat-trayees, either directly under the description of teaching methods or as reflected from other portions. Specific constructivist instructional strategies like Constructionism, Guided instruction, Problem based learning, Inquiry based learning, Anchored instruction, Co-operative learning, Reciprocal peer teaching, Jigsaw teaching etc. are available either directly or indirectly from Ayurvedic literature. Such methods, being defined and structured on a very later period when compared to the period of construction of Samhitas, are, naturally, seldom dealt with that much precision, but reflected in many instances available there.

3.1.7. Agreement with hypothesis

The hypothesis proposed for literary comparison was "Basic elements of ancient teaching is similar to the principles and practices of contemporary teaching". From the above comparative effort it was found to be agreeable with the hypothesis proposed.

Chapter - 2

RESULTS & OBSERVATIONS ON DEVELOPMENT OF INNOVATIVE MODEL

The total development process was done in five steps of formative evaluation which is enlisted under methods of evaluation research: needs assessment, evaluability assessment, structured conceptualization, implementation evaluation and process evaluation. These five steps were implemented through different exercises as shown in Table 3.1.

Table 3.2.1. Steps in development of new model

Step in Formative assessment	Exercise involved in the present study
Need assessment	Brainstorming among UG & PG Ayurveda students
Evaluability assessment	Survey among teachers
Structured conceptualization	Focus Group Discussion
Implementation evaluation	Pilot study
Process evaluation	Structuring and implementation

3.2.1. Brainstorming among UG and PG students

The brain storming sessions, one each for UG and PG scholars of VPSV Ayurveda College Kottakkal, conducted on 16.09.2016 and 10.09.2-16 respectively. The sessionsdiscussed core issues in teaching and learning Ayurvedic subjects especially concepts like Tridoshsidhanta in relation to methods adopted for transacting them. 43 BAMS students and 23 PG students participated in the sessions.Thesessionsopened free expressions from the students regarding the proposed content. The sessions were conducted by posing two open questions:

1. What are the main problems in learning concepts of Ayurveda?
2. What are your aspirations on an ideal teaching Tridosha sidhanta?

The following conclusions were derived from them together:

Regarding present day teaching

- The chief obstruction of obscurity in concept learning is lack of attempts to convince them based on real life situations.
- The concepts were presented as “new” ideas without relating to the previous learning experience.
- Most of the time, memory oriented learning predominated in the class rooms.
- There was disparity in ideas when implemented later in clinics.

- Questioning attitude was mostly discouraged in the concept class rooms.
- Newer methods of teaching were seldom employed in the class room.

Ideal settings to teach Tridosha

- It is easy to construct Tridosha frame in learners if it is demonstrated in real life situations.
- Early exposure to clinics is important.
- Learners understanding should be properly reviewed and corrected

3.2.2. Survey among teachers

Structured survey among teachers regarding probable content and strategies for transacting Tridoshasidhanta was conducted using a structured questionnaire (Appendix - 1)on 05.09.2016. 23 teachers from different departments of VPSV Ayurveda College, Kottakkal with an average service of 12 years participated in the survey. The results are as shown below:

All the 23 teachers participated in the survey agreed with the idea that Tridosha sidhanta should be taught in activity oriented method. 10 teachers (43%) agreed strongly with it whereas 13 (57%) have moderate agreement. Regarding the feasibility of such transaction, 13 teachers (56%) had shared their strong agreement, 9 (40%) with moderate agreement and 1 teacher (4%) neither agreed nor disagreed to the feasibility.

Table - 3.2.2. Results of survey among Ayurvedic teachers

Q. No	Question	Options	Response No	Response %
1	Do you think that method of transaction for Tridosha sidhanta should be Activity Oriented?	♦ Strongly agree	10	43
		♦ Agree	13	57
		♦ Neither agree nor disagree	0	0
		♦ Disagree	0	0
		♦ Strongly Disagree	0	0
2	Do you think that Activity Oriented learning s feasible in learning Tridosha teaching?	♦ Strongly agree	13	56
		♦ Agree	9	40
		♦ Neither agree nor disagree	1	4
		♦ Disagree	0	0
		♦ Strongly Disagree	0	0
3	After implementation, which of the following skills you expect from a student as an introductory learner in Ayurveda? (multiple response)	a. Should be able to explain Tridosha sidhanta with possible comparison with modern biological principles	13	57
		b. Should be able to express major physiological activities in terms of Tridosha	16	70
		c. Should be able to identify Gunas and karmas of doshas in normal human body	18	78
		d. Should be able to identify or elicit doshik symptoms in patients	7	30
		e. Should by heart corresponding slokas related to specific topics	5	22

4	Which of the following components do you wish to include in the content of Module for introductory learning of Tridosha sidhanta for a BAMS student, as a part of an induction course? (multiple response)	a. Etymology of Tridosha ..... 16 ..... 70 b. Gunas of Tridosha ..... 19 ..... 83 c. Understanding tridosha with possible comparison with modern biology ..... 14 ..... 61 d. Karmas of Tridosha ..... 19 ..... 83 e. Prakriti ..... 11 ..... 48 f. Vriddhi-kshayalakshana of Dosha ..... 11 ..... 48 g. Locations of Dosha ..... 14 ..... 61 h. Five fold classifications of dosha ..... 10 ..... 43 i. General treatment of doshas ..... 2 ..... 9 j. Any others; please specify 0 0
5	Specify the teaching strategy suitable for each topic (multiple response)	*Response given as a separate table 3.2.3.*
6	Do you think that learning and by hearting Sloka should be a separate entity from the Module? or Should it be part of the Module?	♦ Separate from the module ..... 8 ..... 35 ♦ Part of module 15 65
7	Which of the following mode of module transaction would you prefer?	♦ The whole content at a stretch (two or three days) ..... 7 ..... 31 ♦ Coupled with other subjects 16 69
8	Do you think that Ashtangahridaya Sootrasthana alone is sufficient to illustrate Tridosha for a new comer?	♦ Sufficient ..... 12 ..... 53 ♦ Not sufficient 11 47
9	Which of the following assessments will be suitable after the implementation of the module? (multiple response)	a. Achievement test, descriptive ..... 9 ..... 39 b. Achievement test, objective ..... 15 ..... 65 c. Viva-voce ..... 9 ..... 39 d. Practical test with healthy person and patients ..... 9 ..... 39 e. Module evaluation proforma 17 74

Table - 3.2.3. Topics in the module vis-a-vis teaching strategies

Teaching Strategy → / Topics ↓	Didactic lecture	Lecture discussion	Lecture with AV aids	Group discussion	Demonstration method	Clinical Based Learning	Case simulation	Problem Based Learning	Role play	Home work/assignments
	% of positive response (multiple responses)									
Etymology of Tridosha	78	35	4	4	0	0	0	0	0	0
Gunas of Tridosha	26	61	26	13	30	13	9	9	4	4
Understanding tridosha with possible comparison with modern biology	26	39	43	35	22	35	17	9	4	4
Karmas of Tridosha	35	35	26	9	22	26	22	9	4	4
Prakriti	39	17	26	9	30	39	26	13	48	13
Vriddhi-kshayalakshana of Dosha	39	35	21	4	26	65	52	9	22	0
Locations of Dosha	47	39	47	9	22	22	9	4	4	4
Fivefold classifications of dosha	39	26	17	4	13	48	78	26	9	0
General treatment of doshas	39	60	34	0	22	78	52	30	0	13

To the question regarding the expected skills attained by the learners through the new module, teachers were allowed to have multiple responses so that they could select more than one options from those listed out. 18 teachers (78%) expected the learners to identify Gunas and karmas of doshas in normal human body. 16 (70%) teachers wanted the learners to express major physiological activities in terms of Tridosha. 13 teachers (57%) expected the learners to to explain Tridosha sidhanta with possible comparison with modern biological principles. Eliciting the Dosha symptoms in patients was suggested by 7 teachers (30%). By hearting the sloka was opted as objective of the module by 5 teachers (22%) only.

Regarding the content of the inductive module to transact Tridosha sidhanta, 19 teachers each (83%) agreed to include Gunas and Karmas of Tridosha. Etymology of Tridosha was opted by 16 (70%), understanding Tridosha with possible comparison with modern biology by 14 teachers (61%), same number of teachers with locations of Tridosha. 11 each (48%) supported to include Prakriti and symptoms of increase and decrease in the module. Fivefold classification was opted by 10 teachers (43%). Only 2 teachers (9%) opted to include treatment principles of Tridosha in the module.

According to 15 teachers (65%) sloka learning should be made part of the new module where as others (8, 35%) opined not to insist to learn sloka in the module. Regarding the implementation of the module, 16 teachers (69%) showed their acceptance to introduce the module along with the current time table coupled with the other subjects. The others (7, 31%) opted to

introduce the module as a special program at a single stretch of two or three days. Almost equal weightage was noticed for the opinion regarding whether Ashtangahridaya is sufficient as a textbook to teach Tridosha theory in the module. 12 teachers noted the text is sufficient whereas 11 teachers suggested other textbooks for getting complete idea about Tridosha sidhanta.

Regarding the methods of assessment,achievement test (objective) (15, 65%) got dominance over achievement test (descriptive) (9,39%). Practicals and viva voce were suggested as assessment methods by 9 teachers each (39%). Great majority of teachers (17, 74%) reached in consensus about relevance of a module evaluation proforma at the end of the classes.

Regarding the teaching strategy teachers had varied opinion. This was also open for multiple responses. Majority (78%) agreed that etymology of Tridosha should be transacted through didactic lecture method. Lecture discussion stood next to this (35%) in that topic.

Lecture discussion was found to be the ideal method for transacting Gunas of Tridosha, agreed by 61% of teachers. Next method opted was Demonstration (30%).

There was no clear majority regarding the methods adopted for teaching Tridosha in modern parlance, the weightage went for lecture with AVaids (43%), Group discussion (35%) and CBL (clinical based learning, 35%).

Regarding Karmas of Tridosha there was no difference in suggesting didactic lecture (35%) and lecture discussion (35%) whereas other methods fell even lesser. Role play was suggested as the best way of transacting Prakriti (48%) followed by Didactic lecture (39%) and CBL (39%). The best method for teaching Vriddhi-kshayalakshana was found to be CBL (65%) followed by case simulation (52%). Dealing with locations of Dosha Didactic Lecture and Lecture with AV aids were found ideal (47% each), followed by Lecture discussion (39%). The best method for teaching types of Tridosha was suggested to be Case simulation (78%) followed by CBL (48%).

3.2.3. Focus Group Discussion

Focus Group Discussion is a discussion among a homogenous group of experts. While planning for developing an innovative module, lack of expertise for such an attempt was a main shortcoming. Lack of expertise in teaching technology, philosophy of teaching and development of modules was considered seriously. Inputs from multiple sources were required for such an effort. In that back ground, a Focus Group Discussion was planned where in experts from multiple sectors – Educational Sector, Medical Educational Sector, Ayurvedic Academy, Ayurvedic clinical teaching, Student sector etc. 11 experts, including Research Guide were selected from different fields. It included

1. Three Subject experts with an average service of 16 years who teach Tridosha sidhanta and as a part of Basic Principles and Kriyasareera

2. Two experts from medical field and Ayurveda who are well experienced in preparing and implementing modules for Medical teaching, One was from Nursing field and the other from Ayurveda.
3. A clinical teacher, with teaching service of 12 years, who has expertise in implementing concept of Tridosha in clinics.
4. An expert in educational research from General Education, who has ample experience in designing, implementing and experimenting different types of modules.
5. Representatives from UG and PG students
6. Research Methodologist who had rich experience in conducting researches in similar subjects.

Discussion was organized at VPSV Ayurveda College Kottakkal on 19th September 2016. The scholar opened the session by presenting a draft module for 3 hours intended for the pilot study to sensitize the discussants regarding the subject, since some of them are not from the field of Ayurveda. Research guide gave a brief introductory note on the topic. The Research Methodologist moderated the session. After the discussion, ideas evolved from the discussion were summarized (see Appendix-2).

3.2.3.1. Summary of ideas evolved from Focus Group Discussion

The ideas were summarized in the following headings:

1. Character of ancient teaching

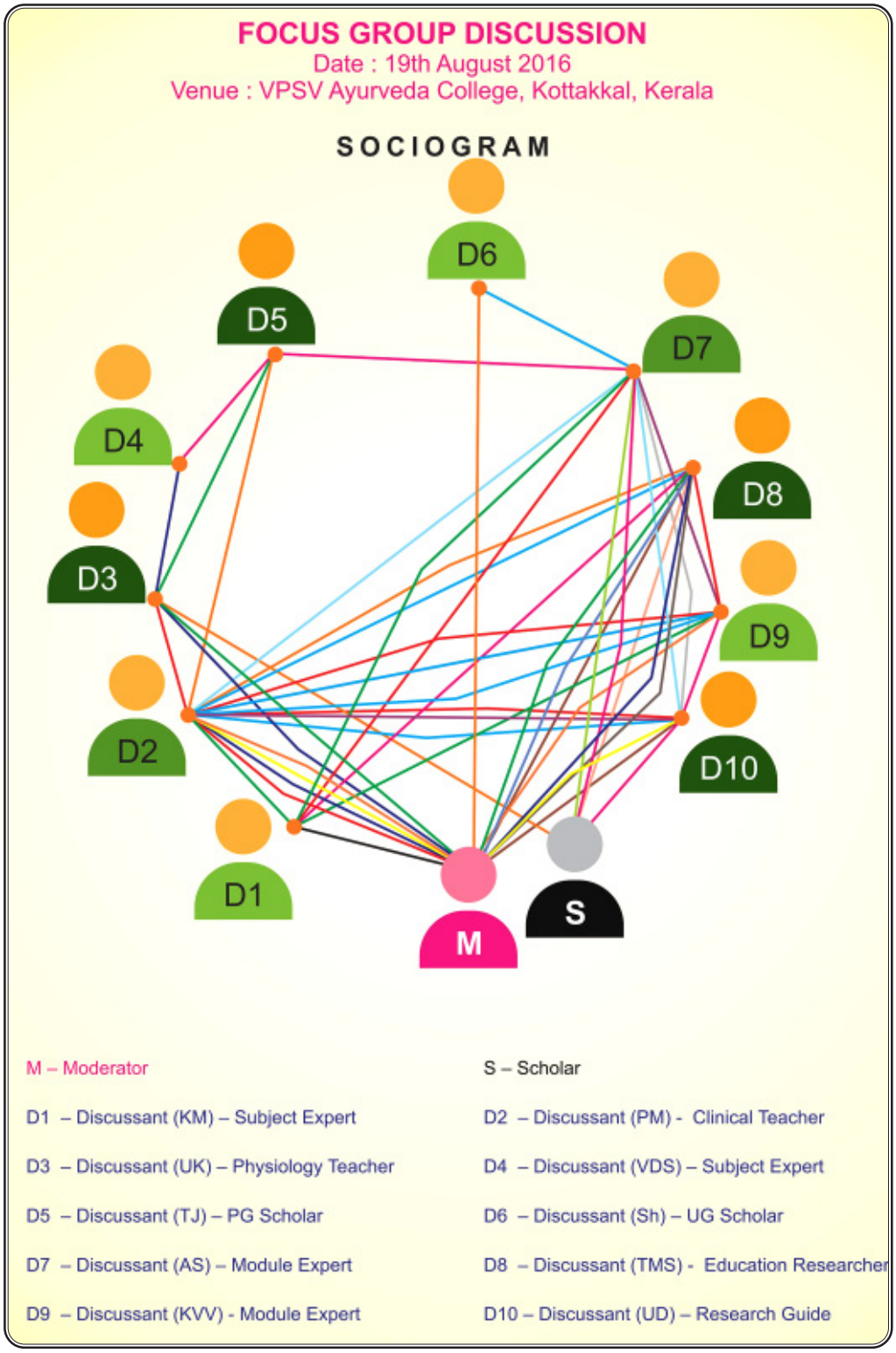


Fig. 3.2.1.
The Sociogram prepared in the FGD

2. Nature of learning/teaching Tridosha
3. Character of present/conventional teaching
4. By hearting of sloka
5. Settings of the study
6. Clinical Learning of Tridosha
7. Learners' role
8. Considerations on content and implementation of new module
9. Comments on present draft pilot module
10. Outcome Assessment

3.2.3.1.1. Characters of ancient teaching

Class room teaching was not a method in ancient medical education. Instead it came into practice in late medieval period or even modern age. Activity oriented learning is not a new methodology as far as Ayurveda is concerned; it was prevailing right from Upanishat tradition. There are many instances in our Samhitas which prove the activity orientation of the pedagogy. Ideal teaching of science is said to be appropriate for three types of learners (high, moderate, low intelligent). Order of chapters in Caraka Samhita itself gives the methodology of teaching.

3.2.3.1.2. Nature of learning/Teaching Tridosha

Understanding Tridosha is a long process and learning Tridosha sidhanta is typically formative in nature. That means, it starts from the very beginning of the study tenure of a learner, advances to its applied aspect in

the coming years, even persistslifelong after the formal education. Naturally, while teaching attributes of Tridosha,weexpecta reflection from the students. This kind of theories can be considered as to necessitate reflective practices in a high order.The main problem faced in the case of Tridosha is that they are not quantifiable, but are qualitatively expressed phenomena. Another issue is the subtleness of principles explained in Ayurveda. Macro level and micro levels of human biology should be approached based on Tridosha theory.It is always better to avoid difference of opinion among teachers about Tridosha.

3.2.3.1.3. Present teaching/conventional teaching

We have to define conventional teaching in this study as the method adopted by teachers *now* to transact basic principles, not the ancient methodology. Terminology should not become a barrier in learning Ayurveda. Conventional method here is reciting sloka, making its prose order (anwaya), meaning (anwayartha) and so on. Conventional teaching is not always a bad experience and it has its own merits. But, there is no standard for conventional teaching now. First we should standardize the conventional method.We cannot challenge the prevailing system of transacting the particular topic. As far as general education is concerned, in the present curriculum methodologies like issue based curriculum, critical pedagogy, constructivism etc. get more acceptance.

3.2.3.1.4. By hearting of Sloka

Even though by hearting is not a good way of learning, Ayurveda typically requires by hearting. Important thing is how to bridge between by hearting and its application.Good lecture makes things naturally by

hearted.Minimum period of six months is taken to change students' attitude towards Ayurveda.

3.2.3.1.5. Settings of the study

As the setting of study we can select two colleges, one with traditional method and the other new method. It will be more feasible to implement the new module in this college which can be compared to the traditional method in some other colleges.Implementing both the methods in the same college will make problem of inter communication between them about the strategies. One group learning from the other group will make some problems. Regarding the settings, when more number of colleges is there, more is the chance for getting good assessment of results. Still, for practical reasons, it is better to concentrate in a single institution, not going wider. Applying a module, which is clinically oriented, in different institution may not be feasible.

3.2.3.1.6. Clinical Learning of Tridosha

It is evident that if we can create a clinical atmosphere in 1st BAMS itself, change can be brought about in the attitudes of learners at an early stage. If exposed to clinics, even though students may not be able to understand the principles, they will remember the outcome. This can boost up their confidence also. Prakriti can be used as a tool, for basic understanding of Tridosha. But for advanced learning, clinical exposure is a must. Still, practically, students can be taken to clinics after three or four months of their admission.It is not ideal to introduce fresh BAMS students to the ward or

OPD. The only thing that can be done is teacher can have some specimen patients, (eg: specimen for rooksha etc.) to teach I BAMS students.

3.2.3.1.7. Learners' role

Students can try to appreciate things among themselves. Students can be very well categorized based on the left-right brain dominance also. Assessment of their own nature, parent's nature, their own problems etc. can be done as a part of Activity oriented learning. Clinical based learning can be done with the help of teachers, PG's, House surgeons etc.Learning Tridosha from within (observing oneself) can be the method adopted initially.

3.2.3.1.8. Considerations on content and implementation of new module

Transaction, may it be conventional or modular, depends on many variables like quality of the teacher, quality of students, standard of the College, clinical setting etc. Initially it needs a didactic lecture about such things, even though it may be sometimes boring, before going to interactive sessions. A better method is a combination of both the styles. (Conventional and new). We can develop an innovative method which is a blended mode of teaching which incorporates both traditional method and modular method. Initially students should be considered as lay man, not as a professional. It is better to start from some modern terminologies and then explain Ayurvedic perspective of such things. They should never feel that what they have learnt is wrong, but we have to make them identify that there is another way to view human body.Technology enabled transaction also can be considered in

teaching and learning. It is better to mix the concepts of learning module and teaching module. The content and strategy of module should meet the need of all the students. The method should be starting from simple to complex. Also, we have a lot of multimedia scopes (video clippings/photos). Among different strategies, one can be cognitive apprenticeship. Concept mapping can be used in by hearting slokas. Ayurveda requires more imaginative and creative ability.

3.2.3.1.9. Comments on present draft pilot module

Two or three days' implementation of module is not that much promising. The time limits prescribed in the module seems to be inadequate to complete the idea. The prepared module is an inductive module. We have to modify the present proforma for Prakriti assessment, to Caraka's model. We can centralize in sloka in this inductive method. In inductive method, we cannot by pass slokas. The present module seems to be excellent in an interactive aspect. The imaginative capacity is well nourished here.

3.2.3.1.10. Probable content of the new model

Before introducing Dosha, concept of Guna should be introduced to the students. Better use Caraka's model of Prakriti assessment, which gives a better Guna orientation. Concept of *guna* is more important than learning terms like *Vata, Pitta* and *Kapha*. Rather than Prakriti, Guna will be more important in introducing Tridosha. We can use different historical persons, kings, and leaders etc. to explain characters of Tridosha. There are lots of examples of Prakriti, the features which are easily identifiable. Updating

the examples also is important. As a part of preliminary module, slokas explaining Gunas, relation to agni, relation with kostha, diurnal variation, variation with age, general sites only are essential. No need to go to the further details of Karma and all. Focusing on Guna is good, but when to focus on Guna is to be fixed. Precautions should be taken to avoid confusions among students.

3.2.3.1.11. Outcome Assessment

Just asking the satisfaction rating we cannot assess how much volume of the content is learnt by the student. As an educational package, we have to assure that students get adequate knowledge. Imagination, application level of questions is a must in achievement tests. There should be formative and summative assessment. Assessment of Knowledge, Attitude and Skill should be enabled in the questionnaire. There can be two sorts of assessments. One is to assess the level of understanding of students and the other, effectiveness of teaching. IQ of students and their interest in the subject are two components which may affect the outcome of teaching. A pre-test post-test study can be done. Post-test can be done at different intervals. Pretest can be there regarding the attitude. Assessment component of the module should never consider tests, practical's, viva etc. Satisfaction scoring only is needed.

3.2.4. Pilot study: Results & Conclusion

A pilot module of 3 hrs duration was prepared after discussion with educational experts and implemented for three batches of students –

one batch of +2 students and another two batches of I year BAMS students.Pilot module was aimed at testing the feasibility of activity oriented, interactive teaching for transacting Tridosha sidhanta.60 learners were present in Group-1 with a male female ratio of 1:5. Group-2 consisted of 50 students with male-female ratio 3:4. Mean age in years in the groups were 18.7 and 16.9 respectively.

The results obtained from the above observations can be summarized as below:

- Majority of learners agrees with clarity of ideas, participatory nature and chance for critical thinking. I BAMS students marked higher intensity.
- Majority of learners feel themselves well communicated with the content offered through the module. Group-1 marks higher percentage.
- Grand majority shared their interest to know more about Ayurveda. I BAMS students' marked higher percentage.
- In almost all parameters Group-1 showed shift to positive aspect, where as Group-2 marks more or less an equal distribution.
- Majority in Group-2 don't want to become Ayurvedic physician.
- Majority in Group-2 doesn't feel learning Tridosha sidhanta is easy.
- Majority of learners agree with the scientific nature of Ayurveda. Group-2 agrees with more intensity.

The findings suggest that the module was an effective communicative and learning model for introducing Ayurvedic principles to novice students. The module proved to meet its outcomes in the scientific

understanding as well as improved participation in class. A significant number of participants from both groups showed interest to learn more at the end of the module. Thus, this pilot trial puts light on feasibility and nature of teaching module as a part of developing innovative teaching models to transact basic concepts of Ayurveda. However, the assessment of the module will be completed only after comparing it to current practice in colleges as well as a slightly expanded subject matter. Detailed module of the Pilot Trial is appended as appendix – 2.

3.2.5. Structuring of innovative model

The Guiding Principles of the Innovative Model

After considering (1) the nature of dearth in pedagogy as reported in previous attempts to revive Ayurveda pedagogy (discussed in the review of literature) (2) the ideas from the back ground preparations and (3) the conclusions from the Focus Group Discussion, further discussions were made with Research Guide and Educational Experts. As a result of such discussions, the guiding principles for the Innovative Model were formulated as follows:

1. The new model should basically address a learner during his/her inception to Ayurveda. It should bring out a smooth transition from his/her previous learning premises to that in Ayurveda. In that way, this model should be conceived as a transitional model.
2. Ayurveda is a clinical discipline, but having a preclinical phase for its learning. In this phase learner place the new idea/concept in natural surroundings and understand it as a source for rationalizing man-nature

mutuality. Explaining the concepts in normal human beings also is related the pre-clinical phase. In the clinical phase, these principles are applied to clinical situations. In the new module learners are better not directly exposed to patients, and thus are typically pre-clinical. Such a pre-clinical learning should be completed within six months of admission to the course, preferably within three months of the admission.

3. While a learner is exposed to new information, Piaget's concepts of cognitive development, especially those related to assimilation and accommodation need to be considered.
4. The new model should not challenge the timeframe prescribed as per the present curriculum. It should follow the present time structure and time table adjusted for the content to be delivered.
5. The strategies adopted in this package should ensure activity oriented learning, such as discussions, brainstorming, games, role plays, problem based learning, simulation, assignment etc.
6. The package should ensure student centered learning as far as possible, instead of teacher centered teaching.
7. The package should agree with a fact that learner's have their own capacity to construct new ideas out of their experience. Educational ideology of *Constructivism* should remain as the key principle behind this package.
8. Focal point of education in constructivist model is changed to student which builds up their interest, attitude, aptitude and creativity. The role of teacher there is only to let them identify themselves.

9. The package should impart ample chances for reflective practices. Reflective practice is the ability to reflect on one's actions so as to engage in a process of continuous learning. A key rationale for reflective practice is that experience alone does not necessarily lead to learning; deliberate reflection on experience is essential.
10. With the move toward a competence-based curriculum and reflection being considered an essential aspect of lifelong self-learning, reflective activities are becoming part of the curriculum at all levels of medical education.
11. While adopting new methods of teaching, there is every chance for the traditional methods, especially those related to sloka learning, to be defied. Such traditional methods have their own merits. While preparing a new model, it should attempt to blend the new methods with traditional methods. Sloka learning should be preserved as an integral part in these modules.
12. Role of new media in the process of learning is not negligible. Using them judiciously increases the effectiveness of the content delivered.
13. Regarding the content of the new model, it is always ideal to introduce Tridosha Sidhanta as a continuation to the concept of Guna in Ayurveda.
14. Even though the new model typically follow any of the available models described and classified by Joyce, it is ideal to follow the format prescribed for a model by the same author consisting of Syntax, Social system etc.

3.2.5.1. Fixing the construct of the new model

Teaching models are just instructional designs. They describe the process of specifying and producing particular environmental situations which cause the student to interact in such a way that specific change occurs in his behavior (1972).Models of Teaching are designed for specific purposes- the teaching of information concepts, ways of thinking, the study of social values and so on-by asking students to engage in particular cognitive and social tasks. Some models centre on deliver by the instructor while others develop as the learners respond to tasks and the student is regarded as a partner in the educational enterprise. Models have their own pre designed structure. It has five components:

1. *Syntax*, the systematic sequence of activities in the model.
2. *The social system* describes the role of and relationships between the teacher and the pupils.
3. *Principles of reaction* tell the teacher how to regard the learner and to respond to what the learner does.
4. *Support system* describes the supporting conditions required to implement the model including books, films, lab kits, reference materials etc.
5. *Effects of model*Two types of effects: Instructional effects and Nurturant effects. The first one is direct effects which results from the content and skills on which the activities are based. Nurturant effects are implicit in the learning environment. They are indirect effects of the model.

The Content : Content and duration of the module was fixed

considering the syllabus and time structure of BAMS I year by CCIM. Since the preliminary, pre-clinical aspects of Tridosha sidhanta was suggested during the preparatory phase, the content was restricted to such an area which allows the learning of Tridosha through natural observations, permitting an easy approach through understanding of Guna concept in Ayurveda and making the content palatable to the new comer building an easy transition. The content to be delivered as per the actual syllabus was fixed after discussion with teachers dealing with the subject and considering the availability of normal hours available for transacting the content as a part of the present structure of the curriculum. The time frame also was fixed considering the weightage of the content in the actual syllabus. In the actual syllabus, concept of Tridosha was dealt in the paper Maulikasidhanta and Ashtangahridaya, where the topics related to Tridosha are scattered in different chapters in Sootrasthana especially in chapter numbers 1,11,12 and 13. Portions from those chapters were selected so as to make a logical sequence in the understanding of Tridosha sidhanta, after discussions with subject experts. Apart from the content from Ashtangahridaya, relevant portions from Susrutasamhita and Caraka Samhita were also selected, which were felt to be essential to make the transaction logical and sequential.

Finally areas of the syllabus were selected as shown in Table 3.2.4.

Table - 3.2.4. Content of New Model

Source	Content selected for the new model	Sloka in the chapter
Caraka Samhita Sutrasthana – 1	Concept of human body – conglomeration of Sareera, Indriya, Satwa and Atma	C S Su 1
Susruta Samhita Sutrasthana	Description of Visarga-Adana-Vikshepa nature of human body and nature	Su S Su
Ashtanga Hridaya Sutrasthana – 1	Introduction and statement of Tridosha sidhnata Vimsati Guna Gunas of Tridosha Normal fluctuations of Tridosha	AH Su 1
AH Sutratshna 11	Normal functions of Tridosha Symptoms of increase of Tridosha Symptoms of decrease of Tridosha	AH Su 11
AH Sutra 12	Locations of Tridosha Subdivisions of Vata	AH Su 12
AH Sareera 3	Description of Prakriti (general)	

Apart from the above said actual content of the module, for attaining easy transition from their pervious learning experiences, necessary modifications were done in the content so as to make the transaction more interactive, participatory and keeping continuation with their previous learning experiences.

Calculating the relative load offered by the above content, the total hours of the new module was fixed as 15. The total content was divided into 10 units adjusted to the phase wise sequencing of the model.

Different phases, their purpose and unit wise outlay of content is shown below in table 3.3.

Selection of teaching strategies with its rationale : The guiding principles adopted while selecting teaching strategies are given below:

1. *Learning is an active process*. This means we have to actively engage the learners in learning activities if we want them to learn what we intend teach. We have to give our students opportunities to participate in classroom activities.

2. *The more senses that are involved in learning, the more and the better the learning*. What is seen *and* heard are learned more than what are seen *or* heard. This implies that use of teaching methodology that makes use of more visuals and those mere audio aids.

3. *A non-threatening atmosphere enhances learning*. A non-threatening and conducive classroom atmosphere is not only a function of the physical condition of the class room but more of the psychological climate that prevails in the class room. Building comfort into learning is essential if we expect students to respond positively and constructively to their education.

Table - 3.2.5. Phases of transaction in the new model

Phase No	Phase Name	Purpose	Units
1	Changing the perspective	To make a change in the perspective of the learner so as to create a new perspective suitable for learning Ayurveda. Also, it ensures to observe nature for identifying principles related to Ayurvedic understanding of human being and nature	1. Change your perspective 2. Man as an epitome of universe
2	Furnishing back ground knowledge	To create a platform where learners understand the three basic principles - Visarag, Adana and Vikshepa, as the three driving forces of nature as well as human body. To make awareness on how Guna spectrum reflects the character of human body as well as nature.	3. Guna spectrum
3	Introduction of the concept	To introduce the gross idea of Tridosha from the background knowledge already imparted. Starting from the biological identification of the three principles, the sessions advance to the connotation of the terms (Tridosha - Vata, Pitta &Kapha)	4. Building Tridosha approach to life
4	Establishing connections between concepts	To build up connected knowledge of Tridosha with Guna spectrum and their interrelatedness with nature	5. From Gunas to Doshas
5	Reinforcing, elaborating	To reinforce the theory with the help of concept of Prakriti and further elaborations related to normal and abnormal functions, structural basis, subdivisions etc.	6. Tridosha basis of personality 7. Normal functions and fluctuations of Tridosha 8. Structural basis of Dosha 9. Disturbance of Dosha equilibrium 10. Functional divisions of Vata

4. *Emotion has the power to increase retention and learning.* We tend to remember and learn more those that strike our hearts! In fact, the more emotionally involved our students become in our lesson greater the impact.

5. *Learning is meaningful* when it is connected to students' everyday life.

6. *Good teaching* goes beyond recall of information

7. *An integrated teaching* approach is far more effective than teaching isolated bits of information.

The present module, being constructivist, student centred and activity oriented one, scope of different interactive strategies have been included, apart from the conventional didactic method. Always it was kept in mind to consider students level of understanding regarding the subject being introduced.

Lecture discussion, guided instruction, inquiry based learning, group discussion etc. with the help of AV aids have been attempted in abundance to assure active participation from the learners. In such practices, ample scope for interaction has been kept in the class room. These strategies also expected to help building up democracy in the class room premises. Students will get the notion of constructing ideas with their own effort.

Problem based critical thinking was enhanced through spot quizzes. Spot quizzes were taken as a tool for formative assessment as well as a method to inculcate problem based thinking. Often, new ideas on the learnt concepts were introduced through the quizzing sessions with the help of pictures and descriptions.

Real life examples were abundantly quoted during the elaborations of the concepts. Case simulations, case reports etc. were adopted to make sense of the ordinariness of the concepts being learnt. This helps learners to get along with the concepts without feeling strangeness.

Brainstorming sessions were introduced where learners themselves think on their own logic to assess their own status regarding the knowledge being imparted.

Role plays, demonstrations and games with the participation of the learners themselves helps to convey the ideas and feel it to have a “me too” effect to the topics. This helps to nourish the affective domain too.

Video lessoning was introduced**,** featuring some famous stories and persons,to make convinced about concept of Prakriti, etc., where learners could identify the features easily.

Sloka learning also was made constructivist in this model. Connotation of the terms, etymology, identifying the terms in groups or pairs and finally arranging the terms in an order to construct sloka as seen in the

textbook. This makes a reverse order when compared to conventional teaching. In conventional teaching, slokas are introduced first, then the meaning and sense. In this model, sense and meaning are introduced initially and then advancing to the construct of sloka). Some exercises similar to language teaching also are introduced.

Constructionistic practices were implemented through constructing proforma for assessing Prakriti.

Assignments like Proforma filling, proforma preparation etc. are expected to bring out enhanced participation from the learners.

OTB activities (Open textbook) are included to make sense of how to properly identify and arrange the topics scattered in the Samhita (Ashtangahridaya). This sort of activities is really fitted in the context of Ayurveda where, learning through the prescribed textbook is inevitable.

Concept mapping was rarely done to draw conceptual clarity to the ideas delivered.

Concept building through new Maxims: When a complex theory is introduced there was a tradition of introducing Maxims (Nyayas), which explain the concept in simpler analogical method. Maxims try to build up a conceptual clarity to different theories through symbolizing them to some common objects and their relationships. In the same manner, some new Maxims were tried in the present module to explain complex approaches.

3.2.6. Incorporating ideal structure of a model

3.2.6.1. Syntax

Syntax is the systematic sequencing of the model. The package is organized in such a way that the learners are exposed to new ideas from the background of what they have within them. Also, they are trained to observe the nature and to come up with ideas related to man-nature mutuality, before approaching the core content ie, Tridosha sidhanta. Tridosha sidhanta is based on Gunasidhanta. Initially, learners are familiarized with the way in

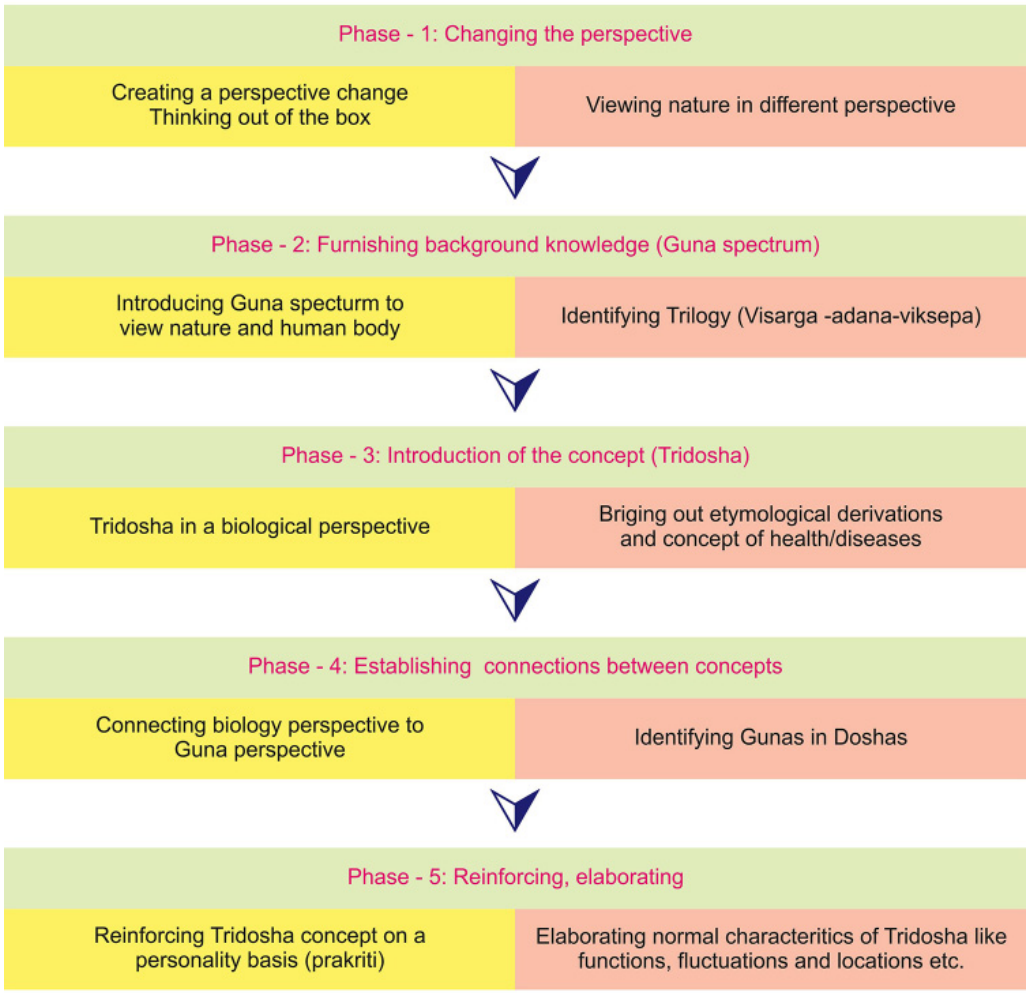


Fig. 3.2.2. Phases of new model

which the nature around them including materials they consume hold the Guna pattern within them. Reflection of this pattern in human body comes through introducing the trilogy in human body, ie, Tridosha.Parallel to this exercise, Tridosha was introduced in its biological paralance through showing how basic life processes reflects the presence of three kinds of activities. These activities were etymologically connoted to derive the terminology – Vata, Pitta and Kapha. Idea of Tridosha was then subjected to elaboration by relating it to the structural, functional aspects of human body and fluctuations observed due to various exposures. Normal functioning was followed by abnormal functioning and other divisions. The sequencing of the model is given in the fig. 3.2.2.

3.2.6.2. The Social system

The social system describes the role of and relationships between the teacher and the pupils.In a constructivist model, teacher is not an instructor of the knowledge but, acts as a facilitator. Teacher establishes an atmosphere from where learner constructs new ideas. Learners have a participatory role in the generation of knowledge. The strategies adopted in the model such as role play, interactive discussions, games, spot quiz, etc. ensure participation and interaction.

3.2.6.3. Principles of reaction

Principles of reaction tell the teacher how to regard the learner and to respond to what the learner does. In the present model, teacher is regarded

as a facilitator so that free and supportive responses are offered to the learner. Learners are regarded as equally participating in the construction of knowledge. Instant feed backs are assured during the transaction, so as to allow the learner to assess his/her advancement in assimilating new concepts.

3.2.6.4. Support system

Support system describes the supporting conditions required to implement the model including books, films, lab kits, reference materials etc. In this model the whole sessions were streamlined through power-point slides as inserted in the model document. Apart from this, hands on materials like tables, charts etc., films, textbooks etc. are used as support system.

3.2.6.5. Effects of model

3.2.6.5.1. Instructional effects

1. Understanding the concept of Tridosha as a principle adopted in Ayurveda
2. Acquire skill to identify environmental and physical characters in terms of Tridosha
3. Creating an aptitude for advancing to the higher knowledge base of Ayurveda

3.2.6.5.2. Nurturant effects

1. Widen their thought process to enable better learning of Ayurveda
2. Convincing the concepts in Ayurveda in relation to real life situations
3. Creating positive attitude towards sloka learning

3.2.7. Fixing the assessment criteria

(1) Summative assessment: Summative assessment questionnaire was prepared considering the final knowledge to be attained by the learners through undergoing the whole span of transaction. The questionnaire contained knowledge, understanding and application level questions and also assessment of Sloka basis of the learner. It was used for pretest and post-test. The questionnaire is appended as appendix - 10

(2) Formative assessment : It was carried out by assessing the on-going progress in attaining different levels of knowledge. The main method used were:

a. Spot tests (pre-test) 10 one word questions as pretest-post test in each unit
b. Spot quiz, for assessing the advancement in understanding/ application levels of some of the units
c. Assignments in the form of construction of questionnaires, furnishing questionnaires, tabulations, OTB activities, sloka writing etc.

3.2.8. Writing the document

Written document titled as “Innovative model for transacting Tridosha sidhanta” was prepared by incorporating all necessary components for making it as a self-explanatory document. As an independent document it consisted of description of the back ground preparations, rationale, structural

details etc. apart from the original content of the module. There are 10 units/ modules in the model, each one explained with (1) aims and objectives (2) list of teaching strategies used (3) note to the instructor (4) ideas to be transacted with their logical sequencing and probable outcome of the activities during transaction (5) power-point slides needed for each activity (6) tables and other tools used for activities with instructions on how to use it (7) Necessary slokas from classical textbooks in Ayurveda (8) Assessment questionnaire (9) Feedback questionnaire.

3.2.9. Review by experts

After preparing the new model, it was sent for review by three experts: Guide, Educational expert and subject expert. Educational expert considered it important to incorporate conventional structure of a model to the present model to get it structurally consistent and comparable with standard models.

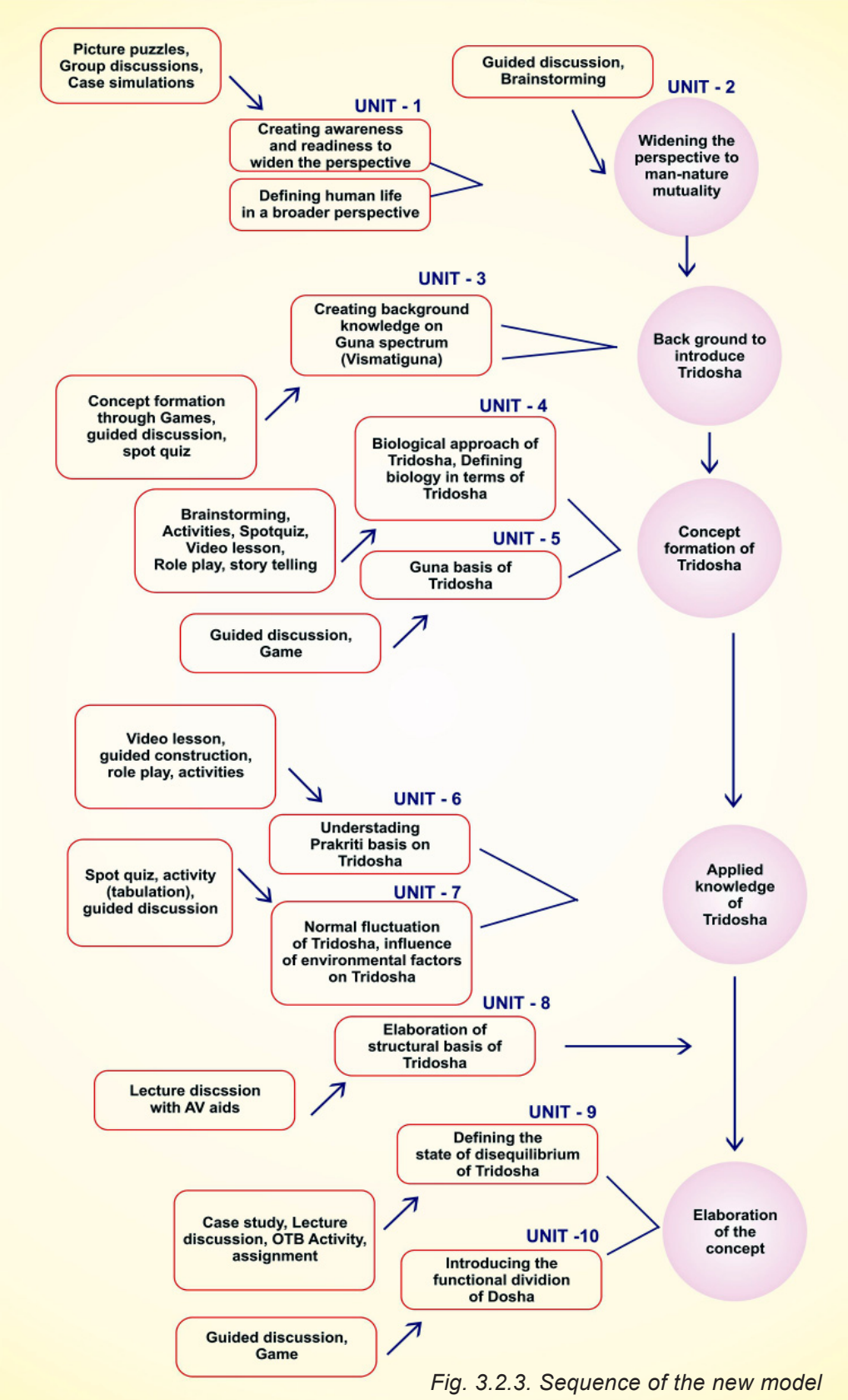


Fig. 3.2.3. Sequence of the new model

Chapter - 3

INNOVATIVE MODEL FOR TRANSACTING TRIDOSHASIDHANTA

3.3.1. CHANGE YOUR PERSPECTIVE!

(UNIT - 1)

3.3.1.1. Learning objectives

To enable the learners to

1. Become aware that “thinking out of box” is inevitable part of medical learning
2. Build up a broader perspective on Human Body
3. Define Life (Ayus) in Ayurvedic perspective.

Notes to instructor

This is an introductory session. Give formal self-introduction about the Teacher and about the whole program. Let the learners introduce themselves simply.

Learner is a beginner in Ayurveda. He is in a phase of transition in two ways:

1. Learner begins to learn an applied science, that also a medical science, in which human being in its full complexity is the object of study.
2. They begin to learn a science which does not have continuity to their experience in lower classes. Ayurveda is a new area to them.

In both the above cases, the learner needs a larger outlook than mere physical sciences learnt in lower classes. Learner knows to view the world in terms of Physics, Chemistry, Biology independently. Most of the times he/she neither analyzes the inter connectedness of the above perspectives, nor thinks about truths beyond these perspectives. So, this session intends to make awareness on thinking beyond such perspectives. Care should be taken to add on to their present perspectives without challenging their existing scientific temperament.

3.3.1.2. Details of the class

Teaching strategy	Lecture discussion, Case simulation, Picture puzzles with the help of visual aids
Materials required	AV facility, black/white board, and chalk/ marker, feedback proforma
Duration	60 minutes
Assessments	Participants' feed back

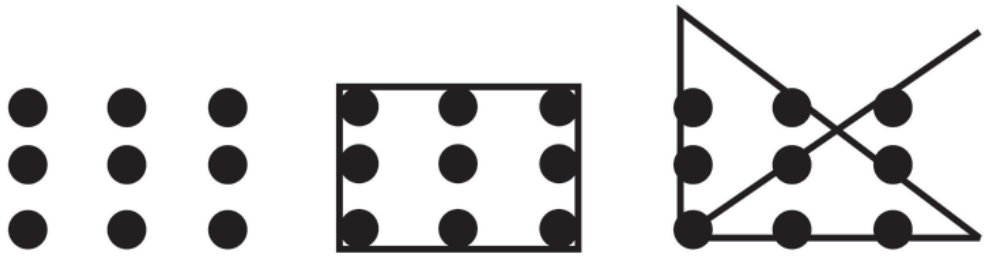
3.3.1.3. Class Activities

Activity 1 Game

"Reframe your thoughts…!"

The session starts with a "nine-dot-game." Participants are asked to join nine dots (see figure1) with four continuous lines without break. Nine dots are drawn on the white board and students are asked to come forward and join the dots using marker. Those who know the game early may be restricted from trying the task. Some of the students will try to join. Most of the times they tend to think within the box (as shown in figure2). After three or four trials, ask the students who already know the game to come forward and complete the diagram. If nobody is ready, the teacher may complete the diagram. While drawing the lines (as shown in figure 3) the teacher stresses on extending the line "out of the box". After completing the drawing, ask the students about what caused the failure in attempting the game. They will be convinced that thinking within the frame caused the failure. Teacher reinstates the importance of thinking out of the box once again. (Suggested video URL: https://youtu.be/XrwnrFVugw)

Summing up: Think beyond frames



Activity 2 Picture Puzzles

"Frames are important"

This session enables the students to identify the factors influencing formation of perspectives. Show the students the following pictures using powerpoint presentations. One can see figure in two ways, if you see white color in black back ground read it as LIFT, and in turn there is nothing legible while you see black figures in white back ground. Perspective is different in this case.

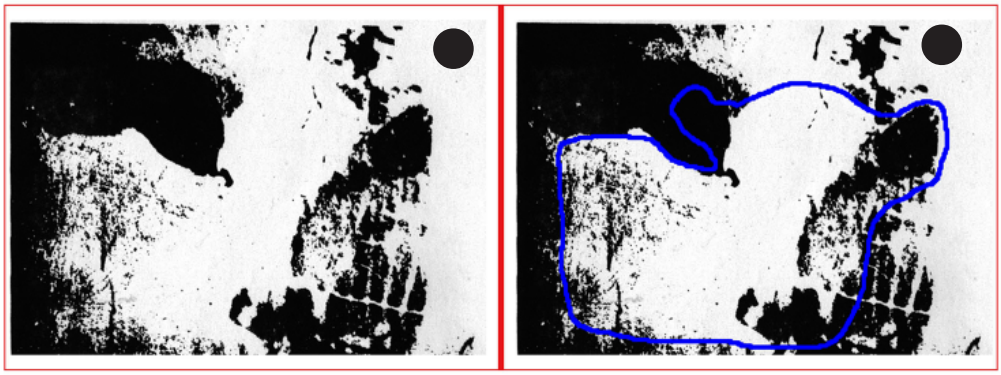


Message: Knowledge depends on perspective



The book can be visualised in two ways - either open or closed. When a person is interested in reading he will see the book open and vice versa. The attitude of the person determines the perception.

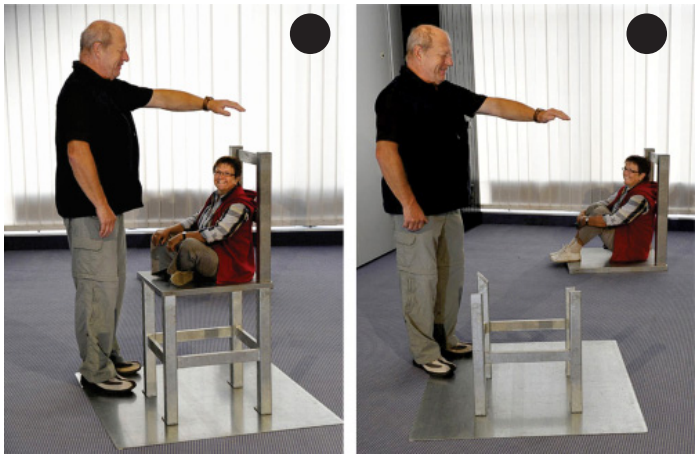
Message: Attitude determines perception.



Ask the students to identify the form in fig.a. They will go on guessing many forms. Identifying the figure of cow is the task. Some of the students will do. Show fig.b and ask those who failed to identify about what made them to commit mistake. Let them know about importance of framing their ideas in a proper way.

Message: Making frames are important

Show figure fig.a first. Ask what they see. Then show fig.b. They will find out how does perspective influence understanding.



Message: Perspective determines understanding

Activity 3 Lecture discussion - "An egg, but, something beyond…!"

> ***Note to Instructor:*** *A perspective means referring an object on the back ground of a particular discourse which they learn from previous experience (school classes). Students learn Mathematics, Physics, Chemistry, Biology etc and are trained to view an object through the above perspectives.*

Show the picture of an egg and ask students to describe it. They describe different features of egg. The instructor then directs the students to describe egg in different perspectives with the help of pictures on nscreen. Teacher can intervene in the discussion to draw idea about different perspectives - Biological perspective, Chemistry perspective, Physics perspective, Biochemistry perspective, Anatomy perspective etc., as desribed below.

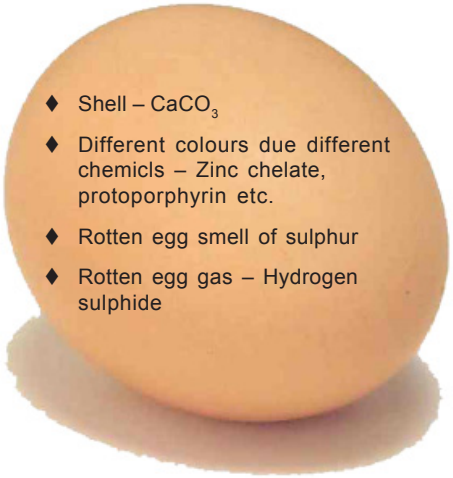
Biology perspective



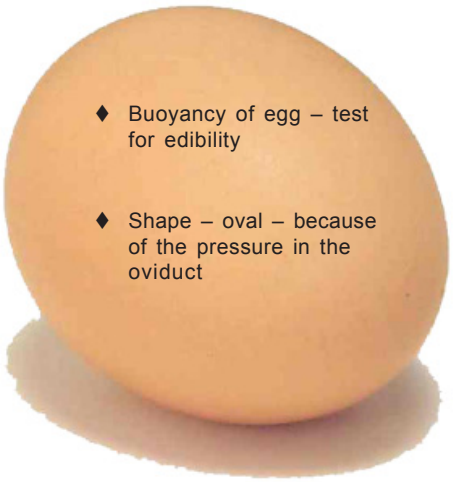
Egg is the biggest single cell, egg laying organisms are called oviparous, study of egg is called oology, egg is an embryo, it needs temperature for nutrition, biggest egg – ostrich's, smallest, Humming bird's.

Chemistry perspective

Egg shell is CaCO3, Different colours of egg shell are due to different chemicls – Zinc chelate, protoporphyrin etc., Rotten egg smell similar to sulphur, Rotten egg gas – Hydrogen sulphide.



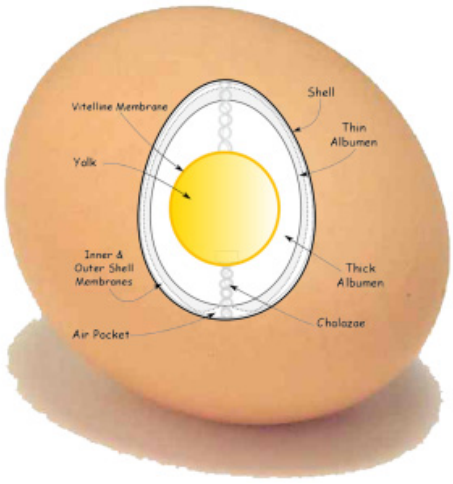
Physics perspective



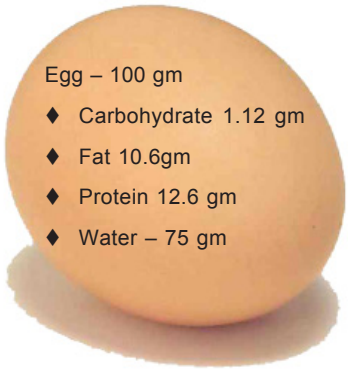
Buoyancy is important in testing egg, presence of bubble inside causes buoyancy, buoyancy test is confirmative for quality of egg. Shape of egg (oval) is to withstand the pressure during its movement through oviduct.

Morphology perspective

Structure of the egg like shell, thin albumen, thick albumen, air pocket, Inner & outer shell membrane, yolk, Vitelline membrane etc.



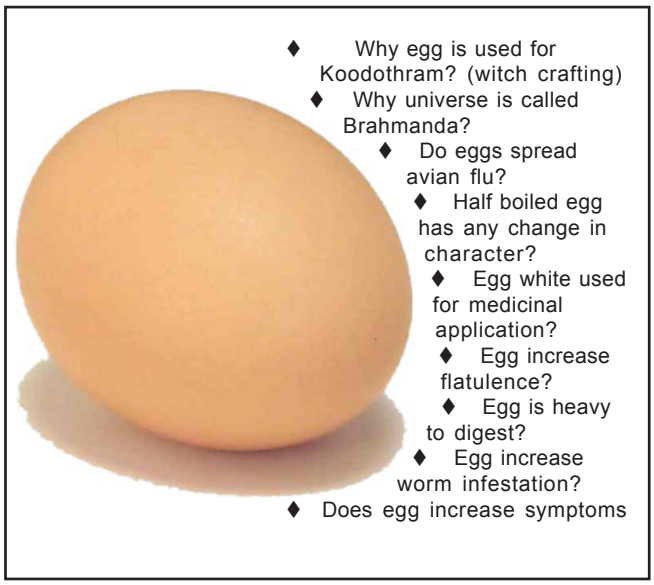
Biochemistry perspective



The nutritional content of egg (100 g) - Carbohydrate 1.12 g, Fat 10.6g, Protein 12.6 gm, Water – 75 g. Egg white almost purest form of protein.

Beyond perspectives

Even after describing egg in all these perspectives, still there are some more questions left back unanswered. They are not directly related to any of the perspectives described above (see figure).



It is concluded that egg has something beyond commonly viewed perspectives. Some of them are relevant in diseases and treatment also. If this is the case with a simple egg, what will be the case of human body, one of the most complex systems in the world?

Human being can be studied in many perspectives like Anatomy, Physiology, Anthropology, Genetics, Culture, History, Environmental issues, Lifestyle and many more. All of them are highly significant in medicine. So, widening the perspective is very important in learning human being also.

Activity 4 Group discussion
"The PCBM basis of human life"

Divide the whole class into four groups – Physics, Chemistry, Biology and Mathematics (PCBM). Allow two or three minutes to discuss among them about the roles of PCBM in human body. After discussion let them enlist a few examples to prove the role of PCBM in the body. Aim of the discussion is to identify human body as a material obeying different principles of PCBM. After the discussion, instructor can conclude the session by explaining some important areas related to PCBM as described below.

Area / Specific areas	Expected entry in Column 3 (not to be printed)
Physics	
Mechanics	Musculoskeletal activities, flexion/extension, movements in joints –comparison with theory of fulcrum, concept of pressure in relation with BP
Electricity	Conduction system in Heart, Nerve impulse transmission, ECG, EEG etc.
Vibration	Hearing
Optics	Vision
Osmosis / diffusion	Cellular transportation, absorption
Chemistry	
Organic chemistry	Digestion
Inorganic chemistry	Minerals
Mathematics	
Numbers	Number of chambers, number of RBC, number of WBC
Measurements	Hb%, BP
Graphs	ECG, EEG
Biology	
Anatomy	Structure
Physiology	Function

Activity 5 Case Studies
"Is there anything beyond physical?"

Note to Instructor: *This session aims to derive an idea that even though the PCBM basis of human body is important there are many other factors beyond PCBM which affects health and diseases of human beings. This can be explained on the background of WHO definition of health.*

Teacher explains some clinical situations, in the form of dialogues between patient and doctor (see the table below). Randomly select students and ask them to read the conversations loudly. Let them explain how "extra-physical" things influence health. Each dialogue stresses on the factors influencing human body and health viz., psychological factors, environmental factors, hereditary factors, social factors etc. The table explains the conversations with their health implications.

Conversation		**Domain being explained**
Patient	"Doctor, my BP shoots up when I am in stress…"	Psychological domain of health
Doctor	"Don't worry, actually you don't need any medicine for controlling BP, you do Yoga regularly, it can reduce your stress…."	

Conversation		Domain being explained
Girl (with stress)		
	"What a stomach pain…! I have loose bowels also… I don't think I can write the exams today….."	Psychological, lack of confidence
Friend:	"You be relaxed… Its your fear that caused stomach ache… You prepared well for exam and be confident…"	
Patient	"How can I develop diabetes…? I usually take moderate food and do excercice regularly…?"	Heredity, familial factors
Doctor	"Its not your fault. You have a family history of diabetes. Some diseases inherit from your ancestors"	
Patient	I became a drunkard because, I have a lot of problems in my life….	Social domain, relationships etc.
Counselor	You share your problems with some good friends… Always, build up good friendship and believe in them….	
Patient	How could I get this cancer Doctor?	Environmental and lifestyle factors
Doctor	There can be many reasons – stress in your life, harmful chemicals in your food, environmental pollutants, lack of rhythm in your lifestyle… and many more….	

Finally, it is summed up as to describe health as a state of balancing in the above realms. This reinstates that health has something beyond mere physical parameters.

Activity 6 Lecture discussion "Broader perspective of human being…!"

Notes to instructor: *On the back ground of WHO definition of Health, human being has to be viewed in a broader perspective beyond mere physical existence. Physical, Psychological, Social and Spiritual levels of health are mentioned in it. The best model in explaining human life in a multi-dimensional approach is definition of Ayus as explained in Carakasamhita (Sareerendriyasatva aatma samyogo…). If this concept is introduced directly, students will feel difficulty in assimilating the idea. So, it can be made through a simple interactive method. This session can be in a simple and casual question-answer mode as described below.*

Instructor talks about three situations:

1. A dead body
2. An unconscious man
3. A conscious person who responds to stimuli

The participants are directed to differentiate these three situations. Dead body has a body. There is no life. In unconscious person, there is life in the body, but does not respond, or there is no consciousness. In the third

situation, the body is living, and is conscious. So, there are three different agents in a living organism. One is body, the other is an agent which imparts life in it. The third is an agent which makes a body conscious. Body is called Sareera in Sanskrit. The agent which puts life in the body is called Atma (Soul). The agent which helps to know and respond is called Manas or Satwa (Mind).

Situation 1 : No Atma, No Manas, only Sareera (dead body)

Situation 2 : Sareera and atma is present but no Manas

Situation 3 : All the three are present

For Manas to work, there should be sense organs to receive stimuli from outside. This is the fourth agent called Indriya.

To conclude, human life is the conglomeration of four agents Viz. Sareera, Indriya, Satwa and Atma. In Carakasamhita, this concept is explained as below:

Definition of Ayus

शरीरेन्द्रियसत्वात्मसंयोगो धारि जीवितम्
नित्यगश्चानुबन्धश्च पर्यायैरायुरुच्यते ।

(चरकसंहिता सूत्रस्थानम् 1/42)

Ayus (life) is conglomerationof Sareera (body), Indriya (sense organs), Satwa (mind) and Atma (soul). It has synonyms like Jeevitham, Dhaari (one which sustains), Nityaga (ever dynamic) and Anubandha (one which follows).

Caraka Samhita – Sutrasthana 1/42

Conclusion

1. Thinking beyond PCBM framework is important in medical science, but knowledge of PCB is not irrelevant.
2. Widening of the perspective is mandatory when dealing with human being in its entirety.
3. Human life is not merely a physical entity; it is conglomeration of Sareera, Indriya, Satwa and Atma.
4. Sloka from Carakasamhita explains the same.

3.3.1.5. Unit Feedback

Participant code : ..... Date : .....

Name of institution : ..... Hour : .....

Unit No. : ..... Class No. : .....

Main ideas conveyed in the class:

1. Strongly agree 2. Agree 3. No comment 4. Disagree 5. Strongly disagree

Comment	**1**	**2**	**3**	**4**	**5**
Class was interesting	☐	☐	☐	☐	☐
Class ensured participation	☐	☐	☐	☐	☐
Class was interactive	☐	☐	☐	☐	☐
Slides were clear and communicating	☐	☐	☐	☐	☐
Class ensured interest for further learning	☐	☐	☐	☐	☐
The ideas conveyed were clear	☐	☐	☐	☐	☐
Class ensured critical thinking	☐	☐	☐	☐	☐

3.3.2. MAN AS AN EPITOME OF NATURE
(UNIT - 2)

3.3.2.1. Learning objectives

To enable learners to

1. Identify human being as an epitome of Nature
2. Understand change as an inevitable phenomena in the nature as well as in human body
3. Derive three main principles governing nature as well as human being
4. Reinforce idea of this trilogy in a biological perspective
5. Learn the sloka depicting the above ideas from Susrutasamhita

Notes to instructor

Lokapurushasamya sidhanta (theory of man-nature similarity) is the basic foundation of all the principles explained in Ayurveda. Students might have heard this principle as an idiom in their lower classes. Often, while explaining the mutuality of nature and man, this understanding gets quoted in several contexts by environmentalists. But students may not be convinced about in which way it is applied in a medical system. For explaining this principle, Susruta's explanation of Visarga-adaana-vikshepa in relation to Moon (Soma), Sun (Surya) and Wind (Anila) can be

taken as a model. Explanation of this principle can be facilitated on the basis of learners' present apprehension of nature and their scientific temperament. Physical and Biological explanations can be given to the above understanding. Introducing construction-destruction dichotomy (=set of two principles) is the easiest way to introduce concept of Visaraga and Adana. Vikshepa can be illustrated by the association of that dichotomy with Movement. Along with that, students need to be convinced about mutually opposite characters governing the Nature. Dichotomy like Ushna/ Seeta, mobility/stability (Calatva/Sthiratva) also can be introduced here.

Method of teaching Sloka: Here, Sloka is taught in a conventional method comprising of reading sloka, making the prose order (anvaya) and explaining its gross meaning. The terms Kapha-pitta-anila in the sloka can be hidden at this stage. Sloka can be either written on the white board or projected on screen. Also, printed form of sloka can be given to students as a study material.

3.3.2.2. Details of the class

Teaching strategy	Discussion, Lecture discussion, Brainstorming, Activities, Sloka learning
Duration	60 minutes
Materials required	AV facility, white board, markers, study materials, feed back progorms, assessment questionnaire
Assessments	Spot assessment (pre-test-post-test), feed back

3.3.2.3. Class Activities

Activity 1 Discussion

Instructor starts the class with a statement that Man is an epitome of Universe. Epitome means miniature. Then Instructor asks the students above their agreement to the statement. Some of them may agree. To prove that "Man is an epitome of Universe", instructor asks students to identify different things in the universe and to examine whether it is present in a man. To start with, mention two things in the nature: Matter and Energy. Tell the students to examine whether these things are present in human body. The discussion can be preceded with a few more examples as follows:

Features of Nature / Represented in human body	**Other related comments**
Matter, energy Matter is the body, Energy stored in the form of ATP	Matter (nutrients) can be converted to energy (through oxidation) and energy converted and stored in the form of ATP
Different states of matter Solid, Liquid and Gas – Present in human body	Solids – bone, muscles etc. Liquid – 70% body is water Gas – through respiration it reaches upto alveoli – not directly present in circulating blood
Structure of tree in the nature Inverted tree concept of Man	Can be illustrated as a basic concepts discussed in Upanishats and accepted in Ayurveda
Natural phenomena like movement, heat, water etc. present in human body as movement, digestion, plasma etc.	Nature represented in human body
Nature is subjected to change Body also is subjected to change	Change is inevitableanywhere in the universe
So, it is concluded that Man is an epitome of Universe	

Activity 2 Brainstorming
"Change is inevitable"

The discussion starts with statement of Heraclitus as: "The only unchangeable is change". The brainstorming may start with a question, "what are the phenomena in the world which is subjected to change". Let one participant write the ideas on the whiteboard. The answers can be time, environment, human life, human body, materials, mind, emotions etc. Enlist some examples also. Once the list is prepared, Instructor asks them to classify the observations.

Activity 3 Lecture discussion
"The trilogy governing nature"

The above discussion may end up with different types of classifications of the phenomenopn of change: Reversible and Irreversible (reversible water to ice, ice to water. Irreversible: mango ripens, no reverse process). Linear change and cyclic change (Linear-milk, curd, ghee. Cyclic: Seasons, daily pattern.) Constructive change and Destructive change. Construction and destruction are two major events on change. (Volcano – eruption is destructive but later on it solidifies to form rock – constructive. Making table from tree – initially destructive, cutting to pieces, then constructive-making the table).

In between the discussion Instructor introduces the terms Adana and Visarga. Word meaning of Visarga is constructive and Adana is destructive. For fulfilling both the above processes to fulfill there should be a mediator – Eg: From making table from tree, there should be a co-ordinator –

carpenter who brings out the changes. This third factor is known as Viskhepa, the co-ordinating factor, the controller. Thus the whole process comes to a trilogy: Visarga, Adana and Vikshepa. They are interconnected also. The trilogy is again established through the following examples:

1. Stones, wood etc. are cut into pieces (Adana) to construct a house (Visarga). There should be men to co-ordinate the process (Vikshepa)
2. Vegetables are cut into pieces (Adana) to finally make a dish (Visarga). A cook co-ordinates the process (Vikshepa).
3. Food ingested is broken down in the body (Adana), to finally absorb and assimilate to the body (Visarga). The process is co-ordinated by hormones and nervous system in the body (Vikshepa).

Symbolically Visarga-Adana-Vikshepas are represented by Moon, Sun, and Wind respectively. In Susrutasamhita, a sloka explains that the nature is governed by three Principles viz – Visarga, Adana and Vikshepa in the same way as Sun, Moon and Wind control the nature.

विसर्गादानविक्षेपैः सोमसूर्यानिलाः यथा

धारयन्ति जगद्देहं कफपित्तानिलास्तथा

(सुश्रुतसंहिता सूत्रस्थानं 21/8)

Human body is maintained by three principles viz. Kapha, Pitta and Vata in the same way how nature is governed by three forces Visarga, Adana and Vikshepa represented by Moon, Sun and Wind respectively.

Susrutha Samhita, Sutrasthana 21/8

Activity 4 Lecture discussion "The opposites within"

Introducing Ushna - Seeta and Sthira - Cala dichotomy: Discussion is based on two examples:

1. **A glass of water:** Water becomes ice when subjected to Cold (Seeta) and becomes vapor when subjected to heat (Ushna). Application of coldness, the molecules becomes more consolidated and stable (Sthira).



Cool (Seeta)
Stable (Sthira)
Constructive



Hot (Ushna)
Unstable (Cala)
Destructive



Application of heat – the molecules become more mobile (cala). So, Sthira quality goes along with Seeta, Cala quality with Ushna. They represent Visarga and Adana respectively.

2. **The example of volcano:** The heat (Ushna) inside earth causes eruption where the earth's content is flown out (Cala). After eruption, it solidifies (Sthira) due to coldness (Seeta) which becomes consolidated as rock.

The constructive (Visarga) and destructive processes (Adana) are brought about mainly by two sets of natural phenomena: Seeta-Ushna and Sthira-Cala.

Activity 5 Discussion "Trilogy in human body"

This exercise aims at understanding Visarga-Adana-Vikshepa trilogy in human body. By the above exercise participants become familiar with the core concept of the trilogy. They can readily understand different terms in relation with the trilogy.

The participants are directed to classify the following terms into Visarga-Adana-Vikshepa by their own logic. Let them write in a piece of paper. At the end, randomly select some of the participants to present their observations. Let the Instructor discuss on the agreement made by others on these observations. Instructor can modify the observations through proper guidance and interpretations.

Terms to be classified:

- Birth
- Growth
- Death
- Degeneration
- Storage
- Release
- Utilisation
- Control
- Rejection
- Excretion
- Conservation
- Division
- Assimilation
- Accumulation
- Degradation
- Co-ordination
- Synthesis
- Catabolism
- Anabolism

Finally, the instructor leads the discussion to the classification below.

Visarga	**Adana**	**Vikshepa**
Birth	Death	Control
Growth	Degeneration	Co-ordination
Storage	Release	
Conservation	Utilization	
Assimilation	Rejection	
Accumulation	Division	
Synthesis	Degradation	
Anabolism	Catabolism	

The above exercise ends up with an idea that the processes happening in human body is intensively related to the trilogy. The terms enlisted will be referred in later contexts also.

So, different activities in human body can be grossly understood in three terms: Visarga, Adana and Vikshepa.

Conclusion

1. Nature as well as Human being is subjected to Constructive and Destructive changes continuously.
2. Three prime factors those are followed by Nature and Human being are: Visarga (Conservation), Adana (Utilization) and Vikshepa (Co-ordination of the two).
3. They are symbolically represented by Sun, Moon and Wind.
4. Human body follows these principles in its biological activities
5. Sloka in Susrutasamhita explains the same principle.

3.3.2.4. Assessment

Spot assessment – Pretest & Post test (10 marks)

Unit 2: Man as an epitome of universe

Participant's code No. ..... Date .....

1. Which natural object represents anabolic changes in the body?
2. Surya represents – Visarga/Adana/Vikshepa
3. Identify Visarga/Adana/Vikshepa among the following:
    - A. Absorption
    - B. Disintegration of food
    - C. Oxidation
    - D. Conversion of glucose to glycogen
    - E. Hormonal control
    - F. Formation of ATP
    - G. Cardiac pumping
    - H. Gastric movements.

3.3.2.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.3. GUNA SPECTRUM
(UNIT - 3)

3.3.3.1. Learning objectives

To enable the learner to:

1. Be familiar with Gurvadi Guna in their physical and biological parlance
2. Build up back ground to the concept of Tridosha
3. Interpret certain environmental and lifestyle variables in terms of Guna
4. Learn sloka explaining Gurvadi Guna.

3.3.3.2. Details of the class

Teaching strategy	Game, Lecture discussion, Case simulation, Picture puzzles with the help of AV aids
Duration	120 minutes
Materials required	AV facility, cards for game, feed back proforma, assessment questionnnaire
Assessments	Spot quiz, spot assessment (pr-post test), feed back

Note to Instructor

Concept of Guna is pivotal in understanding concept of Dosha. Doshas are often explained and understood in terms of Guna and Karma exhibited by them. Moreover, the action of Dravya on Dosha is explained in terms of Guna. Some of the major Gunas are already introduced in the previous session (Ushna, Seeta, Cala and Sthira). Also, the Gurvadigunas are explained in pairs of opposite nature. Dichotomy of constructive-destructive changes in the previous session trains a learner to view the whole nature as the conglomeration of opposite principles. Gunas generally can be explained in different levels – physical, physiological, pharmacological etc. As far as a beginner learner is concerned, before getting introduced to the intricacies of Guna spectrum, it needs to be introduced as simple as possible. Some of the Gunas can be understood by the students by simply apprehending the irverbal meaning. Its always simple to start familiarizing the gunas through their verbal meaning. In this session understanding gunas are planned in two stages: Stage-1: Understanding Gunas with their verbal meaning. Stage 2: Identifying different Guna at different levels (physical, physiological and pharmacological). The pictures presented for each Guna give hints on different materials in which that particular Guna can be well identified (this help to construct concept of each Guna without directly explaining them.) For bringing out clear understanding of Tridosha, the environmental and lifestyle influences over it should be well addressed. Guna understanding can act as a baseline for interpreting such influences.

3.3.3.3. Class Activities (Class 1)

Recap

Concept of opposites forces governing the nature like Visarga-Adana, Seeta-Ushna, Cala-Sthira etc.

Activity 1 Card game "Understanding Gunas by meaning"

Select twenty students from among the participants. Place twenty cards with printed meanings of Gurvadi Guna (heavy, light, hot, cold etc.) on the table. Tell the 20 participants to select one card each. After reading the names on their card they are directed to find out persons with cards with opposite names. Thus group becomes ten pairs of two persons each. Divide the rest of 30 participants to two groups – Constructive and Destructive. From among each pair, these groups can select one each person. For example, from the pair Cold-Hot, the groups can select one person each after proper discussion in the group. Thus finally, Group Constructive will get 10 persons, and so in Destructive group also. Then, each card holder is supplied with another card in which corresponding Sanskrit terms also are printed. Tell each card holder to read the Sanskrit terms loudly. Then arrange the card holders (Sanskrit) in the order in which the Sloka in which Gunas are enlisted. This helps to construct the sloka easily. Repeat the sloka twice or thrice.

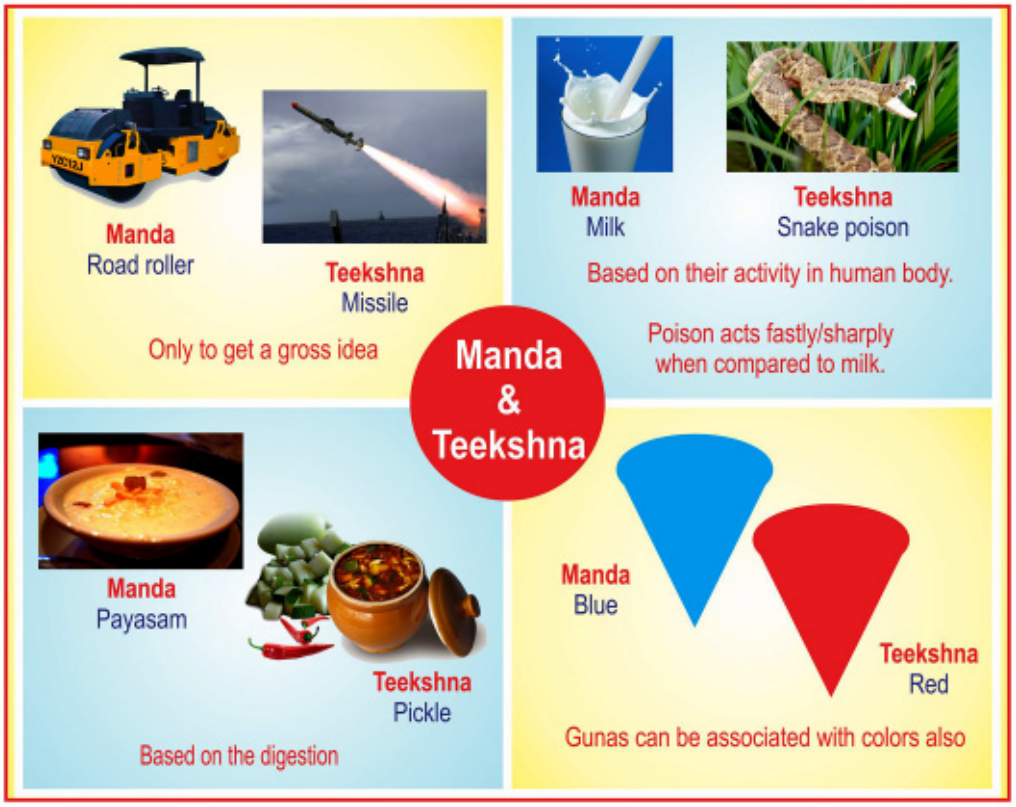
Activity 2 Lecture discussion "The Guna spectrum"

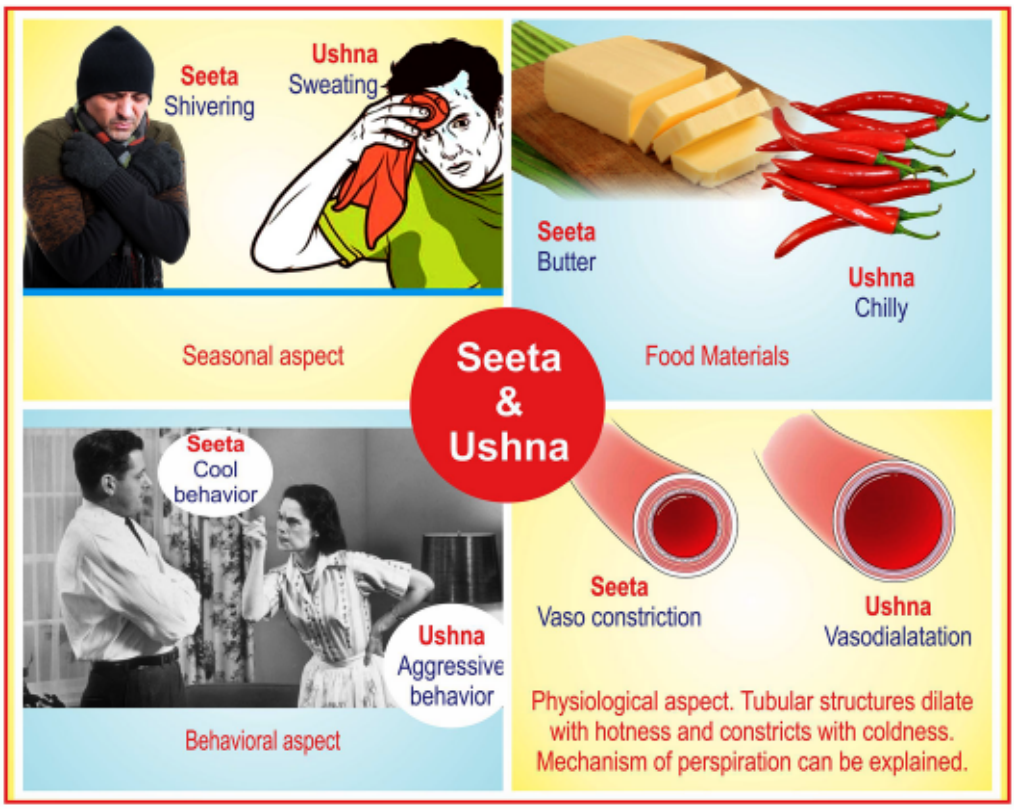
This session familiarizes 20 Gunas as enlisted in Ashtangahridaya. Names of Guna they know early. Here, the pictures suggest the physical and biological meanings of Gunas. The participants are instructed to see the pictures and to identify them in terms of Gunas. While each slide is displayed, the participants who have the cards with names of Gunas are instructed to stand up and to select the object (in the picture) which they find to be matching with the Guna in their card. For example, in the slide Guru-Laghu there are two pictures: balloons on one side and an apple falling on the other side. The two participants are asked to select one among them which they find to be matching with Guna they carry. There will be two or three set of pictures for single set of Gunas. Instructor helps the selection by commenting on the pictures.

> ***Important note:*** *This exercise is not intended to make precise definitions of the Gunas but, to develop rough appreciations on the nature of Gunas by observing objects given in the pictures. Learners are entitled only to select the objects which they find most suitable to reflect the meaning in their mind. The selection is restricted to a pair of observations at a time, not with multiple comparables. Such a one-to-one selection enables easy selection. At this stage, selection from multiple objects will be too early to their level understanding. There are four such pairs for each Guna, each pair indicating specific aspect of the Gunas. This was done to create the notion of multiple improvisations of concept of Guna from the beginning itself.*

Instructor may encourage the participants to bring out natural and spontaneous selection. Let them identify the gunas by themselves.

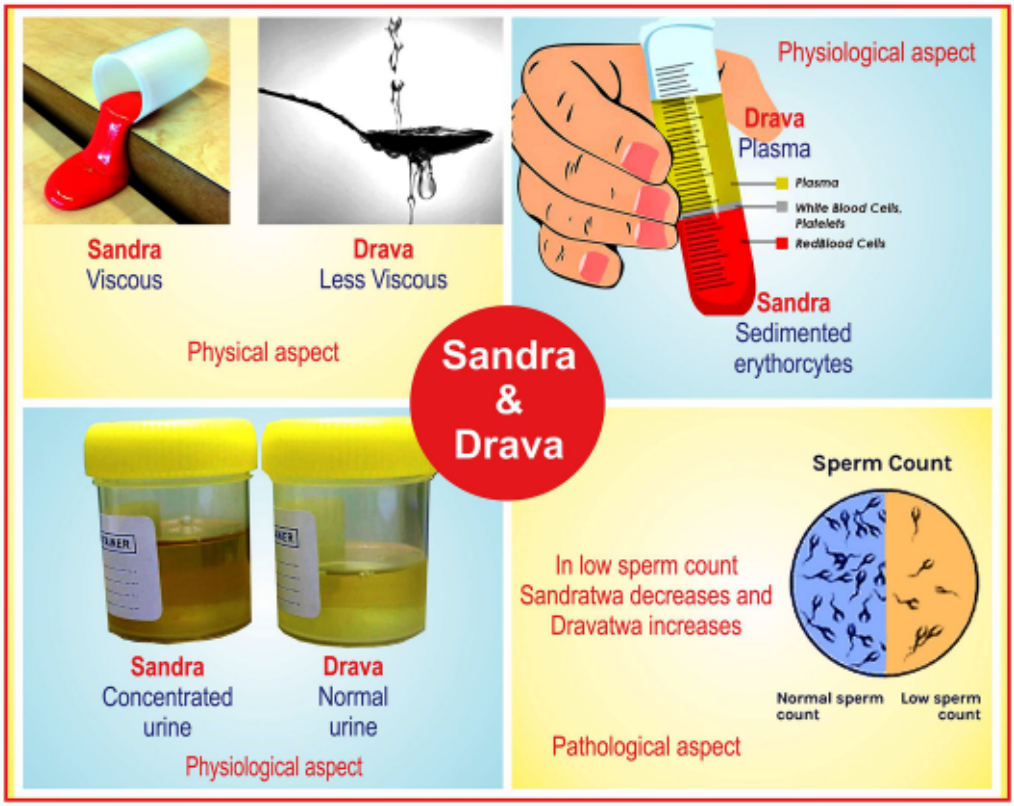

Laghu
Balloon
Guru
Apple falling down
The physical meaning of Guru-Laghu
Laghu
Gruel (Kanji)
Guru
Biriyani
Heaviness & lightness with respect to digestion.
Useful during diet regimen given to patients
Guru & Laghu
Laghu
Lean man
Guru
Fatty man
Heaviness and Lightness in physical appearance
Connection with Guru and Laghu food can be hinted
Fatty Acids Differ in Length
Short-, medium-, or long-chain
Laghu
Guru
Guru and Laghu with respect to molecular structure


Manda
Road roller
Teekshna
Missile
Only to get a gross idea
Manda
Milk
Teekshna
Snake poison
Based on their activity in human body.
Poison acts fastly/sharply when compared to milk.
Manda & Teekshna
Manda
Payasam
Teekshna
Pickle
Based on the digestion
Manda
Blue
Teekshna
Red
Gunas can be associated with colors also


Seeta
Shivering
Ushna
Sweating
Seeta
Butter
Ushna
Chilly
Seasonal aspect
Seeta & Ushna
Food Materials
Seeta
Cool behavior
Ushna
Aggressive behavior
Seeta
Vaso constriction
Ushna
Vasodialatation
Behavioral aspect
Physiological aspect. Tubular structures dilate with hotness and constricts with coldness. Mechanism of perspiration can be explained.


Ruksha
Biscuit
Snigdha
Oil
Gross idea
Snigdha
Watery land
Ruksha
Dry land
Geographical aspect
Snigdha & Ruksha
Snigdha
Oily skin
Ruksha
Dry skin
Easily appreciable in human body
Snigdha
Synovial fluid
Ruksha
Dryness in joints
Structural aspect

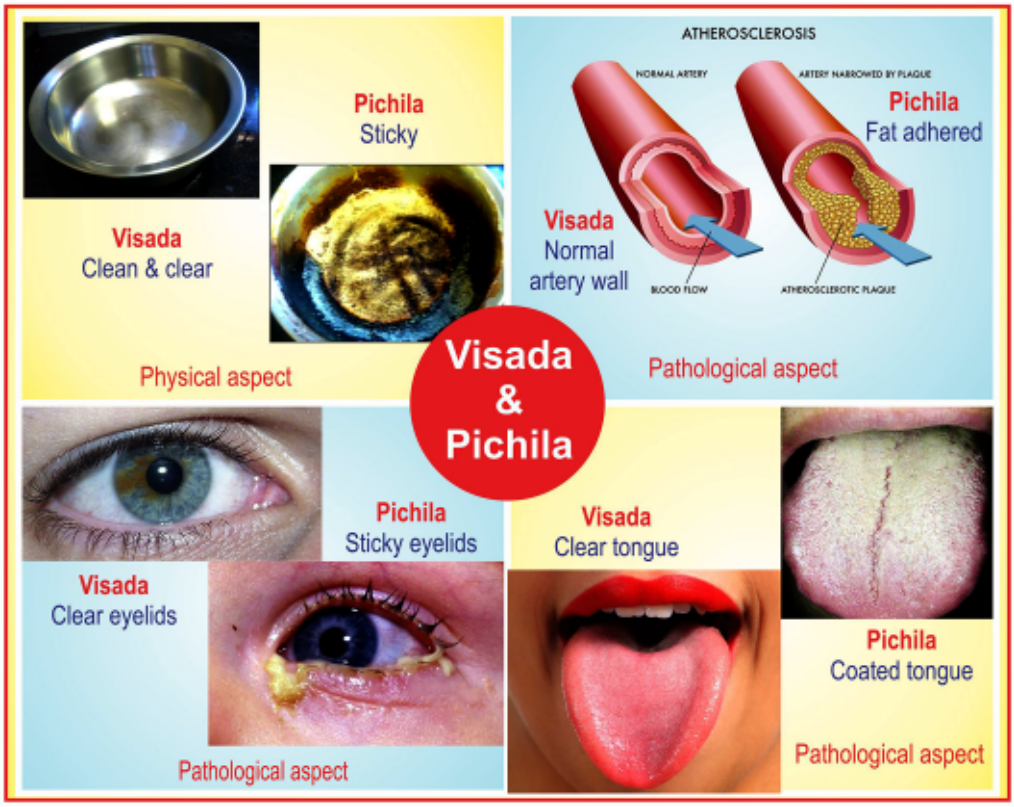

Slakshna
Glass
Khara
Sandpaper
Physical aspect
(for gross idea)
Structural aspect
Khara
Rough tongue
Slakshna
Smooth tongue
Slakshna
&
Khara
Slakshna
Oil
Khara
Scrub
Physical property
Healthy bone
Osteoporosis
Kharatwa increased in osteoporotic bone
Pathological aspect


Sandra
Viscous
Drava
Less Viscous
Physical aspect
Physiological aspect
Drava
Plasma
Plasma
White Blood Cells, Platelets
RedBlood Cells
Sandra
Sedimented
erythorcytes
Sandra
&
Drava
Sandra
Concentrated
urine
Drava
Normal
urine
Physiological aspect
Sperm Count
In low sperm count
Sandratwa decreases and
Dravatwa increases
Normal sperm count
Low sperm count
Pathological aspect


Kathina
Stone
Mridu
Cotton
Physical aspect
Mridu
Blood vessel
Kathina
Bone
Structural aspect
Mridu & Kathina
Multiple Sclerosis - Demyelination
myelin sheath
scarred myelin
nerve fibre
nerve fibre
Mridu
Normal skin
Kathina
Scar formation
Structural aspect
Mridu
Normal myelin
Kathina
Sclerosed myelin
Pathological aspect


Sthira
Bridge
Cala/Sara
Water
Physical aspect
Sthira
Ovum
Cala
Sperm
Physiological aspect
Cala & Sthira
Sthira
Hip bone
Cala
Femur
Structural aspect
Diarrhea
Increase of Sara in diarrhoea
Pathological aspect


Sukshma
Needle
Sthula
Blunt rode
Physical aspect
Biological aspect
Sthula
Copious flow of water
Sukshma
Capillary action
Sukshma & Sthula
Albumin
Globulin
Sukshma
Fibrinogen
Sthula
Physiological
(Capacity to penetrate through small pores)
Sukshma
Lemon
Sthula
Chicken fry
Digestive aspect


Pichila
Sticky
Visada
Clean & clear
Physical aspect
ATHEROSCLEROSIS
NORMAL ARTERY
ARTERY NARROWED BY PLAQUE
Pichila
Fat adhered
Visada
Normal
artery wall
BLOOD FLOW
ATHEROSCLEROTIC PLAQUE
Pathological aspect
Visada & Pichila
Pichila
Sticky eyelids
Visada
Clear eyelids
Pathological aspect
Visada
Clear tongue
Pichila
Coated tongue
Pathological aspect

The pictures help them to identify Gunas appearing in different aspects – Physical, Biological, Pathological, Structural etc. Through this excercise participants are expected to be convinced about the presence of Gunas in human body as well as nature. This exercise aims only to tune participants' thought process so as to view different objects on the basis of Guna pattern.

Guna can be identified in different aspects in human body and around in the nature. There are 20 such enlisted gunas described in Ayurveda, collectively known as Gurvadiguna.

Conclusion of Class – 1

1. There are 20 gunas, 10 pairs of opposites, enlisted in Ayurveda, known as Gurvadi guna
2. The Gunas can be understood in many aspects like physical aspect, Biological aspect, structural aspect etc.

CLASS 2

In the last class, all the Gunas enlisted as Gurvadiguna have been familiarized. In this session, selected Gunas, which are used frequently used for practical purposes are specifically introduced. Also, identification of such Gunas in different variables like food, climate, environment, life span of human being, behavior etc. also is discussed.

Activity 3 Spot quiz

This helps to rewind the last session and also to promote critical thinking on the concept of Guna. This activity serves as a form of formative assessment also.

A participant selected at random for each question is asked to read the question on screen loudly. Others are asked to answer the question their own.

1. Grape is used to cure constipation of kids. The guna responsible is …….

   a. Ushna b. Sara c. Guru d. Laghu ☐

2. Wounds while healing retains scars on skin. Which quality is responsible for this phenomenon?

   a. Manda b. Ushna c. Kathina d. Snigdha ☐

3. Joints become painful due to reduction in quantity of synovial fluid. There is increase of ..... Guna in this condition.

   a. Laghu b. Ruksha c. Guru d. Drava ☐

4. Body is 70% water in content. While dehydration happens …….. Guna becomes increased.

   a. Snigdha b. Ruksha c. Drava d. Ushna ☐

5. ..... Guna is more in Chicken Biriyani when compared to Kanji (Gruel)

   a. Laghu b. Ushna c. Guru d. Visada ☐

6. Alcohol acts faster/sharper in the body when compared to milk. The Guna responsible is ……

   a. Snigdha b. Manda c. Teekshna d. Mridu ☐

7. Doing exercise regularly reduces your weight. The Guna imposed is ……..

   a. Seeta b. Khara c. Mridu d. Laghu ☐

8. Mechanism of sweating comprise of two steps: Dialatation of peripheral blood vessels and filtration of water through small pores of vessel walls. Gunas which

act in the above mechanisms are ..... and .....

a. Ushna, Teekshna b. Ushna, Sukshma

c. Seeta, Sukshma d. Laghu, Seeta ☐

9. Fat molecules adhere to blood vessel which later on develop block to the vessel. The Guna responsible for this adherence is ……..

a. Snigdha b. Kathina c. Pichila d. Laghu ☐

10. Motility of sperms is an important parameter in semen analysis. The Guna responsible for motility is ……..

a. Guru b. Snigdha c. Laghu d. Cala ☐

Answer key: 1-b 2- c 3-b 4-a 5-c 6-c 7-d 8-b 9-c 10d

Activity 4 Lecture discussion "Guna pattern of lifestyle and environmental factors"

This session aims to familiarize probable Guna pattern in different environmental and lifestyle factors such as food, sleep, geographical area, diurnal cycle, age, behavior etc. The prime aim of this session is to inculcate the idea that any thing around us can be understood in terms of Guna. This understanding will helps students to elaborate the idea of nature can influences human body. In this session also, participants are encourages to identify Guna pattern by themselves through minimum hints offered by instructor.

Class starts with enlisting the most prominent 10 Gunas selected from 20 Gunas. They are the most frequently referred Gunas. *By this*

exercise, participants feel more comfortable with a lesser number in the list.



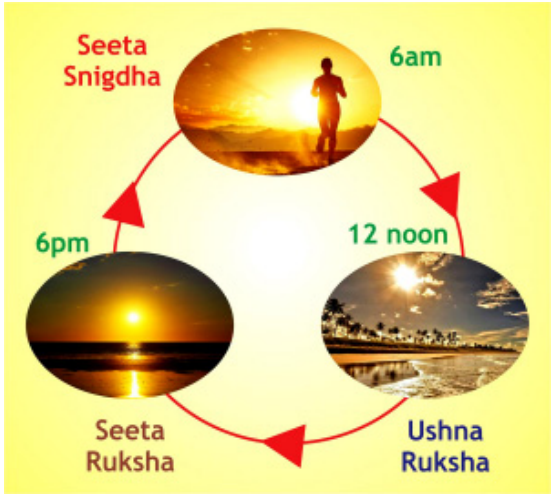
Guna pattern of food materials - Then ask the participants to try enlisting prominent Gunas in milk. Instructor starts with Guru. Participants are encouraged to add to the list, finally reaching to Seeta, Manda and Snigdha. Then show the picture of Red chilly and ask to enlist its Gunas. The list will be Ushna, Teekshna, Ruksha and Laghu. Tell them to compare both the food items. They reach in a conclusion that they are opposite in Gunas. *By this exercise participants learn how food materials are different in Guna pattern*



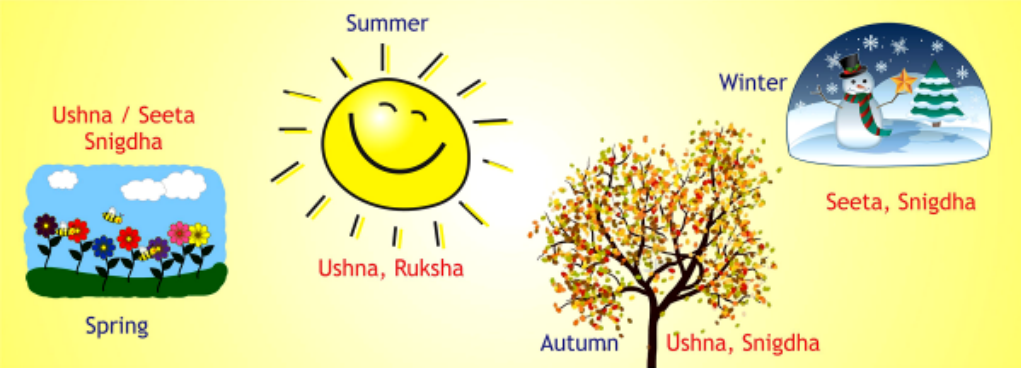
Now, compare the Gunas of Milk and Ghee. Participants try to enlist it such as Seeta, Snigdha, Guru and Manda in both the cases. Then the question remains: in which way they are different? Even though they are equal in the above Gunas, there are some more Gunas which make them different such

as Sara and Drava in Milk and Sthira and Manda in Ghrita. Here, participants come closer to the Guna patters where they understand how similar food materials differ in character.

Guna pattern in Diurnal cycle: The Guna pattern in Diurnal cycle – morning, noon and evening. Showing the pictures, simply ask them to find any of the Guna in any of the picture. Most probably they will find out Ushna at noon. Then Morning and evening are comparatively Seeta. Then ask: is there any difference in Seeta Guna of morning and evening? Hinted by Instructor: Seeta of evening time is probably drier than morning because of an intermediate hotness of the noon. Naturally, participants identify Rukshata of evening hours and comparative Snigdhata of morning hours. Finally, it comes as shown in the slide. This idea will be later correlated with Tridosha pattern of Diurnal variation.



Guna pattern during seasonal variation: Ask the participants to identify prominent Gunas in season. They will easily find out Ushna and Seeta in summer and winter respectively. In spring intermittent hot and cold can be identified (day time ushna and night time seeta). Next is the consideration of drynes and wetness.Usually cold season merges with wetness as in winter. Snigdha. Autumn may dominate with Ushna and Snigdha. Hot season usually



associate with dryness also as seen in summer.

Guna pattern of geographical areas: Water availability is the main criteria of classifying geographical areas (Desa). Abundant water availability makes a land Snigdha, dry land goes with Ruksha. Deserts are dry lands are Ushna also where as arctic region is exteremely Seeta. High altitude areas in temperate zone like Himalaya is Seeta and Snigdha. Some areas are Snigdha and Ushna as costal areas in equitorial region. *(This idea can be later correlated with Tridosha pattern of desa).*



Ushna, Ruksha



Ushna, Snigdha



Seeta, Snigdha

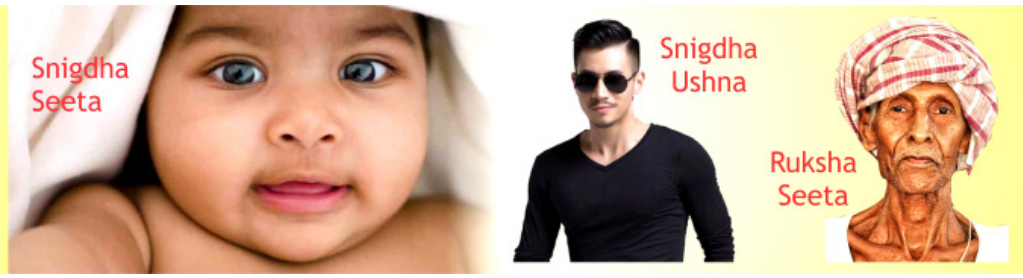
The gross climatic pattern of the Globe can be explained with its Guna pattern. Ushna predominance of equitorial region and Seeta predominance of artic/antartic regions can be taken as a master criterion. The dry areas in the globe



(predominantly deserts) seem to be more in equatorial region where water availability is lesser (comparatively Ruksha). Whereas greenish areas have more water availability, leading to Snigdha predominance. In such a way, the picture of globe can be marked with differential presence of Seeta, Ushna, Snigdha and Ruksha predisposition.

Age related changes in Gunas: Ask participants to classify Seeta/Ushna, Ruksha/Snigdha Gunas according to age. Give some hints: guess the age in which body tissues are dried up. Which age is hottest in the life-span. Which age is the most proliferative? All these questions naturally lead the participants to the pattern more or less as shown in the picture.

Lifestyle variables :



Participants are asked to guess gross Guna pattern of the items. Instructor may help the guessing. Exactness also is not aimed. This exercise just hints on the idea that even psychological, behavioral and lifestyle elements have identifiable Guna influences.

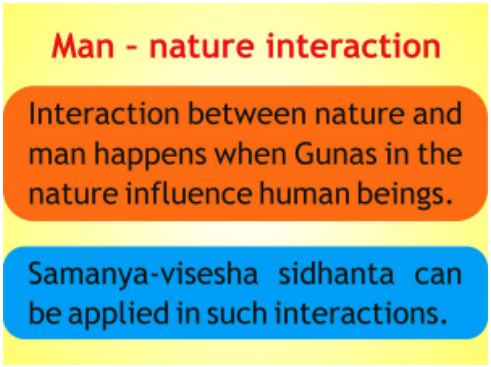
"What will be probable Guna identified in love and affection? Is it hot or cold? Is it dry or wet?" such questions will open their thought to the manner in which they experience love and affection. Most probably they will select Coldness and Wetness as the prominent features of sleep. Similarly, fight among two persons, preferably couples. Participants are directed to guess the nature of such situations among coldness/hotness, dryness/wetness and sharpness/slowness. Definitely they will select Ruksha, Ushna and Teekshna Gunas from the listed items.





Think of Snigdha/Ruksha, Seeta/Ushna pattern related to sleep. Sleep is always Seeta & Snigdha, but alertness at night will produce Rukshata as experienced after a night. Participants can easily conclude this referring to their personal experience.

Man nature interaction occurs due to the influence of Gunas outside the body with those inside the body. Almost all the variables to which human body is exposed can be understood with Guna predominance in them . Those Gunas affects human body abiding Rule of Samanya & Visesha. That means, Gunas similar to those in human being increase and vice – versa.



Nature as well as human being is composed of the same Gunas.

Conclusion of class – 2

- Out of the 20 Gunas, 10 are most repeatedly seen in different objects
- Different food items, climate, environment, lifestyle factors, behavior etc. have their own guna pattern.
- Interaction between Nature and Man happens based on the above Guna pattern.

3.3.3.4. Assessment

Spot assessment – Pretest & Post test (10 marks)

Unit:3: Guna Spectrum

Participant's code No. ..... Date .....

1. Number of qualities enlisted as gurvadi guna:
2. Categorise the following into constructive and destructive guru, ruksha, ushna, cala, teekshna, drava, manda, sandra, snigdha, sthira
3. Make four pairs of opposite gunas from among the following seeta, laghu, manda, ushna, teekshna, guru, sandra, drava.

3.3.3.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.4. BRINGING TRIDOSHA APPROACH TO LIFE (UNIT - 4)

3.3.4.1. Learning objectives

To enable the learners to

1. Understand Tridosha as the basic biological principles of any living organism.
2. Correlate etymological derivation of Vata, Pitta and Kapha with their major activities
3. Identify roles of Vata, Pitta and Kapha in major physiological activities of Human body
4. Verify the concept of dynamic equilibrium in relation to Tridosha
5. Make a statement of Tridosha sidhanta in sloka form.

3.3.4.2. Details of the class

Teaching strategy	Spot quiz, Lecture discussion, Brainstorming, Activity (classification), Video demonstration, Simulation game, story telling
Duration	120 minutes

Materials required	White board, AV aids, materials for role play, feed back proforma, assessment questionnaire
Assessments	Spot quiz, spot assessment, feed back

Note to the instructor

This class introduces the concept of tridosha in biological parlance. The back ground created through the previous classes regarding Trilogy (Visarga-Adana-Viskhepa) and Guna spectrum widens into the concept of Tridosha in this session. For smooth bridging to the new concept, discussions are started in a platform which the participants are well exposed in their previous classes. Widening their perspective is done with the help of some videos and role plays.

3.3.4.3. Class Activities (Class 1)

Activity 1 Brain storming: "Features differentiating living organism from non-living"

A brainstorming can be conducted with a question: "What are the difference between Living organism and non-living organism?" Participants are freely allowed to raise their points which are consolidated on the white board by one of the participants. The expected list is as follows:

1. Movement
2. Digestion
3. Growth
4. Respiration

5. Excretion
6. Reproduction
7. Repair
8. Responses to stimuli

Activity 2 Tabulation "Identifying the three"

Write the above features on the white board. On the other side of the board write Visarga, Adana, Vikshepa. Vikshepa is explained as control/co-ordination which brings out proper Movement. So, the letter M denotes Vikshepa. Adana is the break down process, carried out mainly during Digestion. So, the letter D denotes Adana. Visarga is the cumulative process in the body represented by Growth, so denoted by G. After this introduction, instruct the participants to build up a table as shown below and to mark the roles of M, D and G in each features enlisted in the previous activity. Instructor starts the discussion by taking terms one by one :

Identify the roles of Visarga, Adana and Vikshepa in the identifying features enlisted.

Vikshepa = Movement (M)

Adana = Break down as a part of Digestion (D)

Visarga = Accumulation/Growth as a part of metabolism (G)

Identify the MDG pattern of each term enlisted

Movement – is mainly M, it needs proper D and proper G for its optimum activity. It is marked as M+++, D++, G+. Likewise Digestion – Mainly D, but needs M and results in G.. In such a way, each term enlisted is examined for

Sl No	Features of living organism	M	D	G
1	Movement	+++	++	+
2	Growth	+	++	+++
3	Metabolism	++	++	++
4	Respiration	++	+	+
5	Excretion	++	++	+
6	Reproduction	++	++	+++
7	Repair	++	++	+++
8	Responses to stimuli	+	+	+

roles of M-D-G and are tabulated. Instructor intervenes where participants feel difficulty to tabulate any item.

Homoeostasis is the balanced state of MDG principles. *To sum up, all the basic features of a living organism reflect three principles: movement, digestion and growth.*

Activity 3 Lecture 3
"Introducing the terminology"

The terms Vata, Pitta and Kapha are introduced here. M-D-G trio is substituted by Vata, Pitta and Kapha.

The three terms are related to some other items as shown in the table below:

Major activity		Name of Dosha	Natural objects	Symbol
Movement	Vikshepa	Vata	Air	Anila (Wind)
Digestion	Adana	Pitta	Fire	Surya (Sun)
Accumulation	Visarga	Kapha	Water	Chandra (Moon)

The sloka explained in Unit-2 can be requoted here to re-instate the Trilogy (Su Su21/8).

Now, the class moves onto the etymology of each of the Doshas. During the explanation of the etymology (as shown below), the terms gati and Gandhana is explained in relation to the motor and sensory system in human body so as to relate Vata with nervous system. The term Tap (heat) denotes the digestive processes in the body, where the whole digestion resembles act of cooking. The prime indicator Basal Metabolic Rate is

temperature. The term "sleshma" is synonym of Kapha. Slish means to bring together or binding together. It refers to the accumulative changes in the body such as growth, assimilation etc. The role of Jala in bringing out physiological activities also is referred while explaining Kapha. In that way, etymology is related to the basic actions brought about by the Doshas in body.

वातं वा गति गन्धनयोः ।
Vata is derived from the root "Va" which means 'to move' or 'to sense'

पित्तं तप् सन्तापे।
Pitta is derived from the root "Tap" which means 'to heat'

श्लेष्मा श्लिष् आलिङ्गने।
Sleshma is derived from the root 'Slish' which means 'to bring together'

केन जलेन फलति इति कफः।
Kapha is one which is affected by water.

Su.Sa.Su.21/5

Activity 4 Group activity "Identifying physiology in terms of tridosha"

The participants are divided into three groups: Vata, Pitta & Kapha. Select one leader each. On the screen 28 physiological events are enlisted. After discussion within the group members the groups have to select the terms in which major activity goes with the particular Dosha – Vata, Pitta & Kapha. Make a list of the terms at the end and present as a conclusion of the group discussion. In the final discussion they have to give the justification on selection. Other groups can raise objections if any. The Instructor can moderate the session.

The terms enlisted are:

1. Structural form of the body
2. Energy production
3. Motor activities
4. Digestion of food

5.	Sensory activities	6.	Appetite
7.	Protection	8.	Enzymatic activities
9.	Chemical changes	10.	Repair
11.	Neuronal control	12.	Synthesis
13.	Assimilation	14.	Immunity
15.	Fertility	16.	Temperature regulation
17.	Anabolic changes	18.	Involuntary movements
19.	Secreto-motor activities	20.	Hormonal control
21.	Excretion	22.	Lubrication
23.	Elimination	24.	Pumping
25.	Catabolic changes	26.	Transportation
27.	Transformation	28.	Growth

The expected outcome will be as follows:

Principle	Features
Vata	Motor activities, Sensory activities, involuntary movements inside the body, secreto-motor activities, hormonal control, neuronal control of activities, excretion, elimination, pumping, transport system
Pitta	Digestion of food, Catabolic changes, energy production, transformation, appetite, chemical changes, enzymatic activities, temperature regulation,
Kapha	Structure of body, Growth, protection, immunity, repair, assimilation, fertility, anabolism, synthesis, lubrication.

Conclusion

- Vata, pitta and kapha are principles governing physiological activities in human body

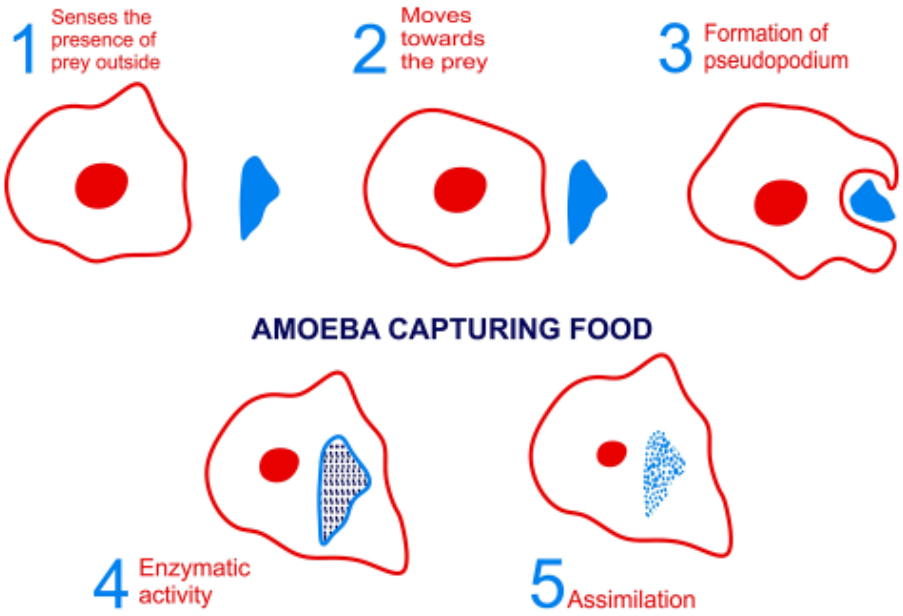
- All the biological activities in human body satisfy definite roles of vata, pitta and kapha
- The etymological derivations of tridosha signify the primary activities done by them in human body.

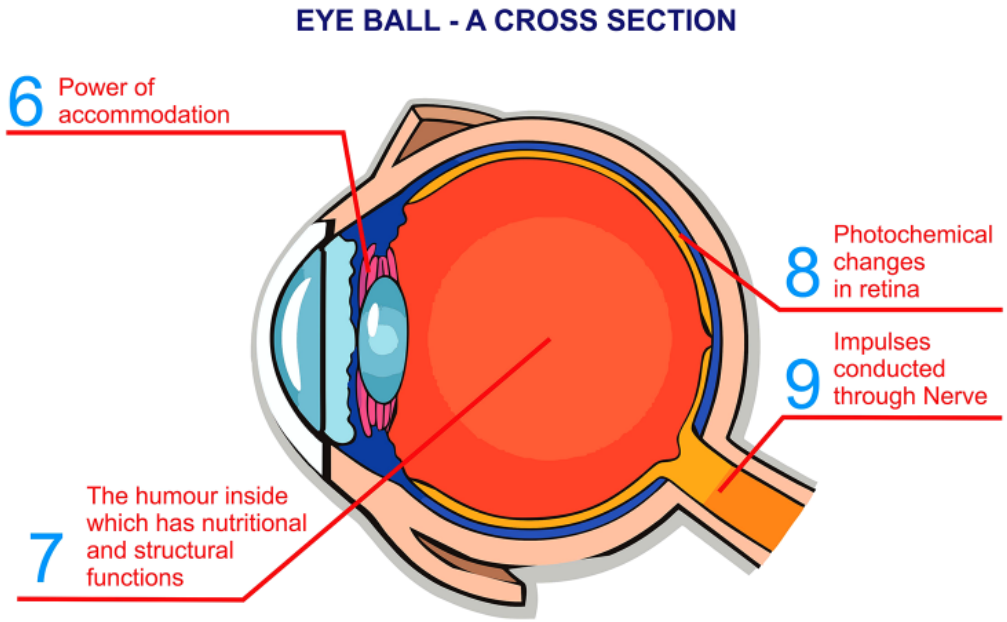
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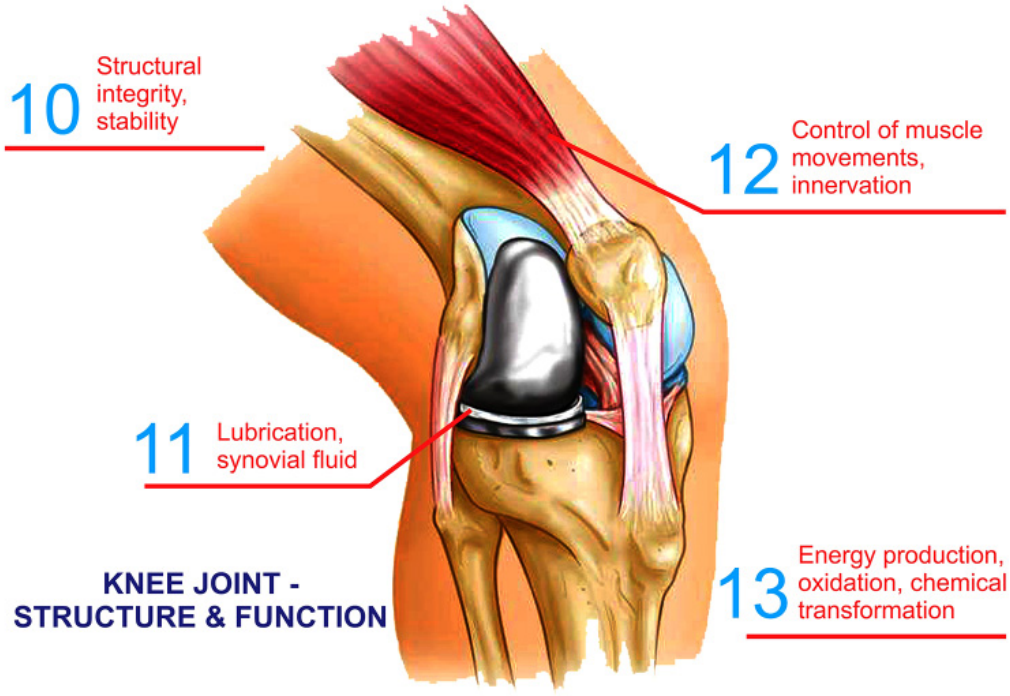
In the last session, the biological significance of tridosha has been discussed. Here, the main discussion goes to see how Triodhas maintain health and what is the peculiarity in the relationship between Tridohas among themselves.

Activity 5 Spot quiz

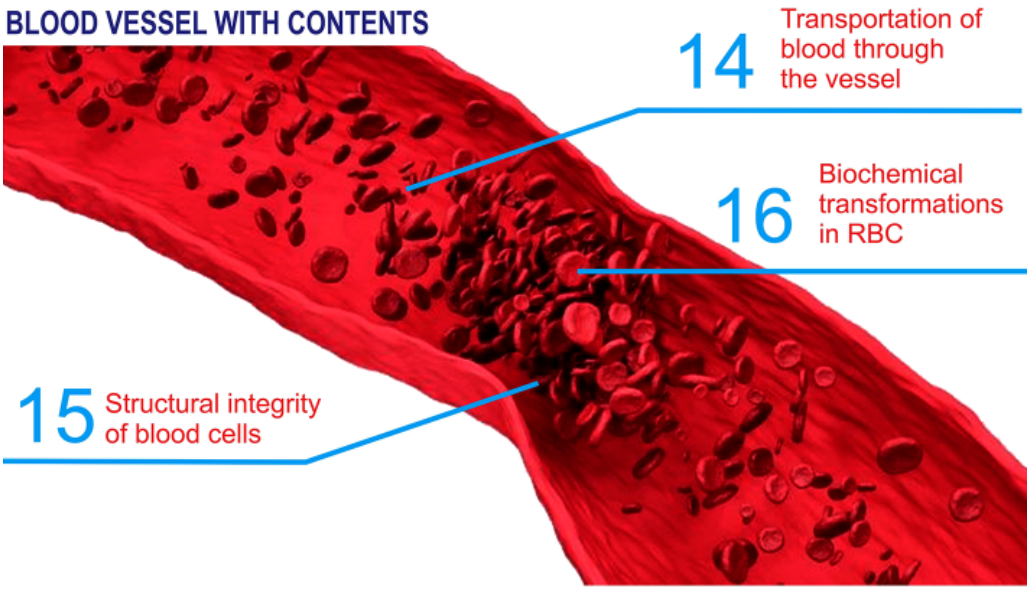
There are some pictures marked with some activities related to the picture. Participants are asked to identify and write which Dosha is responsible for the activity marked with each picture serially numbered. Participants are directed to write the answer in that order.

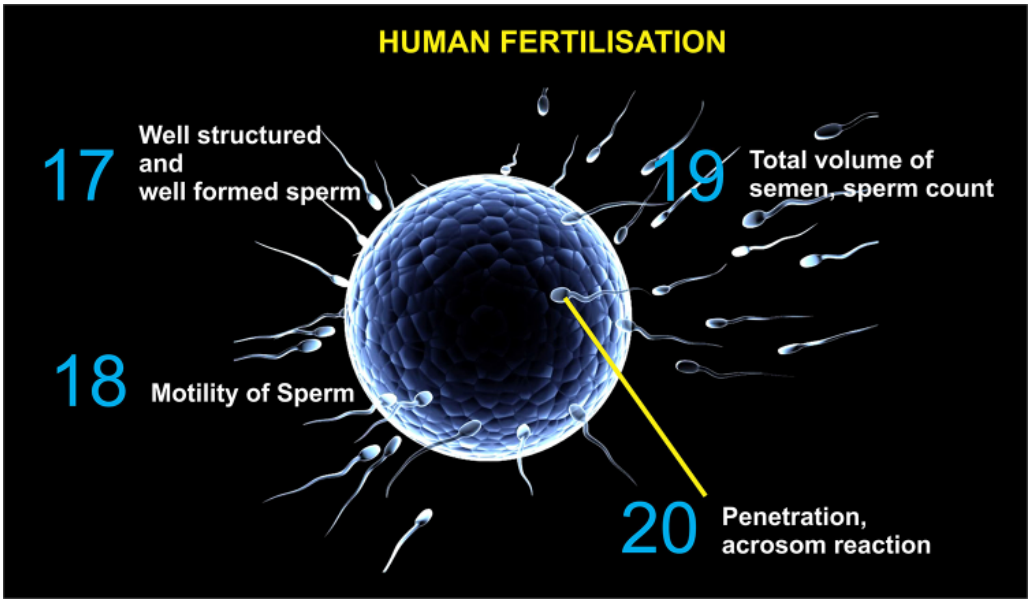






Answer Key			
	1. Vata	2. Vata	3. Vata
	4. Pitta	5. Kapha	6. Vata
	7. Kapha	8. Pitta	9. Vata
	10. Kapha	11. Kapha	12. Vata
	13. Pitta		





Answer Key	14. Vata	15. Kapha	16. Pitta
	17. Kapha	18. Vata	19. Kapha
	20. Pitta		

Activity 6 Concept building
Tridoshas are principles "behind"

Aim of this session is to convince the participants about abstractness of Tridosha sidhanta. Tridoshas are not structurally identifiable; but are inferable from their activities. Tridoshas are having Gunas (qualities) and Karmas (activities). Guna is the factor behind every Karma. These ideas are illustrated through some analogical approaches in this session.

Horses and horse rider approach

Horses draw the chariot. But, they are controlled by the horse rider. In the same way, there are many activities occurring in human body. They are controlled by Doshas from behind.



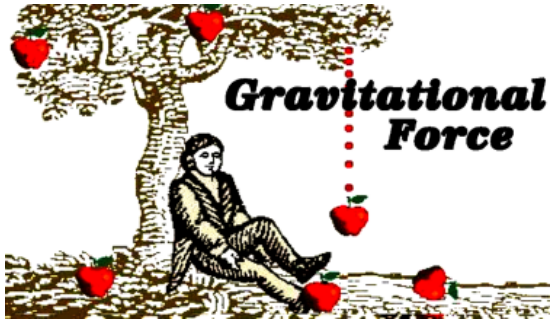
The tea-sugar approach

To test the presence of sugar in the tea, there is no direct method. Sugar is not directly visible. Then we taste the tea and see whether it is sweet or not. Sweetness is a Quality (Guna) of Sugar (Dravya). So, where ever Dosha is not directly visible go for their Gunas to identify them. So, Gunas are important in identifying Dosha.



Concept of "Principle behind"

An apple falls down. The "principle behind" is gravitational force. But, gravitational force as such is not visible. Fall of apple is the visible evidence of Gravitational force. Similarly, Doshas are principles behind different activities in human body. If an activity occurs, there is Tridoshas behind it.



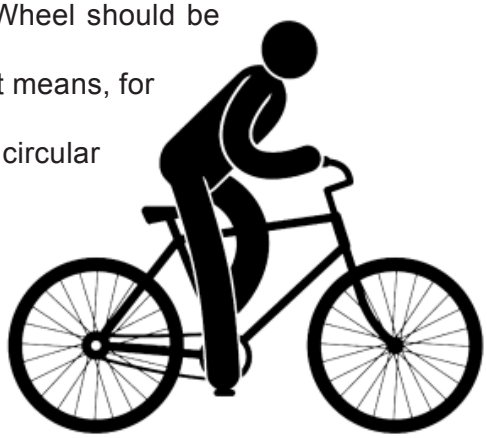
Tridoshas are inferable

To test the electricity, we put on a switch and see whether fan works or not. When fan works, we infer that there is electricity in the line. There is no other practical way to test electricity. So, to ensure presence of Dosha in the body test whether the major activities (Karma) assigned to Doshas are present.



The bicycle approach of Guna and Karma

Bicycle has round wheels. Wheel should be circular to ride the bicycle properly. That means, for proper function (Karma) of bicycle, the circular shape of the wheel is essential. Circularity is a property (Guna). So, for every Karma there should be suitable Guna behind. In the case of Doshas,

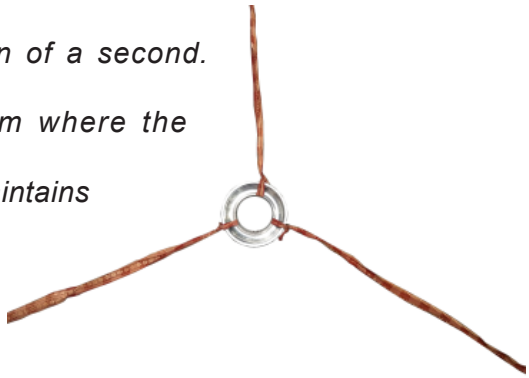


each Doshas are having some Karma in the body, there should be suitable Gunas also.

Tridoshas are principles behind physiological activities, not directly verifiable, can be understood through their Gunas and Karmas.

Activity 7 Simulation game "Dynamic equilibrium"

Human body is under dynamic changes every time, not static even fraction of a second. Dynamic equilibrium is equilibrium where the changes happen incessantly but maintains equilibrium by the adjustments in between the agents bringing out the change. To familiarize the idea of dynamic equilibrium here a simulation game introduced.



Three participants are requested to come forward. A ring is kept on the table with three threads tied on it as shown in the figure. Each participant takes one thread each and keep tightened so that the ring is balanced. This is a static equilibrium where three counter forces keep a system balanced.



Now the participants are directed to move around the class whithout loosing the balance of the ring. They have to adjust their movements so as to keep the ring balanced. It is a laborious task. This is called dynamic equilibrium.



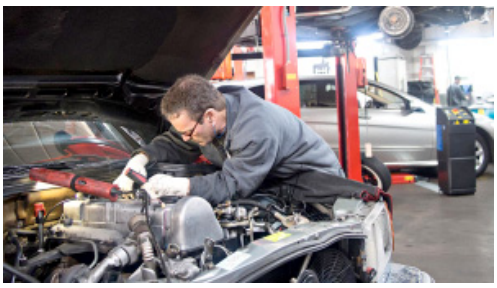
Tridoshas are three principles which are continuously under movement (change), they have to make their status balanced by making adjustments when and where needed. There will be unexpected changes in the environment and the body has to adapt to each and every changes to which it is expected. This happens through the mechanism of dynamic equilibrium kept among the Doshas.

Activity 8 Video "Dynamic equilibrium"

To impress the way in which dynamic equilibrium is maintained in the body, a video of heart functioning is displayed(Suggested video URL - https://youtu.be/oHMmtqKgs50). The function of heart is a dynamic activity and there should be a balanced state of these functions altogether to continue the function. The pumping of heart (Vata) needs the structural make up intact (Kapha). For proper functioning of heart proper metabolism and blood supply is needed (Pitta). If any one of these factors go wrong the equilibrium is broken .

Activity 9 Story telling
"A car mechanic and a cardiac surgeon"

There was a car mechanic who was expert in his job. One day a famous cardiac surgeon visited him for repairing car. While working on the car, they had a conversation.





Mechanic: "My work is almost same as yours. I open the bonnet, examine the defect, repair it and close the bonnet. You also do the same. You open the chest, find out problems in heart, rectify it and close the chest. But, why you are paid much more than me, even when our works are the same?"

Doctor replied: "I will agree with your argument if you show me repairing the car when it is running. I am doing the repair work when the engine (heart) is working, not after putting it off."

Moral of the story: Doctors repair the body without breaking the dynamic equilibrium maintained in it.

Activity 10 Sloka learning
Statement for tridosha sidhanta

वायुः पित्तं कफश्चेति त्रयो दोषाः समासतः
विकृताविकृता देहं घ्नन्ति ते वर्तयन्ति च

अष्टाङ्गहृदयम् सूत्रस्थानं 1/6-7

Precisely threre are three doshas namely Vata, Pitta and Kapha. They maintain body properly when in harmony and destroys the body when in disharmony.

Conclusion

- There is a dynamic equilibrium among Tridoshas in normal conditions.
- Equilibrium of Tridosha leads to health, their disequilibrium leads to ill health.
- Doshas are not always readily visible, they are inferred through their activities.
- Sloka in AH Sutra 1/6-7 explains this concept.

3.3.4.4. Assessment

Spot assessment – Pretest & Post test (10 marks)

1. Pitta is related to …… function among Visarga-Adana-Vikshepa
2. Match the following (draw lines to matching terms)

Vata	Alingana	Sensory function
Sleshma	Tap	Bringing together
Pitta	Gandhana	Heating

3. Write V /P / K against the following biological activities

Digestion	Motor functions	Fertility
Immunity	Pumping	Transportation.

3.3.4.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1)..

3.3.5. FROM GUNAS TO DOSHAS
(UNIT - 5)

3.3.5.1. Learning objectives

To enable the learners to:

1. Understand and enlist Gunas of Doshas
2. Compare Doshas in terms of Gunas
3. Learn the slokas depicting Gunas of Doshas.

3.3.5.2. Details of the class

Teaching strategy	Lecture discussion with presentation, Game
Duration	60 minutes
Materials required	White board, AV aids, materials for game, feedback proforma, assessment questionnaire
Assessment	Spot assessment, feed back

Note to the instructor

Here it is tried to build up Guna pattern related to Dosha. Learners are already informed about the Guna spectrum in Ayurveda. On that back ground, they are allowed to identify Gunas of Doshas as described in Ashtangahridaya, Sutrasthana. Gunas are enlisted in such a way that learners can comprehend them in their own logical perspective, with examples in routine surroundings.

Recap

1. Doshas are basic biological principles those govern physiological activities
2. They are not directly visible, but are identified through their Qualities (Guna) and Activities (Karma)
3. Generally any substance needs suitable Gunas to exhibit their activities.

3.3.5.3. Class activities

Activity 1 Introductory lecture

In this session, two basic questions regarding Tridosha will be answered:

1. *Why the name Dosha is given to the principles which are highly valuable to human body?*
2. *What is the significance of the number "Three" in this context?*

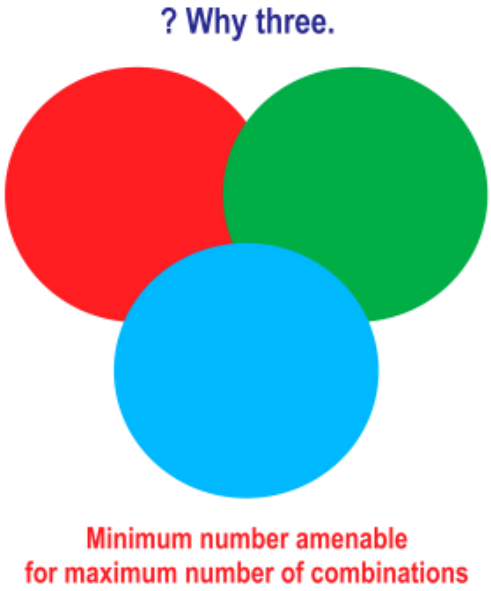
Doshas are highly valuable to the maintenance of human body. But, being dynamic throughout the whole span of life incessantly, they are liable for disturbance at any time. Human body is like a machine which works without break. Many variables inside and outside the body tend to affect the functions of Doshas. So, they are at risk of becoming abnormal at any time. While becoming abnormal, they spoil the whole functioning of body. The term "spoil" is denoted by the root "dush" in Sanskrit. Term Dosha is a derivative of this root. Dosha means "one which spoils." This connotation implies that

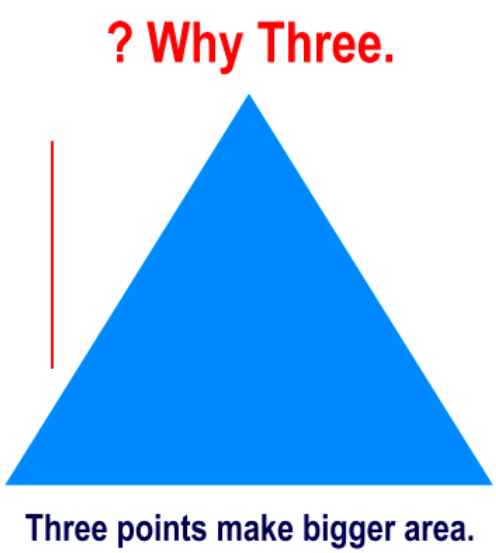
Doshas need to be managed with utmost attention. While Doshas get deranged, they affect other components of the body such as Dhatus, Malas, organs etc. and bring out diseases. So, naturally, the treatment of those diseases basically aims at correction of Doshas, not Dhatus and Malas.

Doshas are like three naughty boys in a class where normally they are very obedient and creative, but very easily become mischievous. When they become mischievous, they tease others and naturally others also come in the naughty list. Correcting the three only will lead to bring normalcy in the class. First attempt is to advise them (pacify) in the class room itself. If not corrected they have to be thrown out from the class. The former line of treatment is called Samana (pacification) and the latter, Sodhana (elimination)

Why there are only three Doshas, why not anymore?

Three is the least number, by which you can make maximum number of combinations. Remember the number of basic colors. Its three because, you can make any color by mixing the three. Similarly, there are innumerable diseases; all the diseases can be expressed in terms of combinations of Three factors. So, three is the minimum number by which you can make maximum number of combinations.





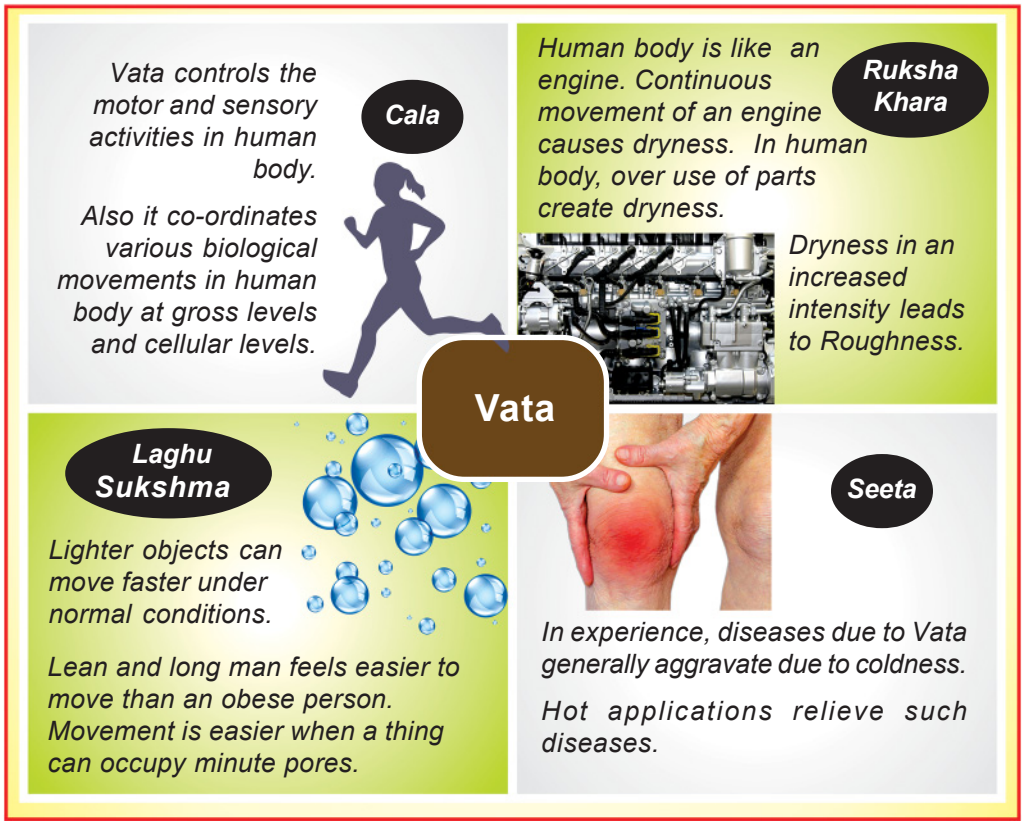
Compare a line segment and triangle. Line segments connect two points, triangle three. Since triangle is the polygon with minimum number of apices which contains an area, but in a line segment, there is no area and the whole figure is limited in a sinlge line. So, the number “three” can represent much more combinations than two.

Activity 2 Group activity with presentation “Gunas of Doshas”

Classify the whole class into three groups – Vata, Pitta & Kapha. Let one of each group read the passages as given along with the pictures. In each description there will be some key terms which indicates a particular Guna. Let others in the group identify those Gunas from the description. After enlisting the Gunas, the group leader is asks to select the card in which those Gunas are printed. Card holders are arranged in such a way that the Gunas are sequenced in the way they appear in Sloka.

The pictures and descriptions narrate Doshas based on the learners’ previous ideas and some common logical descriptionsof those ideas.

Gunas of Vata



So, finally the Gunas of Vata are enlisted as follows: Cala, Laghu, Rusha, Seeta, Khara, Sukshma. Now arrange the card holders of Vata group in the order as seen in the Sloka in AH Su 1/11, ie, Ruksha, Laghu, Seeta, Khara, Sukshma and Cala. Sloka will be constructed by arranging the card holders in the sequence as described in the Sloka.

तत्र रूक्षो लघुश्शीतः खरस्सूक्ष्मश्चलोनिलः

अष्टाङ्गहृदयं सूत्रस्थानं 1/11

Gunas of Pitta



So, in nutshell Pitta has the following Gunas: Sasneha, Teekshna, Ushna, Laghu, Visra, Sara and Drava. Sloka will be constructed by arranging the card holders in the sequence as mentioned in the Sloka.

पित्तं सस्नेहतीक्ष्णोष्णं लघुः विस्रं सरं द्रवं

अष्टाङ्गहृदयं सूत्रस्थानं 1/11

Gunas of Kapha



So, in nutshell the Gunas of Kapha are: Snigdha, Seeta, Guru, Manda, Slakshna, Mritsna and Sthira. Sloka will be constructed by arranging the card holders in the sequence as mentioned in the Sloka.

स्निग्धश्शीतो गुरुर्मन्दः श्लक्ष्णो मृत्स्नः स्थिरः कफः।

अष्टाङ्गहृदयं सूत्रस्थानं 1/11

Activity 3 Game
"Comparing gunas of doshas"

This activity enables the learners to compare Doshas in terms of Gunas. Doshas are having some common Gunas. They are haing mutually opposite Gunas also. So, naturally, Doshas can mutually support and mutually correct. This notion is very important in learning real character of Doshas. Even though they are mutually contradictory in characters, they can co-exist by regulating one another.

Here is a game. Each group (Vata, Pitta and Kapha) will be having cards with names of their Gunas. Ask a Guna in one group stand up, then ask the other groups to respond in two ways: those Guna repeated in other groups may raise the card, then opposite Gunas. For example, when Seeta Guna of Vata raises the card, then Seeta from Kapha will be raised, simultaneously Ushna from Pitta will be raised. Such an exercise continues till all the Gunas are raised.

Practically the above findings can help Dosha functioning in two ways:

- Since there are common Gunas, they can associate in activities.
- Since there are contradictory Gunas they can mutually correct/control.

Conclusions

1. The gunas can be identified in doshas through familiar examples and logics based on their activities.

2. There are some common gunas among doshas as well as some contradictory gunas.
3. Through this commonness and contradiction they can mutually co-operate and control.
4. Sloka can be easily constructed through activities shown above.

3.3.5.4. Assessment

Spot assessment – Pretest & Post test (10 marks)

Participant Code: Unit No: 5 From Guna to Dosha

Date:.....

1. Dosha with Seeta, Ruksha Gunas is .....
2. Dosha with Snigdha, Ushna guna is .....
3. The Guna common for Vata & Kapha is .....
4. The Guna common for Vata & Pitta is .....
5. The Guna in Kapha responsible for slowness in action is .....
6. The Guna in Vata which enables it to move in minute space is .....
7. The Guna in Pitta which helps it to break down food materials is .....
8. Identify a pair of mutually opposite Gunas seen in Kapha and Vata
9. Identify a pair of mutually opposite Gunas seen in Vata and Pitta
10. Identify a pair of mutually opposite Gunas in Pitta and Kapha

3.3.5.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.6. TRIDOSHA BASIS OF PERSONALITY
(UNIT - 6)

3.3.6.1. Learning objectives

To enable the learners to

1. Be familiar with the concept of Prakriti in Ayurveda
2. Widen the idea about further characteristic features of Tridosha through Prakriti assessment
3. Construct an assessment proforma for Prakriti assessment
4. Assess Prakriti of themselves and closest relatives/friends using the structured proforma.

3.3.6.2. Details of the class

Teaching strategy	Video films, proforma construction, role play, prakriti assessment
Duration	120 minutes
Materials required	Audio Visual aids, video films, white board, feed back proforma, assessment questionnaire
Assessment	Construction of proforma, prakriti assessment, feed back

Note to the instructor

So far, the concept of Tridosha was illustrated at physical and physiological basis. Now onwards the teaching moves onto real life human experiences. As a beginning, Prakriti is taken as a tool to appreciate role of Tridosha in personality. This attempt has three advantages:

1. *Tridosha can be explored and understood in a real life situation like personality or behavior*
2. *Through prakriti assessment learners become familiar with the primary lessons how to examine a person in Ayurvedic parlance.*
3. *Learners can take pleasure in assessing their own personality, which address the affective domain in them.*

Here, instead of directly teaching the concept of Prakriti in detail, the class is exposed to videos, role plays, case descriptions etc. so that they can easily identify the features by themselves. Later on they are allowed to construct a proforma for Prakriti assessment and then to assess their own/ their nearest relatives/friends Prakriti using a structured Proforma.

3.3.6.3. Class activities

Activity 1 Role play "Three personalities"

A few students will be selected from the class to present a skit

featuring conversation/communication between three persons, typically bearing the behavioral features of Vata, Pitta and Kapha. Those selected students will be given prior instructions regarding the prominent features of tree types of Prakriti, as follows:

Dosha	**Prominent features in Prakriti**
Vata	Hypermobile, talkative, unsteady, broken speech, enthusiastic, liking hotness, readiness
Pitta	Aggressive, irritative, sensitive, easily disagreeing, precise and fast body movements, intolerance to heat
Kapha	Slow and steady, less body movements, clear but slow speech.

Once the skit is played, other participants than the players will be asked to identify three typical characters in the skit bearing features of Doshas.

Activity 2 Cartoon video lesson
Modified rabbit-turtle story

The famous story of turtle and rabbit is displayed as cartoon *(Suggested video URL - https://youtu.be/kF4Bulj5bcs).* From the cartoon participants are asked to identify the features of Dosha if any. Rabbit is fast but unsteady. Turtle is slow but steady. “Slow & steady wins the race” is the moral. Rabbit shows typical feature of Vata, where as Turtle shows that of Kapha. This shows how Vata and Kapha features become mutually opposite. The following features of Tridosha are conveyed during the discussion:

Vata .....Maintains competitive spirit, but the spirit is short lasting

Pitta .....Maintains competitive spirit for longer duration, but easily gets exhausted.

Kapha .....Less competitive, more tolerative

In a team work, three features come complimentary to each other. Terms like steadiness, firmness etc. apply to body and mind.

Activity 3 Video lessoning
Tridosha in animal behavior

Here, different videos featuring animal behavior will be displayed.



Video 1 : Sparrow chirping

(Suggested video URL - https://youtu.be/4SUPgmqKe1s)



Video 2 : Eagle catching fish
(Suggested video URL - https://youtu.be/hecXupPpE9o)



Video 3 : Duck waddling (Suggested video URL - https://youtu.be/XZVF0VS0VNQ)

Video 4 : Monkey provoking cow (Suggested video URL - https://youtu.be/2JjOB2C5r_8).





Video 5 : Monkey provoking tiger (Suggested video URL - https://youtu.be/0S-oOTzjXn8).

After each video, participants will be asked to identify typical doshas in the behaviors of the above animals. Hints are given by the instructor if they find any difficulty.

Video	Characters to identify	Dosha
Sparrow chirping	Fast body movements, unsteady, wandering, chirping	Vata
Eagle catching fish	Calculated movements, sharp, fast and steady	Pitta
Duck waddling	Slow & steady, not agitative	Kapha
Monkey provoking cow	Monkey is playful, but cow tolerate teasing of monkey	Monkey – Vata Cow – Kapha
Monkey provoking tiger	Monkey playful, tiger easily getting irritated	Monkey – Vata Tiger – Pitta

Participants get ample opportunities to compare the characteristics of Dosha.

Activity 4 Video lessoning Human behavior

Videos of famous personalities including film actors, cricket players, political leaders and other celebreties may be displayed here so that participants can easily identify the Dosha predominance.

Activity 5 Discussion "Probable guna behind"

During the discussion about the above videos, the Guna connection of the characters also can be discussed. Some examples are given below:

Dosha	Features identified	Probable guna responsible
Vata	Hyperactive	Cala
	Unsteady	Cala
Pitta	Sharp	Teekshna
	Short tempered	Ushna
Kapha	Slow	Manda
	Cool	Seeta

Activity 6 Preliminary discussion Identification of characters

In the above exercise, mainly behavioral patterns were illustrated through videos. Here, assessment of Prakriti based on physical and physiological features is stressed. Two of the participants, preferably friends will be asked to come forward. One of them is asked to describe the physical features of the other. Naturally the description may contain complexion, physical appearance, height, built etc.

Ask another pair to come forward. Let one of them interview the other regarding some physiological features. Let them interact spontaneously. The features like sleep, appetite, food regimen etc. may come in the interaction. Likewise, three or four pairs may be invited to continue the exercise. Let them interact spontaneously. Class will be more interactive and interesting by identifying similar features in other participants. Random identification of features among the participants will make the class more interesting and interactive. Examples of features on famous persons also can be included.

Activity 7 Brainstorming

After three or four pairs, let there be a brainstorming, about the features assessed during the interview. Let one of the participants write the features on the white board. The expected list is: skin complexion, hair, height, weight, appetite, sleep, speech, likes and dislikes etc. The list may be elaborated by adding additional features also. Finally, they are asked to classify

the features on some possible basis, considering all the discussions so far. The discussion may end up at preparing a classified list of features as follow:

Physical	**Psychological**
Physical appearance	Grasping & Memory
Physical strength	Planning
Body language/body movements	Concentration
Sleep	Making friendship
Appetite	Completion of task
Speech	Sensitivity
Skin	Excitation
Hair	
Eyes	
Tolerance to heat	
Tolerance to physical exertion	

Activity 8 Constructing Prakriti proforma

In this session, the participants will be preparing a proforma for Prakriti assessment. They will be supplied with a blank table (see below, blank sheet) and asked to furnish the details in the blank spaces on the basis of their present understanding on features of Prakriti. They can make discussions with fellow participants. After completing the task, their tables will be compared to a standard proforma (see the table) and the intensity of agreement will be assessed by scoring the table prepared by them.

Blank sheet - Prakriti Assessment

Feature	Vata	Pitta	Kapha
Physical			
Physical appearance	----------	----------	----------
Physical strength	----------	----------	----------
Body language/body movements	----------	----------	----------
Sleep	----------	----------	----------
Appetite	----------	----------	----------
Speech	----------	----------	----------
Skin	----------	----------	----------
Hair	----------	----------	----------
Eyes	----------	----------	----------
Tolerance to heat	----------	----------	----------
Psychological			
Grasping & Memory	----------	----------	----------
Planning	----------	----------	----------
Concentration	----------	----------	----------
Making friendship	----------	----------	----------
Completion of task	----------	----------	----------
Sensitivity	----------	----------	----------
Interests	----------	----------	----------
Excitability	----------	----------	----------

Standard Proforma - Prakriti Assessment

Feature	Vata	Pitta	Kapha
Physical			
Physical appearance	Lean, long	Moderate	Stout, well built
Physical strength	Weak	Moderate, Easily exhaustible	Strong
Body language/ body movements	Hypermobile, unnecessary facial expressions	Precise, planned movements	Restricted, slow movements
Sleep Interrupted	Less, but deep	Deep, adequate sleep	
Appetite	Irregular	More	Adequate
Speech	Feable, interrupted, flight of ideas	Clear, planned speech	Clear, slow, affirmative
Skin Dry	Pale, hot, with lot of pimples	Oily, smooth	
Hair	Brittle, unequal length	Coppery, thin, early graying	Thick, long
Eyes Dead looking, mobile	Redness due to sunlight, dust etc.	Clear white, well structured	
Tolerance to heat	Tolerate	No tolerance	Tolerate

Psychological			
Grasping & Memory	Easy grasping, easily forgets	Sharp, moderate memory	Slow grasping, deep memory
Planning	Poor	Moderate	Well
Concentration	Poor	Well, in interested areas	Well, in any area
Making friendship	Shifting friendship possessive, sensitive	Selective friendship, deep	Restricted friendship,
Completion of task	Poor	Complete with exhaustion	Complete without exhaustion
Sensitivity	Poor	More	Moderate
Interests	Easily shifting	Shifting after attaining target	Almost permanent
Excitability	Easy excitation, fast recovery	Easy excitation, slow recovery	Delayed excitation, slow recovery

Activity 9 Assignment

Participants will be asked to do Prakriti assessment of three of their friends/relatives as home assignment using the standard Proforma.

3.3.6.4. Assessment

Score obtained through construction of proforma for Prakriti assessment.

3.3.6.5. Unit Feedback

Common format (Refer 3.3.1.6. of Unit - 1).

3.3.7. NORMAL FUNCTIONS AND FLUCTUATIONS OF TRIDOSHA

(UNIT - 7)

3.3.7.1. Learning objectives

To enable the learners to

1. Explain how life cycle and environmental variables bring out fluctuations in Tridosha
2. Identify the normal functions of Tridosha as explained in Ashtangahridaya
3. Construct Sloka depicting normal functions of Tridosha.

3.3.7.2. Details of the class

Teaching strategy	Spot quiz, activity (tabulation), lecture discussion, construction of sloka
Duration	120 minutes
Materials required	Printed table, white board, audio-visual aids, feed back proforma, assdessemnt questionnaire
Assessments	Graded table score, spot quiz, sloka filling, feed back

Note to the instructor

In this session two main topics will be dealt with. One is the normal fluctuations of Tridosha according to environmental factors and internal variables. Second is the normal functions (Prakrita karma) of Doshas. Influence of nature over human body in relation with Gunas is already dealt in Unit-3. On that basis, Doshas are subjected to fluctuations under normal limits. On the other side, Doshas have Gunas and Karmas in the body. Karmas can be Normal and Abnormal. Normal activities are the life sustaining activities and abnormal are those appearing as a part of disease process. Here, normal functions (Prakritakarma) is dealt with. The terms enlisted as normal functions of Doshas in Ashtangahridaya is familiarized in three stages (graded table method) – introducing mere terms without meaning, terms with meaning, terms with sufficient explanation. Level of underatsning through these stages is assessed using a proforma (see activity – 2).

Recap & Introduction

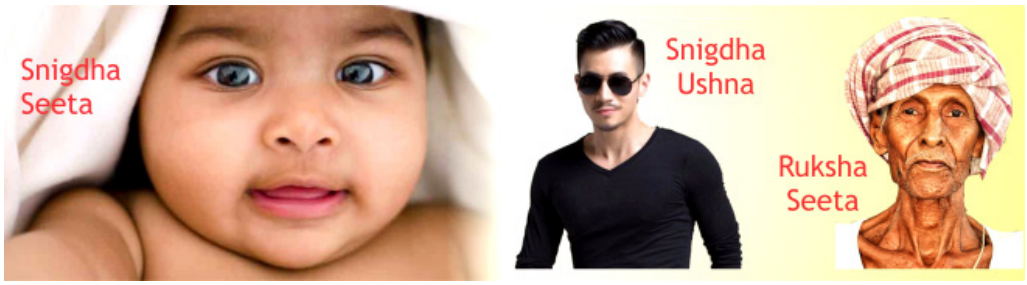
As learnt in Unit – 3, human body learns to adapt to changes in the environment and life cycle. Environmental factors like diurnal pattern, seasonal pattern, geographical pattern etc. and life cycle pattern like ageing etc. are some of those factors. Internal variables like appetite, gut functioning, food intake also influence Dosha functioning. All those factors have their own Guna pattern, naturally their influence also is Guna based.

3.3.7.3. Class activities

Activity 1 Spot quiz

In this activity some situations are described on screen and the participants are asked to identify corresponding Doshas.. Pictures to describe the concept (as used in Unit-3) was also used to convey the concept. In between the activity, concerned slokas are constructed and described. This serves as an activity as well as assessment. After completing the activity, practical implication of each concept was described.

Set - 1



In the life cycle of human being, rate of growth is maximum in early ages (childhood). Middle age is the “hottest” period in one’s life. Later age (old age), the tissues become degenerated and dry.

Identify the change in dosha in these stages of lide cycle.

1. Childhood ..... (Answer - Kapha)
2. Middle age ..... (Answer - Pitta)
3. Old age ..... (Answer - Vata)

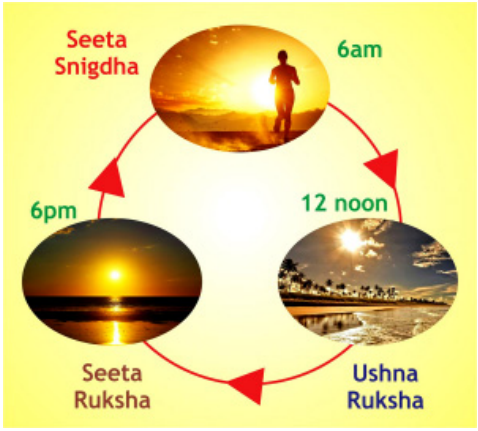
Practical implications

Same disease affecting a child and an old man may vary in treatment, considering the role of Dosha. Diseases are more related to Kapha in childhood and that related to Vata is more in old age. Pitta dominates in middle age.

Set - 2

Read the following statements and answer the question

- Noon time is comparatively hot
- Morning and evening hours are comparatively cold
- Evening hours are comparatively dry compared to morning hours.



Find out Doshas predominant in morning, noon and evening hours

4. Morning hours ..... (Answer - Kapha)
5. Mid day ..... (Answer - Pitta)
6. Evening ..... (Answer - Vata)

Practical implications

In a disease, when we fail to identify the role of Dosha precisely, time of aggravation can be taken as an indicator to identify Dosha. For example, Asthma is a disease where Kapha and Vata are major Doshas.

Asthma aggravating in morning hours, role of Kapha is more and has to treat accordingly, whereas for Asthma aggravated during evening hours, presence of Vata is more.

Set - 3

If you consider digestion into three phases, early stage (gastric phase), middle phase (duodenal phase) and end phase (colic phase) – how can you relate it with three Doshas?

Clue: Duodenal phase is the phase of intensive metabolic activity. Colic phase is a phase comes after absorbing almost all the nutritional content (where food becomes dry and light).

7. End stage of digestion……(Answer - Vata)
8. First stage of digestion……(Answer - Kapha)
9. Middle stage of digestion……(Answer - Pitta)

Practical implications

Some diseases, especially gut related diseases like ulcers etc. shows symptoms related to food. Gastric ulcer shows aggravation of symptoms at the initial stage of digestion. We need to consider the influence of Kpaha in such a diseases and treat accordingly.

After completing the above question, the concepts are tabulated as shown in the figure and simply made into Sloka depicted in Ashtangahridaya Sutrasthana 1/8

	अन्तं	मध्यं	आदि
वयः	वातः	पित्तं	कफः
अहः	वातः	पित्तं	कफः
रात्रि	वातः	पित्तं	कफः
भुक्तं	वातः	पित्तं	कफः

वयोहोरात्रिभुक्तानां ते अन्तमध्यादिगाः क्रमात्

अष्टाङ्गहृदयं सूत्रस्थानं 1/8

Set - 4

There are mainly three types of places according to geographical peculiarities: Jangaladesa (dry land), Anoopadesa (wet land) and Sadharanadesa (moderate Land). Jangala desa is dry, with less water, has abundance of rocks, hilly areas. Anoopadesa means, marshy lands, river banks and coastal areas. Third category is moderate land. Can you try to relate these areas to doshas?



Ushna, Ruksha



Ushna, Snigdha



Seeta, Snigdha

10. Anoopadesa ....(Answer - Kapha)

11. Jangaladesa ....(Answer - Vata)

12. Saadhaarana desa ....(Answer - Pitta*)

**Pitta is a moderate dosha while considering dryness/wetness.*

Activity 2 Tabulating karma of doshas

This activity is a learning method as well as an assessment. Here, the Karma of Doshas are tabulated with a help of a table given below.

Graded Table - Normal Functions (Prakrita Karma) of Doshas

(V - Vata P-Pitta K-Kapha)

	Sanskrit terms								
	Mere terms			With meaning			With explanation		
Terms	V	P	K	V	P	K	V	P	K
उत्साहं	☐	☐	☐	☐	☐	☐	☐	☐	☐
पक्ति	☐	☐	☐	☐	☐	☐	☐	☐	☐
चेष्टा	☐	☐	☐	☐	☐	☐	☐	☐	☐
वेगप्रवर्तनम्	☐	☐	☐	☐	☐	☐	☐	☐	☐
शौर्यम्	☐	☐	☐	☐	☐	☐	☐	☐	☐
स्थिरत्व	☐	☐	☐	☐	☐	☐	☐	☐	☐
तृष्णा	☐	☐	☐	☐	☐	☐	☐	☐	☐
ऊष्मा	☐	☐	☐	☐	☐	☐	☐	☐	☐
दर्शनं	☐	☐	☐	☐	☐	☐	☐	☐	☐
क्षुत्	☐	☐	☐	☐	☐	☐	☐	☐	☐
उच्छ्वासनिश्वासं	☐	☐	☐	☐	☐	☐	☐	☐	☐
रुचि	☐	☐	☐	☐	☐	☐	☐	☐	☐
प्रभा	☐	☐	☐	☐	☐	☐	☐	☐	☐
क्षमा	☐	☐	☐	☐	☐	☐	☐	☐	☐

Terms	V	P	K	V	P	K	V	P	K
धी									
धातूनां सम्यग्गति									
तनुमारर्दवं									
अक्षाणां पाटवं									
स्निग्धत्व									
सन्धिबन्धम्									
मेधा									

How to use the table:

The normal functions of Dohsas as per Ashtangahridaya Sootrasthana 11th chapter are printed in Sanskrit terms in a mixed way as shown in the table. Participants are instructed to use table in three steps:

Step 1 Read the list of Karmas (under column "Terms") themselves. Let them try to relate the terms to any of three Doshas and put tick mark in the box of the corresponding Dohsa in the area specified as "Mere terms".

Step 2 Instructor mentions the simple meaning of the terms enlisted (Eg: Utshaha=enthusiasm, prabha=luster, pakti=digestion etc.). Participants "tick" the boxes under the area specified as "With meaning".

Step 3 Instructor gives a brief explanation of the terms enlisted. On hearing the explanation, participants are allowed to put tick mark in the area specified as "With explanation."

Specific instruction will be given not to correct their responses while coming to advanced steps. This exercise allows participants to make a possible list of functions based on their present knowledge about Doshas. Also it checks their knowledge on technical Sanskrit terms used to describe functions of Tridosha. It is expected that they will make more correct selections when advancing from step-1 to step-3. Assessment is done by counting right tick marks in the three steps. Comparing the scores in three steps make an assessment on the pattern of apprehending meaning of technical terms related to Dosha karma.

Activity 3 Construction of sloka

At the end of the tabulation, the terms are arranged in the way in which appears in Sloka of Ashtangahridayam Sutrasthana 11th chapter with necessary modifications.

दोषधातुमलामूलं सदा देहस्य तं चलः
उत्साहोच्छ्वासनिश्वास चेष्टा वेगप्रवर्तनैः
सम्यग्गत्या च धातूनां अक्षाणां पाटवेन च
अनुगृह्णात्यविकृतः पित्तं पक्त्यूष्मदर्शनैः
क्षुत्तृड्रुचिप्रभामेधाधीशौर्यतनुमार्दवैः
श्लेष्मा स्थिरत्वस्निग्धत्वसन्धिबन्धक्षमादिभिः।

अष्टाङ्गहृदयं सूत्रस्थानं 11/1-3

Activity 4 Lecture discussion - Concept building "Boy with a geometry box approach"

So far, participants were exposed Guna-Karma of Tridosha. Through the bicycle approach of Guna and Karma explained in Unit No.4, it

was explained that Karma is generally brought out by corresponding Gunas in them. That means, for each Karma there should be one or more Gunas responsible. Here, the fashion in which Guna bring out Karma is discussed.

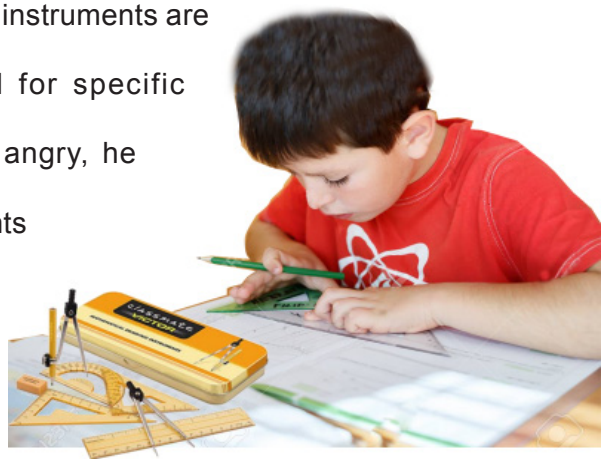
Start a discussion in the following way:

Question	"What are the Prakritakarmas of Vata?"
Expected Answer	Utsaha, Uchwasaniswas-ceshta-vegapravartana-Samyaggati of dhatu, Vegapravaratana, Akshapatava
Question	What are the Gunas of Vata ?
Expected Answer	Ruksha, Laghu, Seeta, Khara, Sukshma, Cala
Question	Try to find out Gunas behind Prakritakarma of Vata
Expected Answer	Almost all Karmas are brought out by Calaguna
Interim comment	Then what is the role of other Gunas in Vata?
Question	Take the case of Koshta. Which Koshta is Vata predominant
Expected Answer	Krurakoshta
Question	Try to identify probable Gunas responsible for Kroorakosht'ha
Expected Answer	Ruksha, Seeta
Interim comment	Never Calaguna

That means, in normal functions Calaguna of Vata is dominant over others. But, in some other situations where Vata is increased (abnormal) there some other Gunas come forefront over powering Calaguna. This can apply to other Doshas also.

"Boy with a Geometry box" approach

Imagine a boy using geometry box in classroom. Most of the times he uses pencil for writing. Other instruments are needed only to assist pencil for specific purposes. When he becomes angry, he abnormally uses other instruments putting pencil aside. Likewise, while performing normal functions, some Gunas become prominent, whereas when becoming abnormal some other Gunas may become dominant.



Conclusion

1. Exposure to environmental changes makes fluctuations to the functioning of Tridosha.
2. The normal functions (Prakrita karma) are prompted by Gunas present in Doshas.
3. Geometry box approach explains the fashion in which Gunas become dominant in different situations.

3.3.7.4. Assessments

1. Marks obtained in Spot Quiz.
2. Graded table score
3. Fill in the blanks.

दोषधातुमलामूलं सदा देहस्य तं .....।

..... उच्छ्वासनिश्वासचेष्टा .....।।

सम्यग्गत्या च ..... अक्षाणां पाटवेन च।

अनुगृह्णात्यविकृतः पित्तं .....।।

क्षुत्तृड्रुचिप्रभामेधा .....।

श्लेष्मा ..... स्निग्धत्वसन्धिबन्ध.....।।

3.3.7.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.8. STRUCTURAL BASIS OF DOSHA
(UNIT - 8)

3.3.8.1. Learning objectives

To enable the learners to

1. Understand how the structure of body relates with functions of Tridosha
2. Enlist chief locations of Dosha in the body
3. Learn sloka depicting chief locations of Dosha in AH.Su.12

3.3.8.2. Details of the class

Teaching strategy	Lecture discussion, case studies
Duration	60 minutes
Materials required	White board, audio-visual aids, assessment questionnaire, feedback proforma
Assessments	Spot test (pre-post), feedback proforma

Note to the instructor

So far the functional attributes are discussed in detail. In this Unit the main focus is how Doshas are related to the structural framework of the body. The detailed description of locations of Doshas (Doshasthanas) explained in Ashtangahridaya is taken as base material. Instead of directly dealing with the content, reaching to the content from logical description is the method adopted here. Apart from enlisting locations of Tridosha, conceptual basis on Koshta-Sakha, Inverted tree approach etc.also are hinted for better understanding.

3.3.8.3. Class activities

Activity 1 Concept building 1

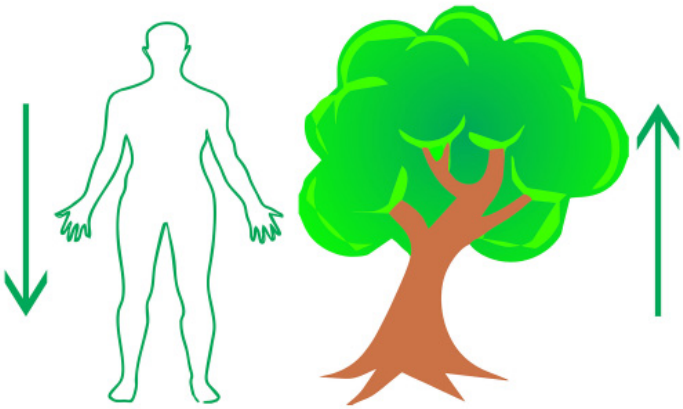
"What is meant by structural basis?"

Imagine an electric engine. Engine has a structure to suit its function. While passing electricity engine will start work. If there is no electricity, there is no function; there is no point in having structure intact. Human body is just like an engine. Tridoshas are its electricity; Doshas exhibit the function on the structural make up of the body. Tridoshas exhibit their activities through Dhatus, Malas, Indriyas, Avayavas etc. which are different parts (components) of the engine. Dhatus are seven in



number. Different organs are made of these Dhatus. Also, there are excretory materials (Mala) which perform minimal activities before getting excreted. There are five special senses (Indriyas) which are considered with separate status than organs. All these components are made of Pancabhuta. So, structural basis means the relation of doshas to the above components.

Activity 2 Concept building 2
"Man as an inverted tree"



This concept will be introduced with the comparison three main phenomena occuring in human bbody and trees: flow of food in the system, mobility of the body and nature of O_2-CO_2 exchange.

(1) Humans take food through the upper part of the body which flows downward. But in a tree absorption happens at the bottom (root) and flows upwards.

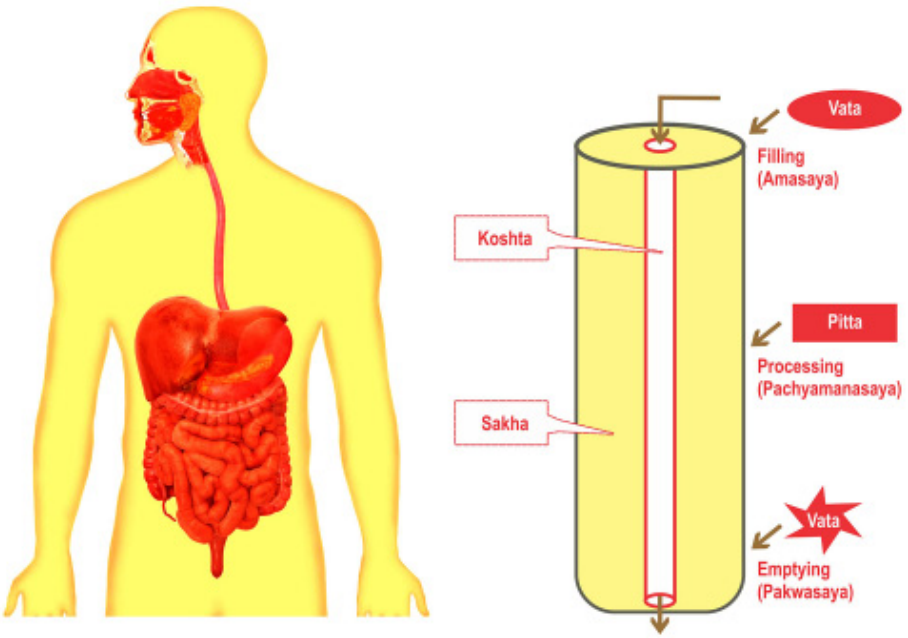
(2) Which part of human body helps in gross movement? Its lower limbs. In the case of plants, lower part is comparatively stationary when compared to upper part.

(3). As a part of respiration, man take in oxygen and release carbondioxide, but as a part of photosynthesis, plants take in carbondioxide and release oxygen.

In the above manner, human body is an inverted tree. This idea is relevant when explaining structural landmark of Tridosha in human body.

Activity 3 Concept building 3 "Gut theory of tridosha"

Instructor initiates a discussion on "which system is the most primary one in living organisms?" For that, take the example of a unicellular organism ie, amoeba. Amoeba exhibits all its activities initiated for food intake. In living organisms of any order, digestive system is the primary system. That implies gut is the primary organ there. All other systems either help or complete the processes being carried out in gut. That is why Ayurveda master Caraka as well as Greek physician Hippocrates consider gut as the primary center in human body. Recently, the theorem of Gut-Brain axis explains that gut has a control over brain functions and emotions. In the context of Tridosha, their chief locations are marked in relation to gut or Koshta.



Human body can be visualized primarily as a pipe surrounded by matrix. The pipe is the Gut extending from mouth to anus. This empty space is called Koshta in Ayurveda. All other systems/organs help/complete the primary processes happening in Koshta. There are many organs which helps the processes in the Koshta. They are called Koshtangas. The outer milieu is called Sakha. Manly the Sakha consists of Dhatus.

The primary process in Kosht'ha can be divided into three phases – the first phase is phase of filling/loading. The second phase, happening in middle part of the Koshta is phase of intensive digestive processing and the third is the phase of evacuation, at the end of Koshta. Structurally, these phases are marked by three regions – Amasaya (where food is collected for digestion), Pachyamanasaya (food undergoing intensive digestive processes) and Pakvasaya (end phase of digestion in gut).

These phases/regions can be represented as three Doshas:

1. Phase of Filling/loading ..... Kapha
2. Phase of processing ..... Pitta
3. Phase of evacuation/emptying ..... Vata

Activity 4 Lecture Discussion
Identifying major landmarks of Doshas

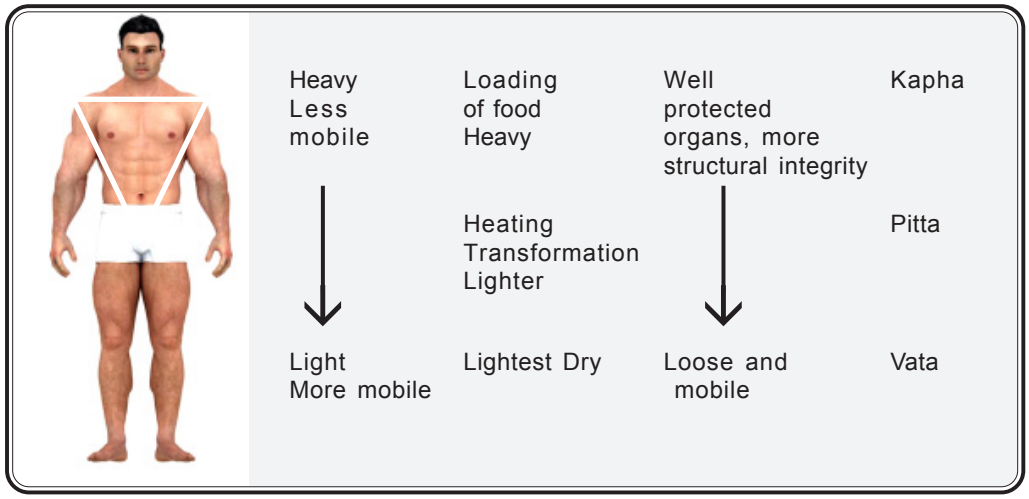
After displaying the picture, ask the learners, which is healthy body? Answer will be mostly the second one.

Draw a triangle on the body. Base of the triangle is directed up in healthy

body. That means, upper part of the body is physiometrically broader than lower part. (In the case of females the proportion is slightly different due to broad pelvis). Then mark some important features of ideal body as shown in the figure.



Upper part is comparatively heavy, less mobile, whereas lower part is more mobile and lighter. Upper part is the loading center of food, where food is comparatively heavier. Middle part is the processing center, centre of transformation and lighter when compared to upper part. Lower part is comparatively dry, evacuating, and lightest after absorption of the nutrients. In the upper part, the organs are well protected with more structural integrity where as lower part is more mobile and loose.



All the above aspects take the participants to the conclusion that

- Heavy, well protected upper part stands for Kapha.
- Comparatively lighter middle portion with intensive transformative changes represents Pitta
- Lower part which is lighter, mobile and loose holds for Vata

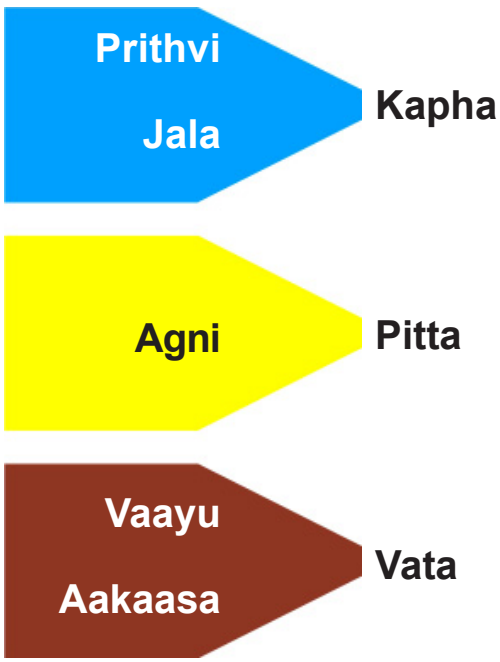
To conclude

> ते व्यापिनोपि हृन्नाभ्योरधोमध्योर्ध्वसंश्रिताः
>
> अष्टाङ्गहृदयं सूत्रस्थानं 1/7
>
> *Even though distributed all over the body Vata, Pitta and Kapha show marked presence above chest, between chest and umbilicus and below umbilicus respcetively.*

Activity 5 Lecture Discussion

Identifying the Bhautik make up of Doshas

List out the panchabhuta on the black board and ask participants to relate them with Tridosha. Clues may be given based on Gunas like Kapha is heavy, Vata is light and Pitta is hot. Naturally they will reach in a correlation as shown in the picture.



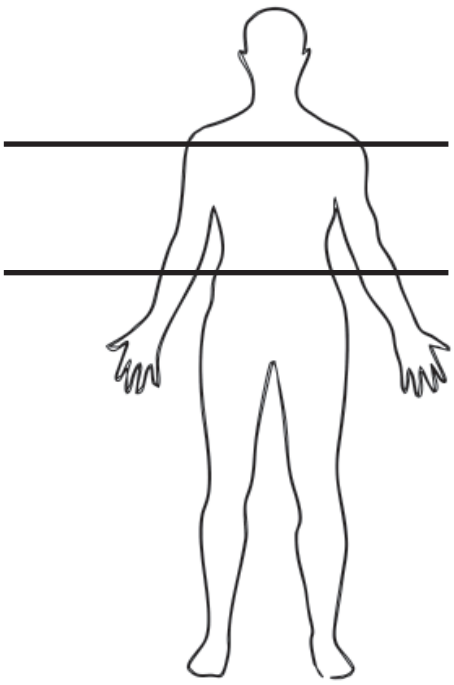
Activity 6 Lecture Discussion
Identifying specific locations of tridosha

Discussion 1

Start the discussion showing the picture of human body. Put two lines acorss chest and umbilicus to divide the whole body to three parts as shown in the picture. Ask participants to identify some externally visible organs/parts in the three main regions – upper, middle and lower. Enlist them on the whiteboard.

The main locations will be:

Upper part	:	Head, palate, eyes, throat, chest, upper part of GIT, nose, tongue etc.
Middle part	:	Umblicus, stomach, intestine etc.
Lower part	:	Colon, low back, lower limb etc.



Siras (Head) Kloma (Palate)
Kantha (Throat) Uras (Chest)
Aamaasaya (upper GIT)
Nose (Ghraana) Jihwa (Tongue)

Nabhi (Umbilical region)
Amasaya (Stomach)

Pakwaasaya (colon, lower GIT)
Kati (Low back, Pelvis)
Sakthi (Lower limb)

Mark the areas in the picture and write their Sanskrit terms (as shown in the picture).

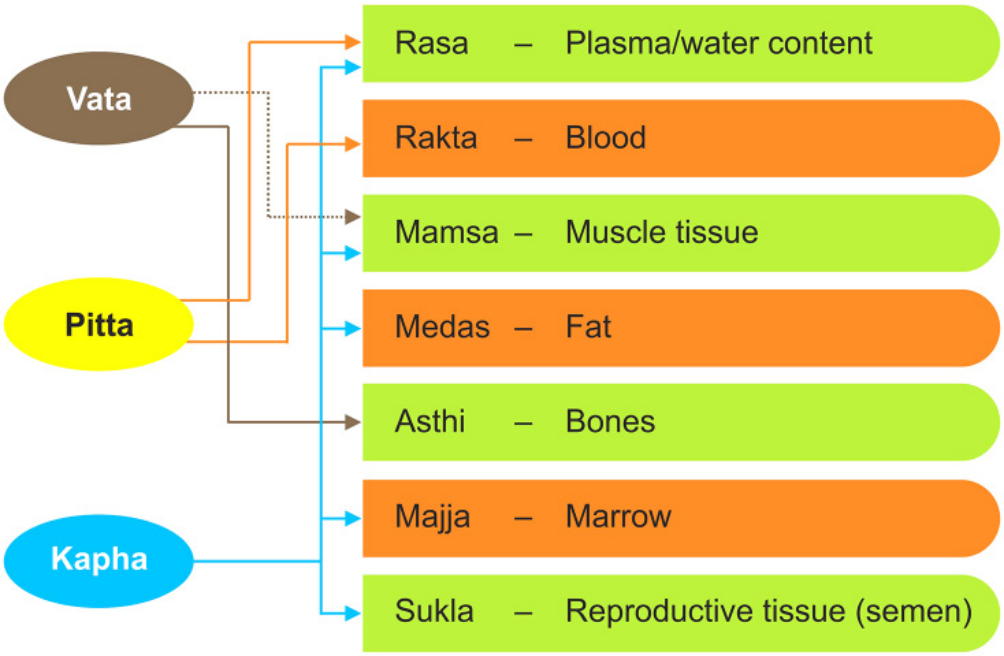
Upper	:	Siras (Head), Kloma (Palate), Kanta (Throat), Uras (Chest), Amasaya (upper GIT), Ghrana (Nose), Jihwa (Tongue)
Middle	:	Nabhi (Umbilical region), Amasaya (Stomach)
Lower	:	Pakwasaya (colon, lower GIT), Kati (Low back, Pelvis), Sakthi (Lower limb)

Discussion 2

Write names of Dhatus on white board. Ask the participants to relate them with Doshas with their own logic. Ask them to think of the primary functions of Doshas (Movement, Metabolism and Growth/structural make up) and their Gunas while making a correlation.

Probable results:

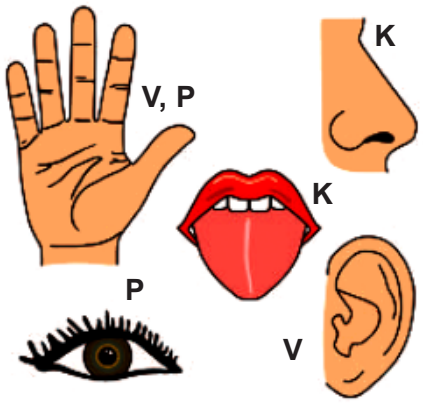
1. Musculo-skeletal system related with movement. Muscle and Bone is selected in relation with Vata. Try to relate Vata to the Dhatu which has maximum dryness (Ruksha). Then Asthi is selected easily.
2. Ask the participants to think of Gunas of Kapha and make possible correlation. Dhatus like Medas, Mamsa, Sukla, Majja are directly related to Kapha owing to their Sthirata and Snigdhata.
3. Thinking of Rasa and Rakta, they should be reminded of their role in metabolism. So the relation with Pitta can be established. In



Rasa, due to its water content, role of Kapha also can be seen.

4. So the discussion is concluded as shown in the flow chart given above.

Discussion 3



Ask the students to relate sense organs to Tridosha, giving the following clues. Also let them relate the connection between Bhutas and Doshas.

Nose, tongue	:	Having more mucous production, relation to Rasa and Gandha
Ear	:	Related to Sabda and Akasha, Skin – related to Sparsa, Vayu
Eye	:	Center of photo chemical changes,
Skin	:	Role in expressing luster of the body

Finally they will reach in the connection as seen in the picture.

After the discussions 1, 2 and 3, finally the findings are tabulated and described as a Sloka given below. Sites is selected as chief location (Viseshasthana) considering their importance.

पक्वाशयकटीसक्थिश्रोत्रास्थिस्पर्शनेन्द्रियं
स्थानं वातस्य तत्रापि पक्वाधानं विशेषतः
नाभिरामाशयः स्वेदो लसीका रुधिरं रसः
दृक्स्पर्शनं च पित्तस्य नाभिरत्र विशेषतः
उरःकण्ठशिरःक्लोमपर्वाण्यामाशयो रसः
मेदो घ्राणं च जिह्वा च कफस्य सुतरामुरः

अष्टाङ्गहृदयं सूत्रस्थानं 12/1-3

Activity 7 Case studies

Here are some cases which explain the practical implications related to the chief locations of Tridosha.

Case – 1

Cervical spondylosis is a condition where degeneration of cervical vertebrae occurs. Main symptom is pain. Since the condition is degenerative, the main Dosha involved is Vata. But, site of the disease is neck, which falls under locations of Kapha. So, even though the disease is caused by Vata. while treating the disease, special caution should be taken to protect Kapha to its location.

Case – 2

Eyes are located in head. As per general rule, head is location of

Kapha. But, as an organ related to light, vision and photochemical changes, role of Pitta is very much significant there. More over Tejas (Agni) should be protected from the influence of coldness of Kapha. For that purpose is anjana (application of specific drugs on eyelids) are advised as a part of daily regimen of human beings (Dinacharya)

Case - 3

Diseases of female reproductive system generally are caused by impairment of Vata. Because, lower abdomen and pelvis are specific location of Vata. Moreover, female reproductive movements like ovulation, menstruation, parturition etc. have direct involvement of Vata. Primarily treatment of such diseases aims at correcting the malfunctions of Vata.

Conclusions

1. Even though Tridoshas are present all over the body, their marked presence is seen in specific locations.
2. These specific locations include Dhatus, different parts of Koshtha, Indriyas and organs.
3. Knowledge of specific locations of Doshas has much importance in treating diseases.

3.3.8.4. Assessments

SPOT ASSESSMENT (Pre-test and post-test)

1. Main seat (Viseshasthana) of Vata in body is ……
2. Main seat (Viseshasthana) of Pitta in body is ……

3. Main seat (Viseshasthana) of Kapha in body is ……

4. Sparsanednriya is seat of …….

5. Sandhi is seat of …….

6. Amasaya is seat of ..... & .....

7. Rakta is related to ..... dosha

8. Asthi is related to ..... dosha

9. Sweda is related to..... dosha

10. Laseeka is the seat of ..... dosha

3.3.8.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.9. DISTURBANCE TO DOSHA EQUILIBRIUM

(UNIT - 9)

3.3.9.1. Learning objectives

To enable the learners to

1. Build up concept of doshasaamya, doshavaishamya, vriddhi & kshaya of doshas
2. Enlist general symptoms of doshavriddhi
3. To learn sloka of vridhilakshana of doshas.

3.3.9.2. Details of the class

Teaching strategy	Case study, Lecture discussion, Open Text Book Activity (OTB), Proforma filling
Duration	120 minutes
Materials required	White board, audio-visual aids, feed back proforma, assessment questionnaire
Assessments	Graded table score, OTB activity score, spot assessments (pre-post), feed back

Note to the instructor

Here, Vridhi-kshaya-lakshana of Tridosha are dealt with. Fluctuations from normalcy happen mainly in two ways: Vridhi & Kshaya. Concept of Vridhi and Kshaya should be clear for learners.

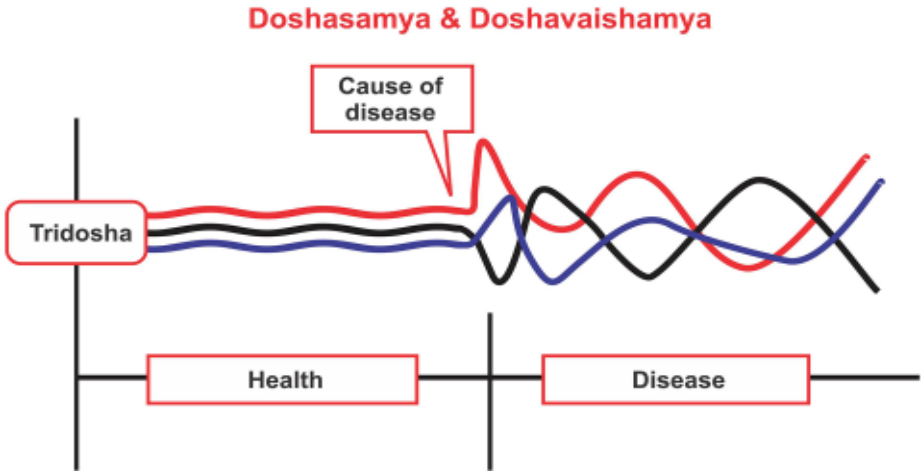
Recap

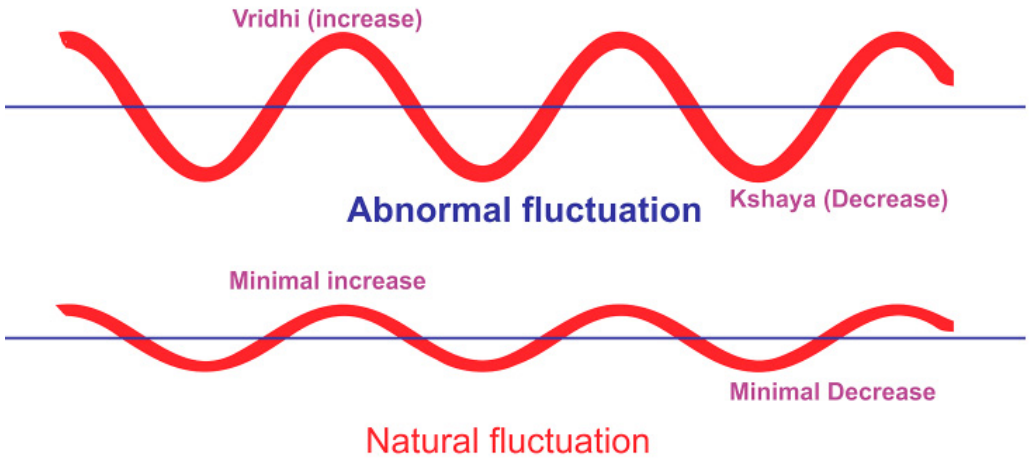
- Equilibrium of Doshas leads to health, loss of equilibrium leads to ill health
- Normal fluctuations of Doshas happen due to many environmental and lifestyle factors
- Equilibrium of Dosha breaks due to influence from external nature.

3.3.9.3. Class activities

Activity 1 Lecture Discussion - Concept building Dosha-samya & Dosha-vaishamya

Health and disease are explained as two states of Doshas in





human body. Dosha-samya is the state of equilibrium of Doshas and Dosha-vaishamya is loss of equilibrium. When human body is exposed to causative agent/s it creates loss of equilibrium which ends up in disease. Treatment is that one which brings back the equilibrium of Doshas.

Loss of equilibrium happens in two ways: Increase (Vriddhi) and Decrease (Kshaya). There can be minimal fluctuations in the form of Vridhi & Kshaya due changes like diurnal pattern, different stages of digestion, age, geographical peculiarities etc. as described in Unit 7. This does not cause diseases but increased presence only.

When the intensity of increase and decrease become more prominent such situations lead to diseases. When doshas are in equilibrium, they exhibit functions as described in Unit.7. When they are subjected to Vriddhi and Kshaya, they exhibit some general symptoms called Vridhi/Kshaya lakshana.

Activity 2 Case study
"Symptoms of increased vata"

Ask the participants to imagine a tedious journey in a damaged bus through a broken road continuously for three days without proper rest and food. Let some of them describe the feelings after completing the journey. Better to have a role play, where, after completing the journey the person goes to a Doctor to get remedy for his discomfort due to the journey.

Tasks assigned to the participants:

1. List out the complaints reported by the person
2. List out some probable causative agents to which the person is exposed
3. Identify probable Gunas involved in such causes
4. Identify Dosha which is subjected to increase/decrease

Expected outcomes

1. Expected complaints reported by patient: Weakness, lethargy, loss of strength, body ache, flatulence, constipation, loss of sleep etc. will be some of them. Due to lack of proper rest, there can be lack of clarity to senses. If sleep deprivation continues, it may lead to disoriented speech. Shivering of the body may also be resulted. Lack of proper food may lead to emaciation. Body luster will be lost, skin may become dark.
2. Probable causative agents: Jerking movement of the vehicle, loss of proper sleep, starvation, suppression of natural urges, exposure to wind etc.
3. Probable gunas behind the above causative agents:

a. Shaking of body ..... Cala

b. Exposure to Wind ..... Ruksha, Seeta

c. Starvation ..... Laghu

d. Loss of sleep ..... Ruksha

e. Suppression of natural urges ..... Cala

4. Probable increase of Dosha: Vata

Instructor enlists the above symptoms one by one and then connotes the corresponding Sanskrit terms as shown below. Some additional symptoms like desire for hot items (Ushnakamitya), disoriented speech (Pralapa) are added to the list by the instructor. Altogether the list becomes the synptoms of increased Vata (Vata-vriddhi-lakshana).

Weakness	दीनता
Eamciation	कार्श्यम्
Distrubed sleep	निद्राभ्रंशम्
Shivering	कम्पम्
Constipation	शकृत्ग्रहम्
Darkening of the skin	काष्ण्र्यम्
Flatualnce	आनाहम्
Loss of acuity of senses	इन्द्रियभ्रंशम्
Giddiness	भ्रमम्
Lack of initiating activity	बलभ्रंशम्

After completing the list, it is converted to a Sloka form by rearranging the words.

..... वृद्धस्तु कुरुतेनिलः
कार्श्य-काष्ण्र्योष्णकामित्वकम्पानाहशकृद्ग्रहान्
बलनिद्रेन्द्रियभ्रंशप्रलापभ्रमदीनताः
(अष्टाङ्गहृदयं सूत्रस्थानं 11)

Activity 3 Tabulation - Graded table "The symptoms of increase of all the three doshas"

The following table will be distributed to the participants.

How to use the table:

The symptoms of increase of dohsas as per AH Su.11 are printed in Sanskrit terms in a mixed way.. Participants are instructed to use table in three steps:

Step 1 Read the list of symptoms (under column "Terms") themselves. Let them try to relate the terms to any of three doshas and put tick mark in the box of the corresponding Dohsa in the area specified as "Mere terms".

Step 2 Instructor tells the simple meaning of the terms enlisted (Eg.: Karsya = emaciation, Atikshuth = excessive thirst, agnisadana = indigestion etc.). Participants "tick (✓)" the boxes under the area specified as "With meaning".

Step 3 Instructor gives a brief explanation of the terms enlisted. On hearing the explanation, participants are allowed to put tick (✓) mark in the area specified as "With explanation." During explanation, instructor may try to bridge up participants with logical correlation between the symptoms and character of doshas.

After completing the task, participants are asked to list out the symptoms under three headings – Vata, Pitta, Kapha.

Graded Table - Symptoms of increased dosha

(V - Vata P-Pitta K-Kapha)

	Sanskrit terms								
	Mere terms			With meaning			With explanation		
Terms	V	P	K	V	P	K	V	P	K
काश्र्यं	☐	☐	☐	☐	☐	☐	☐	☐	☐
अतिक्षुत्	☐	☐	☐	☐	☐	☐	☐	☐	☐
अग्निसदनं	☐	☐	☐	☐	☐	☐	☐	☐	☐
काष्र्यं	☐	☐	☐	☐	☐	☐	☐	☐	☐
अतितृट्	☐	☐	☐	☐	☐	☐	☐	☐	☐
उष्णकामित्वं	☐	☐	☐	☐	☐	☐	☐	☐	☐
दाहं	☐	☐	☐	☐	☐	☐	☐	☐	☐
अल्पनिद्रता	☐	☐	☐	☐	☐	☐	☐	☐	☐
आनाहं	☐	☐	☐	☐	☐	☐	☐	☐	☐
पीतविण्मूत्रनेत्रता	☐	☐	☐	☐	☐	☐	☐	☐	☐
शकृत्ग्रहं	☐	☐	☐	☐	☐	☐	☐	☐	☐
प्रसेकं	☐	☐	☐	☐	☐	☐	☐	☐	☐
बलभ्रंशं	☐	☐	☐	☐	☐	☐	☐	☐	☐
आलस्यं	☐	☐	☐	☐	☐	☐	☐	☐	☐
निद्राभ्रंशं	☐	☐	☐	☐	☐	☐	☐	☐	☐
इन्द्रियभ्रंशं	☐	☐	☐	☐	☐	☐	☐	☐	☐
गौरवं	☐	☐	☐	☐	☐	☐	☐	☐	☐

Terms	V	P	K	V	P	K	V	P	K
प्रलापं	☐	☐	☐	☐	☐	☐	☐	☐	☐
भ्रमं	☐	☐	☐	☐	☐	☐	☐	☐	☐
श्वैत्यं	☐	☐	☐	☐	☐	☐	☐	☐	☐
दीनता	☐	☐	☐	☐	☐	☐	☐	☐	☐
शैत्यं	☐	☐	☐	☐	☐	☐	☐	☐	☐
श्लथाङ्गत्वं	☐	☐	☐	☐	☐	☐	☐	☐	☐
श्वासकासं	☐	☐	☐	☐	☐	☐	☐	☐	☐
अतिनिद्रता	☐	☐	☐	☐	☐	☐	☐	☐	☐
कम्पं	☐	☐	☐	☐	☐	☐	☐	☐	☐

Activity 4 Tabulation
"Dosha Vriddhi in common life experience"

Here is an activity to identify symptoms of Dosha-vriddhi in relation to some of the common etiological factors in our day to day life. Participants are asked to furnish the following table by themselves.

How to use the table:

Symptoms of increase as per textual description are given in the first part of the table. Participants can pick out probable symptoms (coming to their own logic) resulted from different causative factors as enlisted in the first column in the second part of the table. They can infer the Dosha vitiation due to the causes either by their own logic or identifying the symptoms generated by the exposure. Finally, they will try to recollect whether they have experienced such causes/symptoms in their real life. First row of the proforma is filled as a sample.

Part - 1

वातवृद्धिलक्षणाः	पित्तवृद्धिलक्षणाः	कफवृद्धिलक्षणाः
कार्श्यं, काष्ण्यं, उष्णकामित्वं	पीतविट्, पीतमूत्रं, पीतनेत्रं,	प्रसेकं, आलस्यं, गौरवं,
कम्पं, आनाहं, शकृत्ग्रहं	पीतत्वक् (अति)क्षुत्,	शैत्यं, श्वैत्यं, श्लथाङ्गत्वं,
बलभ्रंशं, निद्राभ्रंशं, इन्द्रियभ्रंशं	(अति)तृट्, दाहं,	श्वासं, कासं, अतिनिद्रता
प्रलापं, भ्रमं, दीनता	अल्पनिद्रता	

Part - 2

Probable causes of Dosha Vitiation	Dosha affected	Probable Guna behind vitiation	Probable lakshana	Whether personally experienced by the participant or not
Night alertness	Vata	Ruksha		
Excessive exposure to sunlight				
Excessive day sleep				
Excessive physical exercise				
Starvation				
Use of excessive spicy food				
Excessive mental tension				
Excessive anger				
Excessive sexual intercourse				
Sedentary lifestyle				
Suppression of natural urges				
Excessive, loud, long speech				
Excessive intake of cold and heavy food \				

Activity 4 Lecture discussion

Symptoms of decrease of Doshas (Kshaya-lakshana)

Participants are instructed to recall the normal functions of doshas. Decrease in Doshas generally make diminished activities in the body. Keeping this ideas in mind, the partyicipants are instructed to examine the follwoing list to identify probable dosha decreased in each symptom :

1. Loss of activity
2. Loss of appetite
3. Loss of luster
4. Less speech and movements
5. Coldness of body
6. Loss of sensation
7. Giddiness
8. Emptiness of cavities
9. Looseness of joints
10. Symptom of increase of Kapha
11. Tachycardia

Instructor can guide them to select the symptoms. Symptoms are arranged under headings of Doshas. Finally introduce the Sanskrit terms and reach in Sloka.

Vatakshaya

1. Loss of activity (Angasya sada)
2. Less speech and movements (Alpam bhashitehitam)
3. Loss of sensation (Samjnanasa)
4. Symptom of increase of Kapha (Sleshmavridhyukta amaya sambhava)

Pittakshaya

5. Loss of appetite (Mandanala)

6.	Coldness of body	(Seeta)
7.	Loss of luster	(Prabhahani)

Kaphakshaya

8.	Giddiness	(Bhrama)
9.	Emptiness of cavities	(Sleshmasaya sunyata)
10.	Tachycardia	(Hriddrava)
11.	Looseness of joints	(Slathasandhita)

Concept building: The geometry box approach of Vridhhi & Kshaya

So far three sorts of symptoms/activities related to Tridosha have been learnt: Normal functions (Prakritakarma), symptoms of increase (Vriddhilakshana) and symptoms of decrease (Kshayalakshana).

The Geometry box approach states that all the Gunas of Doshas are not equally dominant in all the three states of Doshas. Gunas dominant in one state (Eg: Normal state) may be dormant in Vriddhi or Kshaya. For establishing this principle, the following activity is planned. Students can do the activity as Open Text Book Activity. They can refer the textbook to verify the references given in the textbook.



Activity 1 Open Text Book (OTB) activity

Aim of the activity is to convince the differential role of Gunas in different states of Doshas. Score of the activity can be used as an assessment also.

How to do the activity

Participants are instructed to locate description of normal functions/Vridhilakshana/kshayalakshana in the textbook and make entriesin Devanagari lipi to the cloumns provided in the table. After this entry, they are allowed to deduce probable Gunas behind each lakshana in three states as far as possible (let them try, better not to except precise answer). Then they are asked whether they are able to select dominant gunas involved in each state. Other Gunas for each Dosha can be enlisted as dormant Gunas. Finally they can consolidate their finding in the last part of the table. Minor mistakes/ ambiguities are clarified by the instructor.

OTB Activity

Name of Dosha	Normal Functions	Probable Guna behind	Dominant Gunas	Dormant Gunas
Vata				
Pitta				
Kapha				

Name of Dosha	Vridhilakshana	Probable Guna increased	Kshayalakshna	Probable Guna decreased
Vata				
Pitta				
Kapha				

	Dominant Gunas behind Avikrita karma	Dominant Gunas behind Vridhilakshanas	Decreased Gunas Kshayalakshana
Vata			
Pitta			
Kapha			

Conclusion

1. Symptoms of Vridhikshaya of doshas can be described in terms of Gunas.
2. There can be different role of Gunas at different states of Doshas especially Samya, Vriddhi and Kshaya.

3.3.9.4. Assessments

1. Pretest – Post-test (Part – 2)
2. Score in OTB activity
3. Score in graded table

Pre-test and post-test (Part-2)

Classify the following symptoms into Kshayalakshana of Vata, Pitta & kapha

Prabhahaani, Samjnanasa, Alpa bhasthitam, Mandanala, Sleshmasaya sunyata, Angasada, Seeta, Bhrama, Hrid drava, Slathasandhita.

Vata	Pitta	Kapha.

3.3.9.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

3.3.10. FUNCTIONAL DIVISION OF VATA
(UNIT - 10)

3.3.10.1. Learning objectives

To enable the learners to

1. Map the concept of five types of Vata in human body
2. Enlist the chief functions of each sub type of Vata.

3.3.10.2. Details of the class

Teaching strategy	Concept mapping, Lecture discussion with AV aids
Duration	60 minutes
Materials required	White board, audio-visual aids, assessment questionnaire, feed back proforma
Assessments	Spot assessment (pre-post), feedback

Note to the instructor

A conceptual entry to the subdivision of Dosha is aimed here.

Vata is taken as a model.

3.3.10.3. Class activities

Activity 1 Concept mapping "Functional division of vata"

This lesson is transacted with the help of graphical representations on black board. Participants are instructed to draw figures on the white board on the basis of description from the Instructor. The whole task is completed in seven steps.

Step 1

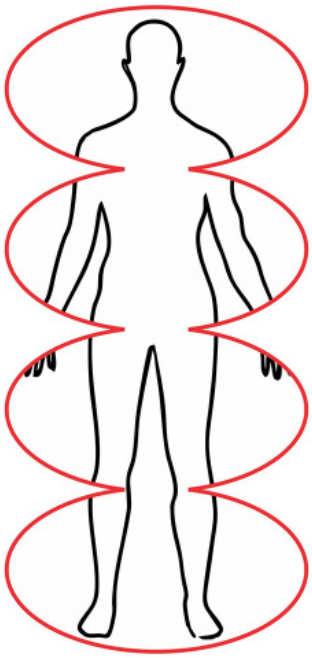
Ask any of the participants to draw four circles one below the other on the white board. Ask the other participants to imagine the circles the whole figure as human and individual circles as four main segments of human body. Give ample time for mutual discussion to identify the four chambers in human body.

Step 2

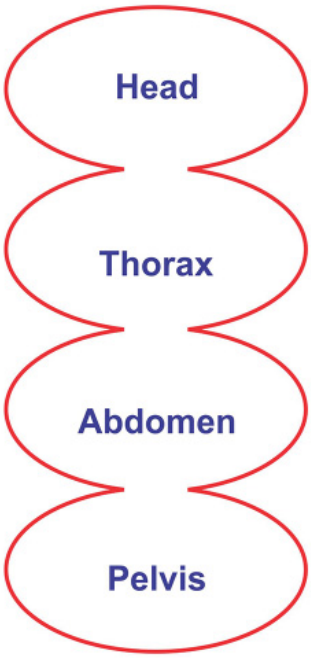
Ask another participant to name the chambers. Expected names are: head, thoracic cavity, abdominal cavity and pelvic cavity. Instructor may intervene in the formation of concept if needed.

Step3

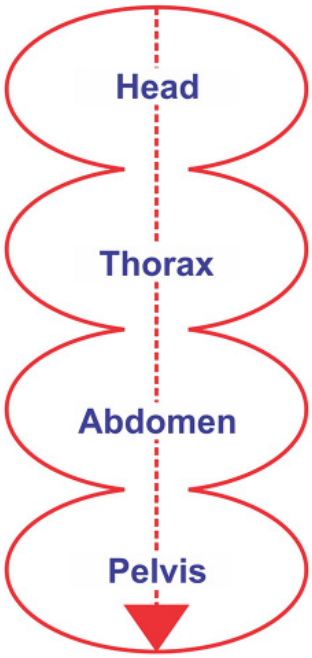
Ask a question: "If you are asked to draw a single arrow representing direction of major physiological flows in human body, will it be from top to bottom or bottom to top?" Give ample time to form the concept. Instructor can intervene by mentioning major physiological flows as those starting from brain downwards (neurology), from heart down wards (cardio-vascular), from mouth downwards (digestive), from kidney downwards



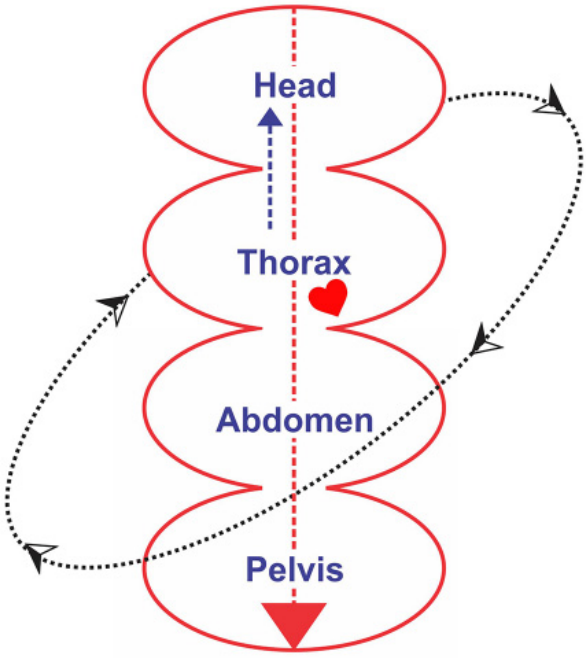
Step - 1



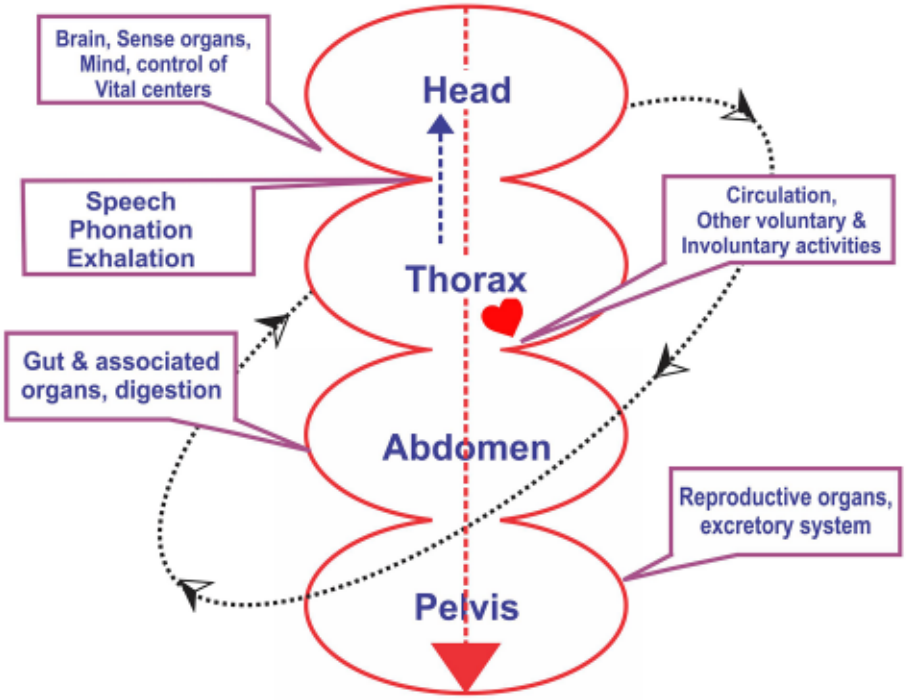
Step - 2



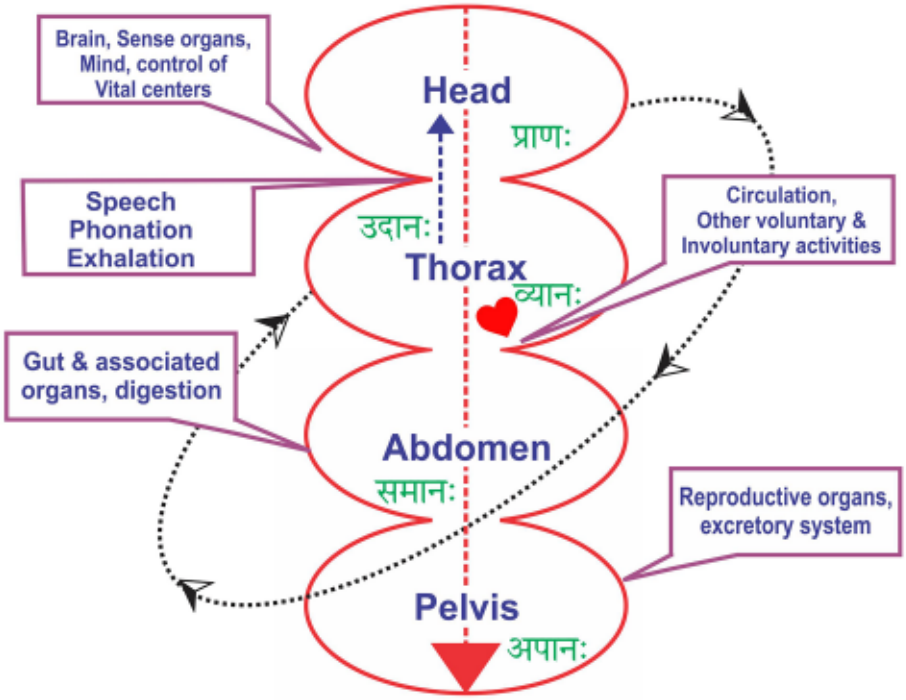
Step - 3



Step - 4


Brain, Sense organs, Mind, control of Vital centers
Head
Speech Phonation Exhalation
Circulation, Other voluntary & Involuntary activities
Thorax
Gut & associated organs, digestion
Abdomen
Reproductive organs, excretory system
Pelvis

Step - 5


Brain, Sense organs, Mind, control of Vital centers
Head
प्राण:
Speech Phonation Exhalation
उदान:
Circulation, Other voluntary & Involuntary activities
Thorax
व्यान:
Gut & associated organs, digestion
Abdomen
समान:
Reproductive organs, excretory system
Pelvis
अपान:

Step - 5

(excretory system), from pituitary downwards (endocrine system) etc.

Step 4

Importance of Gut and gut related activities (digestive activities) has already been established in Unit-7. The flow is digestive typically follows the direction mentioned above. Food ingested through head region, passing down through thoracic segment, filled and digested in abdominal cavity and excreted through Pelvic cavity. It happens in a sequence. Then what happens to the absorbed food nutrients? After absorption, it enters the circulation and spreads all over the body. Such a flow can be represented in an oblique circle as shown in the picture.

Step 5

Participants are asked to discuss the major organs/activities related to each segment. They can mark them on the circles

Expected answers:

Head segment	:	Brain functions, Mind functions, Sensory functions, control of other vital centers
Thoracic region/neck	:	Phonation (sound production)
Abdominal cavity	:	Digestive activities
Pelvic cavity	:	Excretory and reproductive activities.

Step 6

As learnt earlier, Vata is the controller of different activities in the body. There are representative parts of Vata in each segment described above. Even though basic functions are the same, based on the specific

tasks to be undertaken in each segment, functionally Vata is divided into five in the following names:

Prana	–	Located in head region
Udaaa	–	Thoracic region
Samana	–	Abdominal region
Apana	–	Pelvic region
Vyana	–	Spreading the whole body from heart

Step 7

Tabulating five types of Vata

Participants are directed to make a table describing names, locations and major functions of five types of Vata (Panchavayu, Panchaprana) in the following table:

Name of subtype of Vata	Chief location	Main functions

Activity 2 Lecture discussion

Further activities of each types of Vata are described here with the help of visual aids.

Prana	Sensory functions (Indriyadharana)
	Control of Mind (Chitta-dharana)
	Intellectual activity (Budhi-dharana)
	Sneezing (Kshavathu)
	Belching (Udgara)
	Breathing (Niswasa)
	Deglutition (Annapravesa)
Udana	Phonation (Vak-pravritti)
	Efrort (Prayatna)
	Energy (Urja)
	Strength (Bala)
	Complexion (Varna)
	Memory (Smriti)
Samana	Gut movements
	Digestion (Pacana)
	Segregation of food (Vibhajana)
	Flow through the gut
Apana	Excretion (Sakrit-mutra nishkramana)
	Ejaculation (Sukla-nishkramana)
	Menstruation (Menstruation)
	Parturition (Garbha-nishkramana)
Vyana	All voluntary activities in the bodyincluding reflex activities
	Circulation

Conclusion

1. There are five functional divisions of Vata, located at different segments of human body
2. They bring out major activities related to those segments
3. They are Prana, Udana, Samana, Vyana and Apana.

3.3.10.4. Assessments

SPOT ASSESSMENT (Pre-test &Post-test)

Name type of Vata which brings out the following activities:

1. Normal functions of sense organs
2. Functions of Mind
3. Intellectual activities
4. Deglutition
5. Phonation
6. Digestive movements related to stomach and intestines
7. Excretory movements
8. Voluntary movements of the body
9. Circulation
10. Parturition.

3.3.10.5. Unit Feedback

Common format (Refer 3.3.1.5. of Unit - 1).

Participant Code ..... Date .....

FEEDBACK OF THE NEW MODEL FOR TRANSACTING TRIDOSHA SIDHANTA

No. of Units ..... No. of classes .....

1.	By the end of module its purpose and direction were	☐ Clear	☐ Hazy	☐ Unclear
2.	Explanation of new terms and concepts was	☐ Good	☐ Adequate	☐ Poor
3.	Would you like to know more about this topic	☐ Very much	☐ Somewhat	☐ Boring

4. Perception on the module

1. Strongly agree 2. Agree 3. No comment 4. Disagree 5. Strongly disagree

Sl No	Perception	1	2	3	4	5
1.	The whole module encouraged learners' participation	☐	☐	☐	☐	☐
2	The module enabled learners to construct their own ideas regarding the topics	☐	☐	☐	☐	☐
3	Learning the concepts in Ayurveda is not a difficult task	☐	☐	☐	☐	☐
4	Examples used in the classes were real life examples	☐	☐	☐	☐	☐
5	The module encouraged critical thinking	☐	☐	☐	☐	☐
6	Application of Ayurvedic concepts in real life is not a difficult task	☐	☐	☐	☐	☐
7	Learning Sloka becomes easier in the present method	☐	☐	☐	☐	☐
8	The activities, games, role plays etc. were appropriate for the topics conveyed	☐	☐	☐	☐	☐
9	Instructor tried to impose his ideas on us without giving logical explanations	☐	☐	☐	☐	☐
10	The concepts are different from those learnt upto the level of +2	☐	☐	☐	☐	☐

5. Perception on the content

1. Understood very well 2. Understood 3. Somewhat understood
4. Poorly understood 5. Not at all understood

Sl No	Core concept	1	2	3	4	5
1	"Out of the box thinking" is essential in learning Ayurveda	☐	☐	☐	☐	☐
2	Nature as well as human body is governed by three principles Visarga-Adana-Vikshepa	☐	☐	☐	☐	☐
3	Human life is conglomeration of Sareera-Indriya-Satwa-Atma	☐	☐	☐	☐	☐
4	Gurvadi guna can be explained well with examples in real life	☐	☐	☐	☐	☐
5	Any biological activity can be explained in terms of Tridosha	☐	☐	☐	☐	☐
6	Doshas are influenced by environmental and lifestyle factors	☐	☐	☐	☐	☐
7	Gunas can be well identified in environmental and lifestyle factors	☐	☐	☐	☐	☐
8	Gunas of Doshas are logically related to their functioning in the body	☐	☐	☐	☐	☐
9	Concept of Prakriti helps to learn more features of Tridosha in human beings	☐	☐	☐	☐	☐
10	The Karmas of Doshas can be related to Gunas very well	☐	☐	☐	☐	☐

Chapter - 4
OBSERVATIONS & RESULTS OF EXPERIMENTAL STUDY

The study was conducted at four Ayurveda Colleges among 1st year BAMS students with test group (Case) being 45 from a Government aided Ayurvedic Medical College and Control Group of 166 from the another Government Ayurvedic Medical College (N=59) and two Private Ayurvedic Medical Colleges (N=107). A total of 211 students volunteered for the study. In Case, the new model including pre-test and post-test was completed within 57 days, abiding the current time table scheduled by Kerala University of Health Sciences. In case 45 students were volunteered from among 1st BAMS students attending VPSV Ayurveda College Kottakkal in 2016 within three months of their admission. The classes could be completed almost as per the hour distribution suggested in the package. Group 2 or Control were instructed through Conventional Teaching at three Ayurveda Colleges in Kerala such as Govt. Ayurved Medical College, Thiruvananthapuram (Control-1), Pankajakasthuri Ayurveda Medical College, Thiruvananthapuram (Control-2) and PNNM Ayurveda College,Cheruthuruthy, Thrissur Dist (Control-3). In this group, distributed in three centres, it took three months to complete the

portions prescribed. The reason was, in conventional teaching, the portions suggested are found scattered in different chapters and the classes are conventionally scheduled with a chapter orientation instead of content orientation. In Group-1, the package consisting of 10 units was delivered in 15 hours. In the module group (case) 45 students who had attended all classes were only taken into analysis.

Table - 3.4.1. Demographics

Variables	CaseN=45	Control1 N=59	Control 2 N=60	Control 3N=47	TotalN=211
Age in years					
Mean ± S.D	19.02 + 0.84	19.36 + 0.72	18.96 + 0.92	18.98 + 0.84	19.08 + 0.83
MEDIAN	19	19	19	19	19
MODE	19	19	19	19	19
MIN	17	17	17	17	17
MAX	21	21	21	21	21
Gender					
Male	6 (13%)	5 (8.5%)	17 (28%)	8 (17%)	36 (17%)
Female	39 (87%)	54 (91.5%)	43 (72%)	39 (83%)	175 (83%)
Prior Knowledge of Sanskrit					
Yes	6 (13%)	16 (27%)	7 (12%)	8 (17%)	37 (18%)
No	39 (87%)	43 (73%)	53 (88%)	39 (83%)	174 (82%)
Entrance rank					
Mean+SD	5220+4430	5468+3036	22486+22461	14241+14457	11853+11097
MIN	2403	1100	5802	5891	1100
MAX	24000	19182	96467	60000	96467
Parent education					
Professional	1 (2%)	7 (12%)	9 (15%)	2 (4%)	19 (9%)
Post Graduate	4 (9%)	7 (12%)	10 (17%)	12 (26%)	33 (16%)
Graduate	20 (44%)	21 (36%)	19 (32%)	15 (32%)	75 (36%)

Diploma	3 (7%)	2 (3%)	5 (8%)	3 (6%)	13 (6%)
High School	16 (36%)	17 (29%)	14 (23%)	15 (32%)	62 (29%)
< High School	1 (2%)	5 (8%)	3 (5%)	0 (0%)	9 (4%)
Parent occupation					
Professional	10 (22%)	14 (24%)	22 (37%)	12 (25%)	58 (27%)
Semi Professional	7 (16%)	7 (12%)	5 (8%)	7 (15%)	26 (12.5%)
Clerk	4 (9%)	7 (12%)	10 (17%)	5 (11%)	26 (12.5%)
Shop Owner	8 (17%)	5 (8%)	14 (23%)	11 (23%)	38 (18%)
Skilled worker	9 (20%)	13 (22%)	3 (5%)	7 (15%)	32 (15%)
Unskilled Worker	7 (16%)	3 (5%)	0 (0%)	0 (0%)	10 (5%)
Not Entered	0	10 (17%)	6 (10%)	5 (11%)	21 (10%)
Parent incomein INR					
>32000	15 (33%)	13 (33%)	38 (63%)	25 (53%)	91 (44%)
16000-31999	12 (27%)	16 (27%)	8 (13%)	8 (17%)	44 (21%)
12000-15999	9 (20%)	4 (20%)	3 (5%)	5 (11%)	21 (10%)
8000-11999	3 (6.5%)	7 (6.5%)	1 (2%)	3 (6%)	14 (7%)
5000-7999	2 (4.5%)	8 (4.5%)	1 (2%)	2 (4%)	13 (6%)
2000-4999	2 (4.5%)	4 (4.5%)	0 (0%)	1 (2%)	7 (3.5%)
Not entered	2 (4.5%)	7 (4.5%)	9 (15%)	3 (7%)	18 (8.5%)

Among these 83% were female and 17% were male. The percentage of males were particularly low in Government College (8.5%). Mean age in years for all participants were 19.08yrs (+ 0.83). The mean age were similar in all three colleges. In entrance ranks Government aided college and Government College had significantly higher ranks compared to other two colleges of mean ranks of5220 (+4430) and 5468 (+3036). The mean rank for control-2 was 22486+22461 and that for control-3 was 14241+14457. Prior knowledge of Sanskrit was present in only 18% of all participants and these

were comparable between groups. Parent Education Status was predominantly Graduate (36%) and High School (29%). Number of Post Graduates and Professionals were high in Private Medical Colleges (32%). Among occupation of parents most were Professionals or Semi-Professionals (39.5%). Shop Owners constituted of 18%. Income wise 44% of parents were high income group (>32000 INR per month) and 21% were middle income group.

3.4.1. Summative Assessment

The primary efficacy of the package was assessed by means of summative assessment test which consisted three parts a comprehension based MCQ (Part 1), a memorization test of sloka (sloka) and an application based MCQ (Part 2) between groups as post test evaluation.

Table - 3.4.2. Summative Assessment – Grant total between groups

Variable	Case (N=45)	Control 1 (n=59)	t-test score	p value	% Change
Summative assessment (Mean+SD)	92.56+10.88	54.34+14.55	15.63	0.0001*	41.3%
Variable	**Case (N=45)**	**Control 2 & 3 (n=107)**	**t-test score**	**p value**	**% Change**
Summative assessment (Mean+SD)	92.56+10.88	64.51+14.53	10.38	0.0001*	30%

**highly significant (p<0.05)*

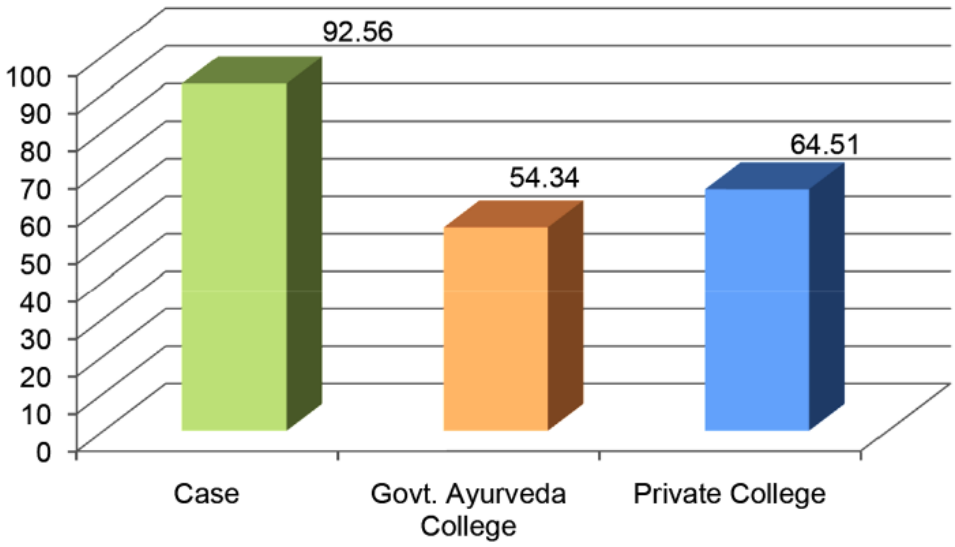


Fig. 3.4.1. Summative assessment grant total between groups

There was a difference of 41% between total score in post package summative assessment of Case and Control 1 (Govt.Ayurveda College) and 30% in total score in post package summative assessment between Case and Control 2 & 3 aggregate (Private Ayurveda Colleges) . Both these differences were highly significant based on an unpaired Welch's t-test. ($p<0.01$).

Fig. 3.4.2. shows that the three parts of the summative assessment were compared separately. Part 1 showed a statistically significant difference of 20% between case and control 2 and 28% between case and control 1, while Part 2 showed an even higher difference of 54% between Case and Control 1 and 43% between case and control 2. This was also a highly significant difference ($p<0.01$) in both cases. Test to check memorisation skills of slokas showed 27% better skills in case group

compared to Control 1, which was highly significant statistically ($p<0.01$). However the difference between Case and Control 2 was only 4% and this difference was not statistically significant ($p>0.05$).

Table 3.4.3. Summative Assessment – Part wise between groups

Variable	Case (N=45)	Control 1 (n=59)	% Change	Control 2 (n=107)	% Change
Summative assessment Part 1 (Mean+SD)	37.56+3.23	26.96+5.29	28%*	29.96+6.99	20%*
Summative assessment Sloka (Mean+SD)	8.05+1.80	5.85+3.04	27%*	7.76+2.70	4%
Summative assessment Part 2 (Mean+SD)	46.95+7.61	21.52+10.12	54%*	26.78+8.14	43%*

**highly significant (p<0.01)*

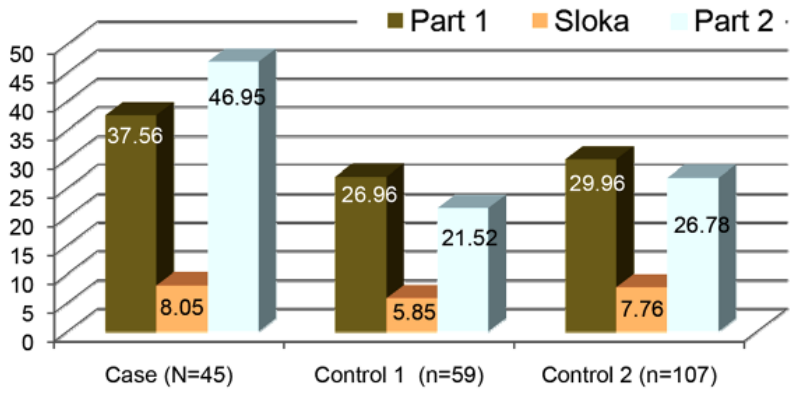


Fig. 3.4.2. Summative Questionnaire in parts

Paired t-test was used to assess the difference within each group in a pretest and post test analysis.

Table 3.4.4. Summative Assessment within Group Pre Test Vs Post Test

Variable	Pre-test	Post test	t-test score	p value	% change
Summative assessment Case (N=45) (Mean+SD)	10.28 + 5.95	92.56 + 10.88	44.5	0.0001*	75%
Summative Assessment Control 1 (N=59) (Mean+SD)	10.63 + 5.95	54.34 + 14.55	20.26	0.0001*	39%

**highly significant using a paired t-test (p<0.01)*

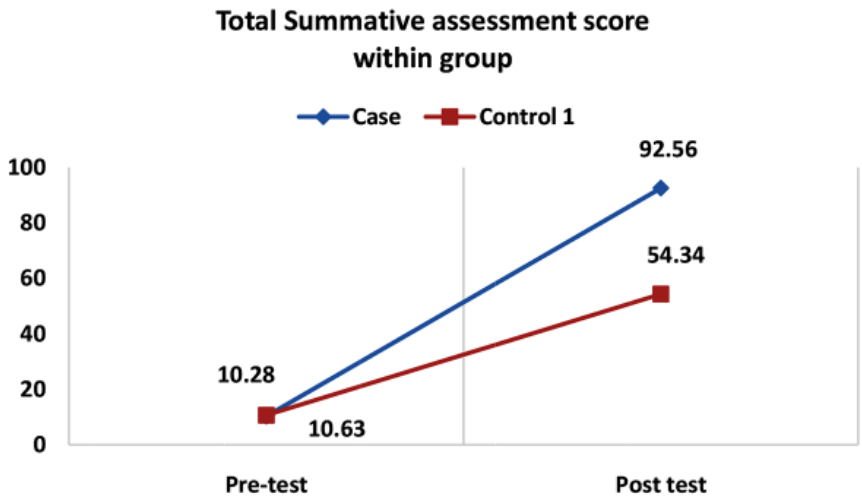


Fig. 3.4.3. Summative Assessment - Pre-post intergroup compariosn

As evidenced from the assessments within group of Case and Control 1, the pre test score of both groups were comparable. The case group had a pre-test score of 10.28 (+5.95) compared to the control 1 which was 10.63 (+5.95). From these comparable baseline scores the post test score show 75% improvement in case 92.56 (+10.88) as opposed to only a 39% improvement in scores in the control group 54.34 (+14.55). Put together with the post test comparison with the case and control groups, this finding garners significance as it points out to a highly effective intervention in the case group as it has improved perceptions uniformly among students of all intellectual levels.

3.4.2. Structured feed backs

Overall feedback was taken for the following questions from 44 respondents from VPSV Ayurveda College, Kottakkal. The feedback included three main domains: (1) Overall perception on the package (2) Specific perception on the delivery of the program (2) Specific perception on the content on the program. There were 3 questions in the first domain and 10 each in the other two. Items in domain 2 were scaled using a 1 to 5 agreement scale in which 1=Strongly Agree; 2=Agree; 3=No comment; 4=Disagree and 5=Strongly Disagree. Items in domain 3, where the perception on the content of the package was responded, the items were scaled using a 1to 5 agreement scale in which 1=Understood very well; 2=Understood, 3=somewhat understood; 4the items were scaled using a 1to 5 agreement scale in which 1=Understood very well; 2=Understood, 3=somewhat understood; 4=Poorly understood; and 5=Not at all understood.

In the first domain, there was unanimous agreement towards the first 3 responses on the overall programme. For the question “By end of module purpose and direction were” all respondent reported “Clear”. Similarly, all participants rated explanation of new terms in concept, as “good”.Interest generation to know more about topic was reported as “very much” by all 44 participants.

In domain-1, to rate the perception of the respondents towards the delivery of the package, the questions asked and responses are given in Table 3.4.5.

All responses showed 100% agreement of “strongly agree” and “agree”, except for the question “The instructor tried to impose his ideas without giving logical explanations” which only gave 39% of agreement,

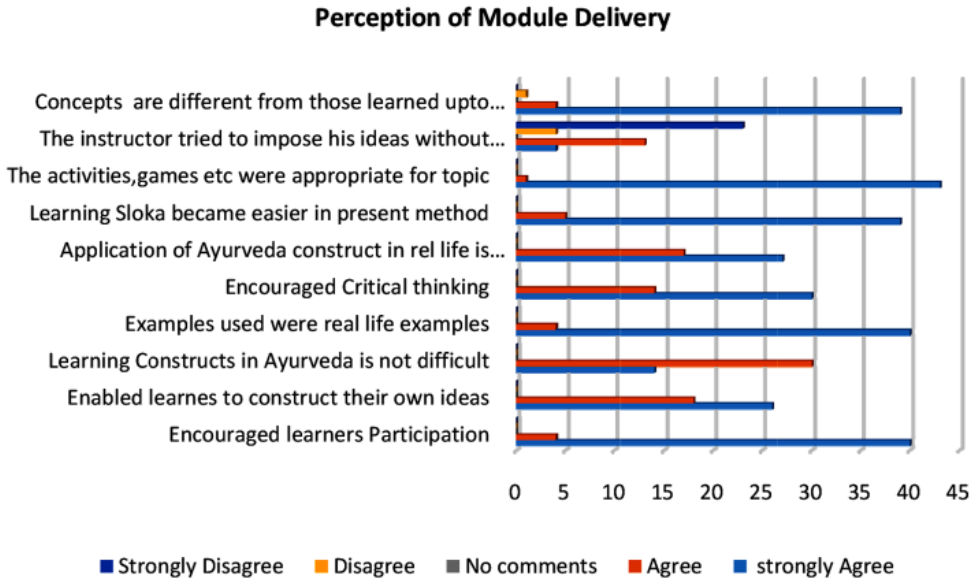


Fig. 3.3.4. Perception of Model Delivery Feed Back

compared to 61% who disagreed. ("Disagree" or "Strongly Disagree"). For the question- "Concepts are different from those learned up to the level of Plus 2" there was only 1 disagreement.

Table 3.4.5. Perception on model delivery

Items assessed	Strongly Agree	Agree	No comments	Disagree	Strongly Disagree
Encouraged learners Participation	40 (91%)	4 (9%)	0 (0)	0 (0)	0 (0)
Enabled learned to construct their own ideas	26 (59%)	18 (41%)	0 (0)	0 (0)	0 (0)
Learning Constructs in Ayurveda is not difficult	14 (32%)	30 (68%)	0 (0)	0 (0)	0 (0)
Examples used were real life examples	40 (91%)	4 (9%)	0 (0)	0 (0)	0 (0)
Encouraged Critical thinking	30 (68%)	14 (32%)	0 (0)	0 (0)	0 (0
Application of Ayurveda construct in real life is not difficult	27 (61%)	17 (39%)	0 (0)	0 (0)	0 (0)
Learning Sloka became easier in present method	39 (89%)	5 (11%)	0 (0)	0 (0)	0 (0)
The activities, games etc. were appropriate for topic	43 (98%)	1 (2%)	0 (0)	0 (0)	0 (0)
The instructor tried to impose his ideas without giving logical explanations	4 (9%)	13 (30%)	0 (0)	4 (9%)	23 (52%)
Concepts are different from those learned upto the level of Plus 2	39 (89%)	4 (9%)	0 (0)	1 (2%)	0 (0)

In Domain-3, to rate the perception of respondents towards the contents of the module, the questions and responses are given in Table – 3.4.6.

Table 3.4.6. Perception on content of the model

Perception on content	Understood very well	Understood	Some what	Poorly	Not at all
Out of the box thinking is essential in learning Ayurveda	40 (91%)	4 (9%)	0 (0)	0 (0)	0 (0)
Nature as well as human body is governed by VisargaadanaVikshepa	35 (80%)	8 (18%)	0 (0)	1 (2%)	0 (0)
Human life is conglomerate of Sarira-indriya-Satwa-Atma	30 (68%)	12 (27%)	0 (0)	2 (5%)	0 (0)
GurvadiGuna was explained well with real life examples	38 (87%)	4 (9%)	0 (0)	1 (2%)	1 (2%)
Any biological activity can be explained in terms of Tridosha	37 (84%)	7 (16%)	0 (0)	0 (0)	0 (0)
Dosha are influenced by environmental and lifestyle factors	35 (80%)	9 (20%)	0 (0)	0 (0)	0 (0)
Gunas can be well influenced in environmental and lifestyle factors	38 (87%)	6 (13%)	0 (0)	0 (0)	0 (0)
Gunas of Dosaha are logically related to their functioning in the body	33 (75%)	11 (25%)	0 (0)	0 (0)	0 (0)
Concept of Prakruti helps to learn more features of Tridosha in human being	23 (52%)	21 (48%)	0 (0)	0 (0)	0 (0)
Karma of Dosha can be related to Guna very well	37 (84%)	7 (16%)	0 (0)	0 (0)	0 (0)

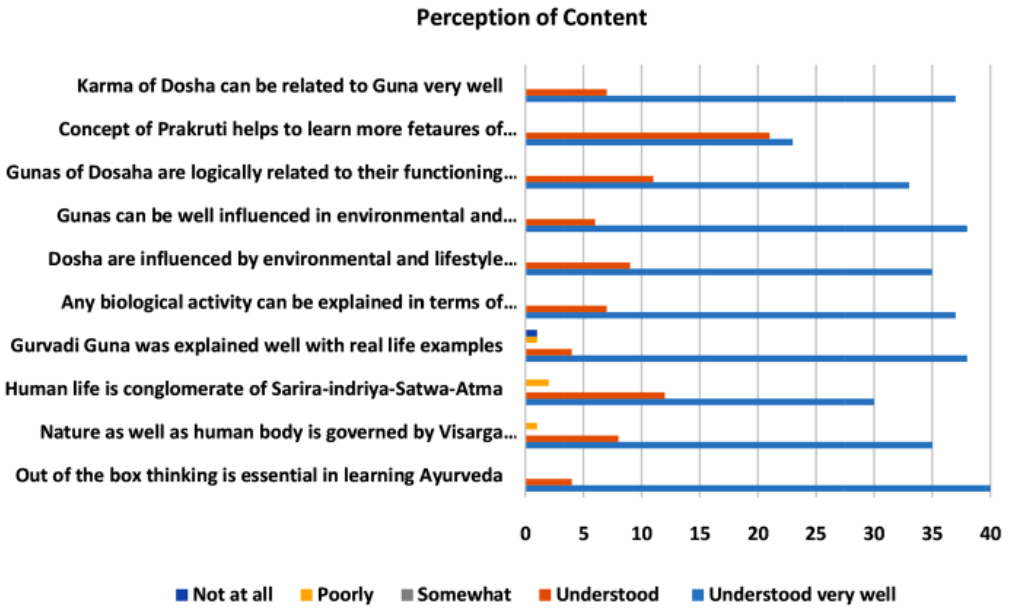


Fig. 3.3.5. Perception on content of the new model

Almost 100% participants responded “Understood very well” or “Understood” for all contents. Regarding the content regarding “Visargaadanavikshepa” there was 1 participant who understood poorly. For the content “Human life is conglomerate of Sarira-indriya-Satwa-Atma” there were 2 patient who understood the content poorly. For the question “Gurvadi Guna was explained well with real life examples” 1 participant found the content poorly understood while 1 found it “not at all” understandable.

3.2.3. Unitwise feedback

Feedback of the classes of each unit were separately assessed based on the following parameters.

1. Class was Interesting
2. Ensured participation
3. Class was Interactive
4. Clear and Communicative Slides
5. Ensured Interest for further learning
6. Ideas Conveyed were clear
7. Encouraged Critical Thinking

Each item was scaled using a 1 to 5 agreement scale in which

1 = Strongly Agree 2 = Agree 3 = No comment

4 = Disagree 5 = Strongly Disagree

Based on parameters the results were as follows;

Table 3.4.7. Feed back - "Class was Interesting"

	Unit									
N=45	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Strongly Agree	23	27	30	33	36	43	36	27	28	30
Agree	21	18	12	11	9	2	8	18	17	13
No Comment	1	0	3	0	0	0	1	0	0	2
Disagree	0	0	0	0	0	0	0	0	0	0
Strongly Disagree	0	0	0	1	0	0	0	0	0	0

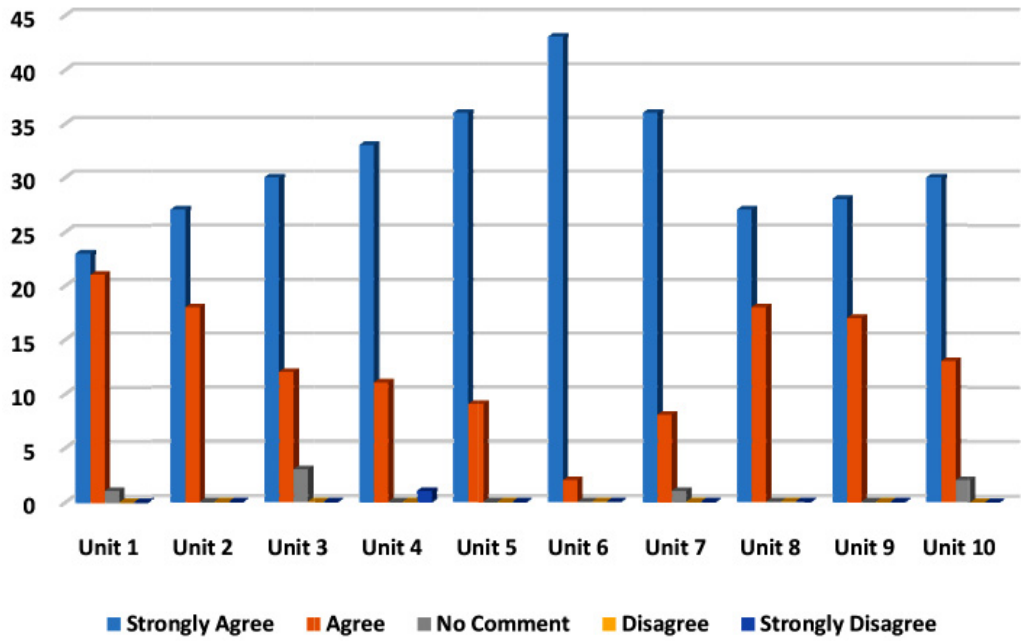


Fig. 3.3.6. Feed back - Class was Interesting

The analysis showed maximum interest levels in unit 6 and lowest interest levels in unit 1. Almost all units showed 97-100% satisfaction levels. Unit 3 showed a 7% of dissatisfaction among respondents.

Table 3.4.8. Feed back - Class ensured Participation

N=45	Unit									
	1	2	3	4	5	6	7	8	9	10
Strongly Agree	21	33	35	31	32	37	32	24	28	23
Agree	23	11	8	13	13	7	12	18	16	20
No Comment	1	1	1	1	0	1	1	3	1	2
Disagree	0	0	0	0	0	0	0	0	0	0
Strongly Disagree	0	0	1	0	0	0	0	0	0	0

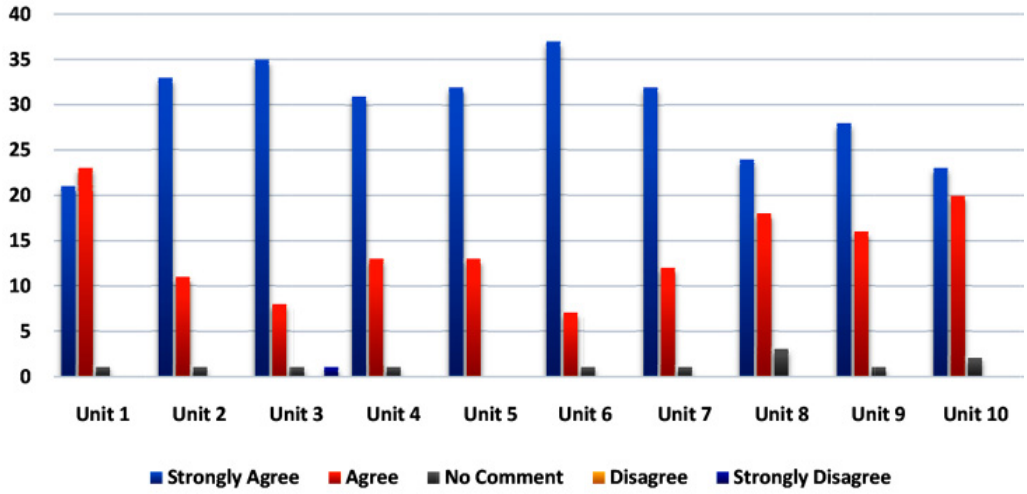


Fig. 3.3.7. Feed back - Class ensured Participation

The analysis showed maximum interest levels in unit 6 and lowest interest levels in unit 1. Almost all units showed 97-100% satisfaction levels. There was a 7% satisfaction deficit observed in Unit 8.

Table 3.4.9. Feed back - Class was Interactive

	Unit									
N=45	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Strongly Agree	29	36	35	34	31	40	32	20	29	23
Agree	15	8	7	11	14	5	12	21	16	19
No Comment	1	1	2	0	0	0	1	2	0	2
Disagree	0	0	0	0	0	0	0	1	0	1
Strongly Disagree	0	0	1	0	0	0	0	1	0	0

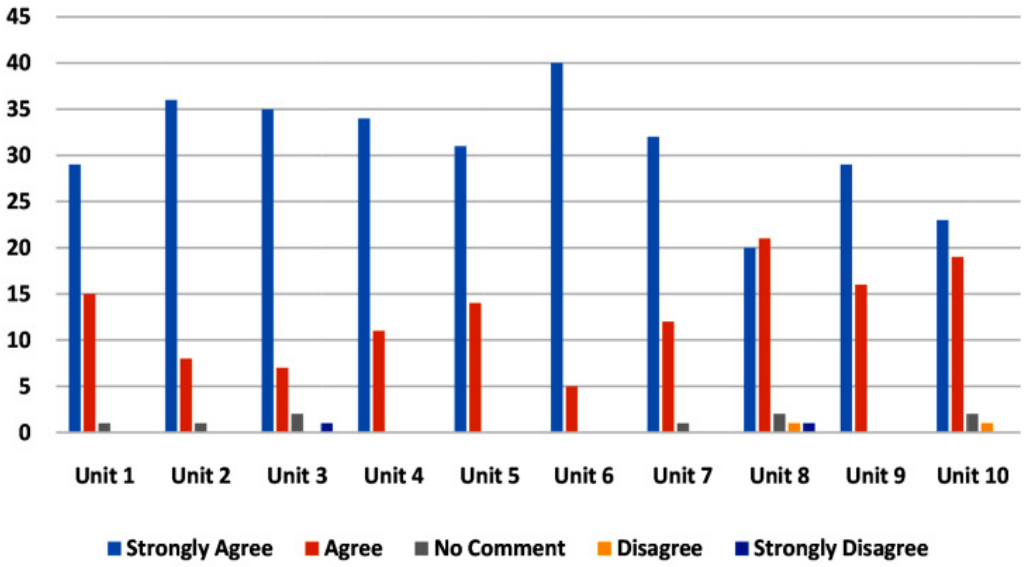


Fig. 3.3.8. Feed back - Class was Interactive

Unit 6 showed maximum interactive nature and Unit 8 showed minimum interactive rates in the analysis.

Table 3.4.10. Feed back - Slides were Clear and Communicative

N=45	Unit									
	1	2	3	4	5	6	7	8	9	10
Strongly Agree	34	36	31	32	31	38	34	22	18	25
Agree	11	8	10	13	12	6	10	22	15	12
No Comment	0	1	4	0	0	1	1	1	10	6
Disagree	0	0	0	0	2	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0	0	0	2	2

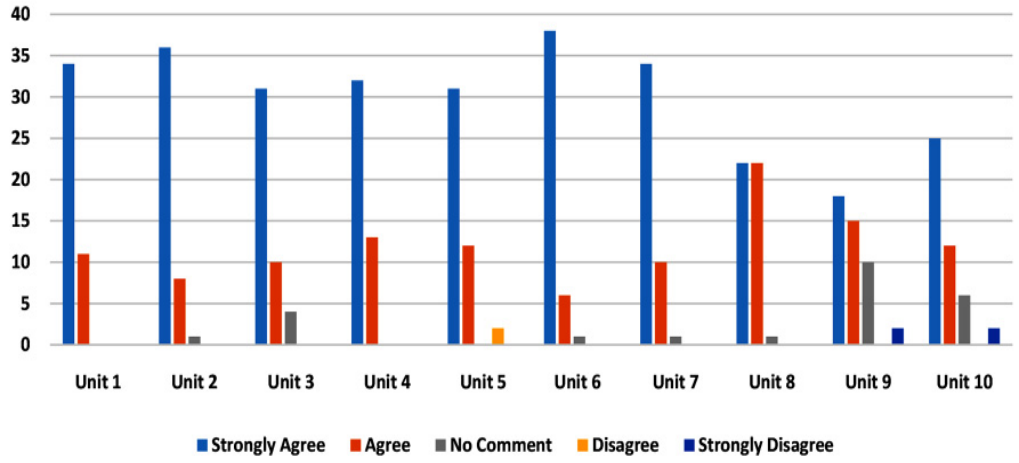


Fig. 3.3.9. Feed back - Slides were Clear and Communicative

Regarding the clarity and communication of slides used in the package the analysis of units revealed maximum level of appreciation for Unit 6 and minimum for Unit 9. The dissatisfaction levels were 22% in unit 9.

Table 3.4.11. Feed back - Class ensured interest for further learning

	Unit									
N=45	1	2	3	4	5	6	7	8	9	10
Strongly Agree	19	21	23	35	30	40	32	26	23	23
Agree	17	20	19	9	14	5	11	19	19	20
No Comment	8	3	3	1	1	0	2	3	2	2
Disagree	1	0	0	0	0	0	0	0	1	0
Strongly Disagree	0	1	0	0	0	0	0	0	0	0

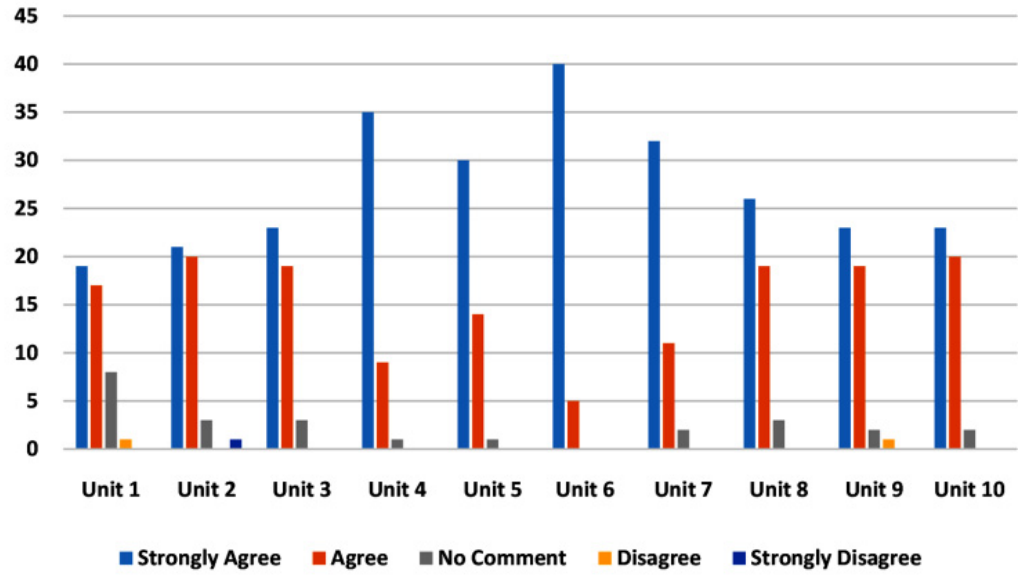


Fig. 3.3.10. Feedback - Class ensure interest for further learning

Regarding the session's ability to generate interest for further learning, the results showed maximum satisfaction in Unit 6 and minimum in Unit 1. Further unit 1 reported maximum dissatisfaction levels of up to 18% as per results.

Table 3.4.12. Feedback - Ideas Conveyed were clear

N=45	Unit									
	1	2	3	4	5	6	7	8	9	10
Strongly Agree	21	23	23	33	29	35	31	25	25	25
Agree	23	19	19	12	16	10	14	19	20	18
No Comment	0	3	3	0	0	0	0	1	0	2
Disagree	1	0	0	0	0	0	0	0	0	0
Strongly Disagree	0	0	0	0	0	0	0	0	0	0

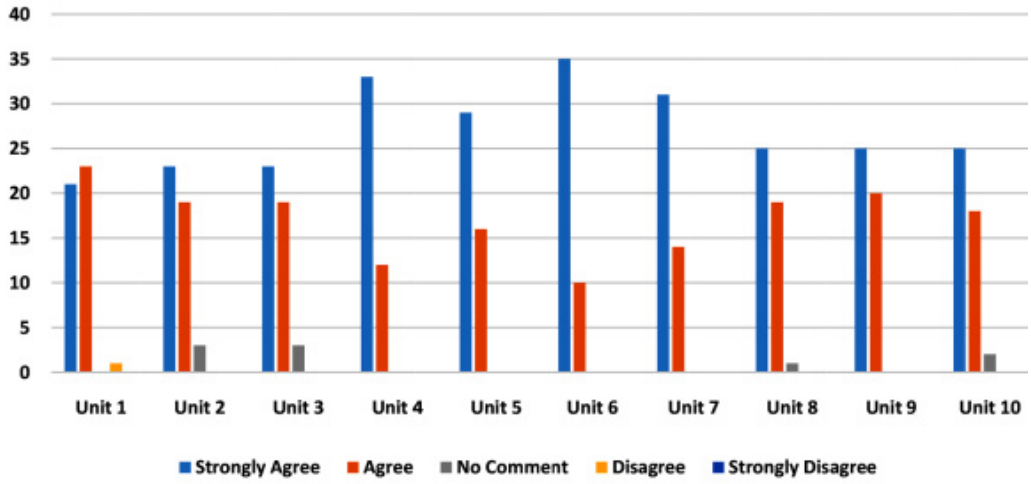


Fig. 3.3.11. Feedback - Class ensure interest for further learning

The maximum levels regarding clarity of the ideas conveyed were the maximum in Unit 6 and the levels of satisfaction were minimum in Units 2 and 3.

Table 3.4.13. Feedback - Encouraged Critical Thinking

N=45	Unit									
	1	2	3	4	5	6	7	8	9	10
Strongly Agree	15	13	14	24	26	36	28	26	23	23
Agree	22	21	28	20	18	9	17	18	21	18
No Comment	8	7	2	1	1	0	0	1	1	4
Disagree	0	2	0	0	0	0	0	0	0	0
Strongly Disagree	0	2	1	0	0	0	0	0	0	0

Regarding the package's efficiency in inculcating Critical Thinking, the study showed maximum responders showing satisfaction with Unit 6 and minimum with unit 2. The dissatisfaction levels were higher in both Unit 1 and Unit 2

3.4.3. Formative Assessments of the 10 Modules

Formative assessment was conducted in a pre - post manner during each module in the Group 1 (Case).

3.4.3.1. Unit 1 – Change Your Perspective

No assessment was done in this session as it was conceived as an icebreaking session. This session only used general feedback of the session as described in the above section.

3.4.3.2. Assessments of Unit 2

Table 3.4.14. Pre-post test assessment - Unit 2

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 2	3.01 + 2.07	8.84 + 1.33	14.18	0.001*	58.3%

The first unit which dealt with Concept of Visarga-Adan-Vikshepa in cosmic and physiological parlance gave a pre- test understanding of 3.01 (+2.07) out of 10. The post test of the unit showed an improvement of 58.3% which was highly significant ($p<0.01$) in a paired t-test.

3.4.3.3. Assessments of Unit 3 Part - 1

This unit dealt with Introducing 20 Gunas through lecture discussion. The session showed 78% improvement in comprehension of the idea in post test analysis which was highly significant ($p<0.01$) in a paired t test.

Table 3.4.15. Pre-post test assessment Unit-3 Part – 1

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 3	1.15 + 1.18	8.98 + 1.42	25.12	0.001*	78.3%

3.4.3.4. Assessment Unit 3- Part – 2

Table 3.4.16. Pre-post test assessment Unit 3- Part – 2

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 4	2.29 + 2.38	9.34 + 2.06	15.43	0.001*	70.5%

The second unit in Guna spectrum also showed a 70.5% improvement in comprehension compared to pre test ($p<0.01$).

3.4.3.5. Assessment Unit 4

Table 3.4.17. Pre-post test assessment Unit-4, Part – 1

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 4	2.29 + 2.38	9.34 + 2.06	14.35	0.001*	56%

Introducing Tridosha as basic physiological principles with etymological derivation which was conducted a brainstorming session showed a 56% increased understanding by the end of the session ($p<0.01$).

3.4.3.6. Guided quiz score - Unit 4

Table 3.4.18. Guided quiz score - Unit 4

Variable	Post test (n=45)	% obtained
Activity (Guided Quiz) out of 54	36+6.85	67%

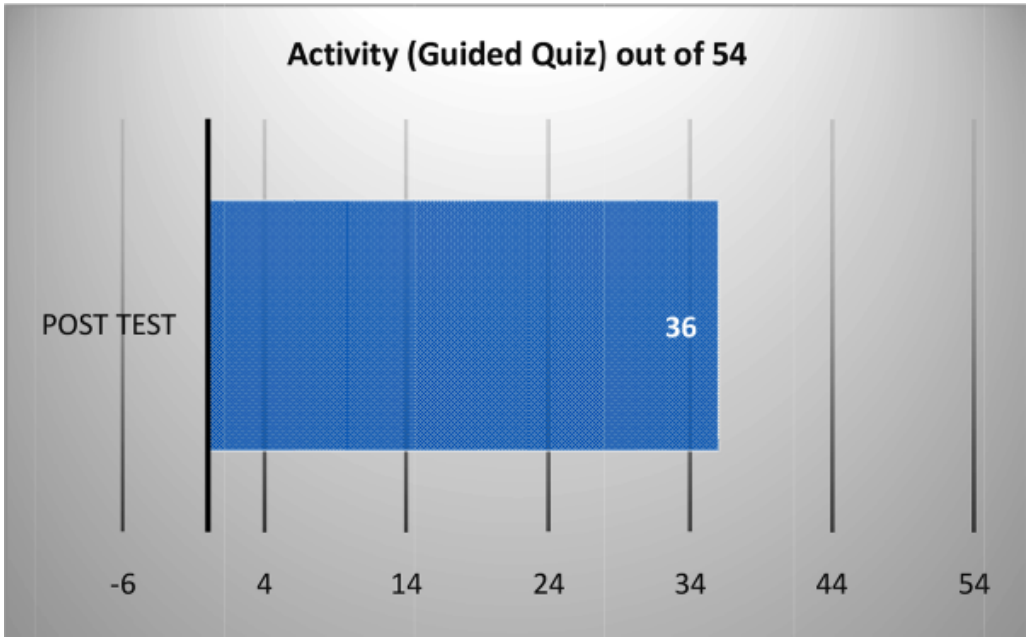


Fig. 3.3.12. Activity Guided Quiz- Post test

Identifying Tridoshas behind any activity in human body and Identifying the dynamic equilibrium among Doshas was done through Activity (Guided Quiz) Lecture discussion, Role play (dynamic equilibrium), Video display and Sloka learning. The quiz results showed 67% marks post-test.

3.4.3.7. Pre-post test assessment - Unit 5

Table 3.4.19. Pre-post test assessment - Unit 5

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 4	3.89 + 2.23	9.50 + 1.01	14.35	0.001*	56%

Connection between the Guna concept and Tridosha was established and the Gunas were constrictively enlisted in the module which showed 56% increased understanding by the end of the session ($p<0.01$).

3.4.3.8. Understanding Gunas through Prakriti Assessment

The first activity was construction of Prakriti assessment proforma by the learners themselves through the ideas gathered previously

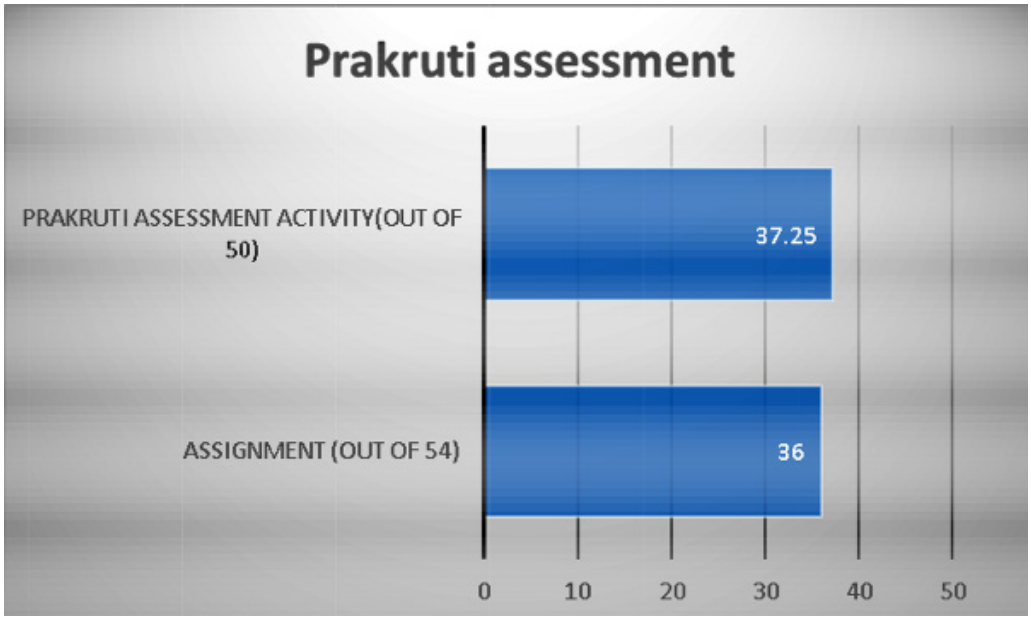


Fig. 3.3.13. Score from proforma construction and Prakriti assessment - Unit-6

in the class. Such a prepared proforma was scored out of 50. Average score gained by participants in 37.5 (74.5%). Prakriti assignment was done using standard proforma where average score attained was 66.7%.

Table 3.4.20. Score from proforma construction and Prakriti assessment - Unit-6

Variable	Post test (n=45)	% of marks
Assignment (out of 54)	36.00 + 6.85	66.7%
Prakruti Proforma Construction (Out of 50)	37.25 + 4.18	74.5%

3.4.3.9. Graded table score - Unit 7

This unit dealt with Normal Fluctuations and Functions of Doshas and had 2 parts. Guided Quiz (to identify normal fluctuations of Tridosha), Proforma filling (three stages) and Sloka learning. Porforma filling was done out of 21 marks in 3 stages.

Table 3.4.21. Score in graded table assessment Unit-7

Variable (Porforma filling)	Post test (n=45)	% obtained
Sanskrit out of 21	11.65+2.86	55.5%
Meaning out of 21	14.33+2.89	68.2%
Explanation out of 21	19.45+2.31	92.6%
Sloka learning out of 8	7.06+1.42	88.3%

The assessment showed increased level of understanding, from 55.5% on reading slokas to 68.2% on explaining meaning and 92.6% after

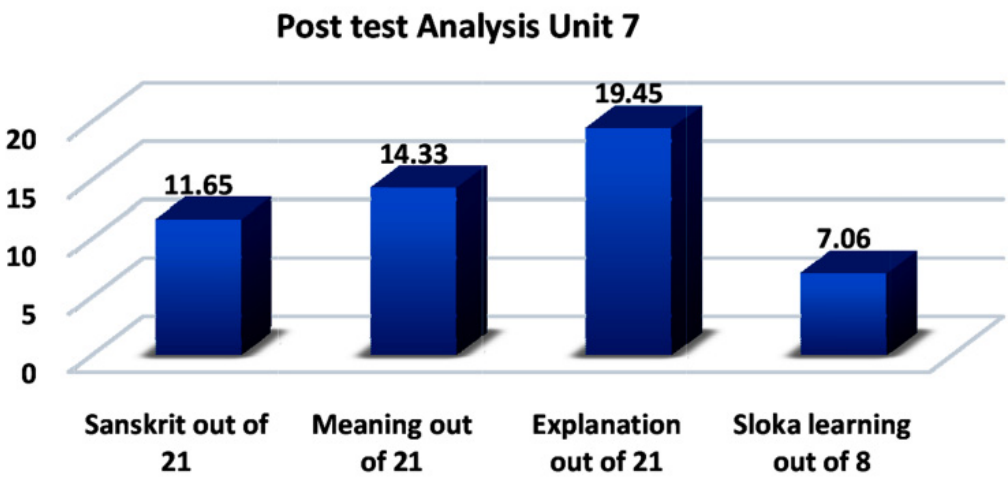


Fig. 3.3.14. Score in graded table assessment Unit-7

explaining the context. The method did not affect the sloka learning skills. Infact it seems to have enhanced the skill as evidenced by the 88.3% rendition of slokas.

3.4.3.10. Assessments of Unit 8

Table 3.4.22. Pre-post test assessment Unit 8- Part – 1

This session was conducted as a lecture with visual aids.

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 8	2.75 + 1.25	9.06 + 2.20	11.65	0.001*	63.1%

The session showed a 63.1% improved comprehension of subject from pre test which was highly significant. ($p<0.01$)

3.4.3.11. Assessments of Unit 9

Table 3.4.23. Scores in different activities of Unit-9

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Pre-post assessment Part 1	3 + 1.59	8.69 + 2.20	9.35	0.001*	56.9%
Part 2	2.58 + 2.16	8.36 + 2.83	9.75	0.001*	57.8%
Assignment (out of 50)		39.13 + 3.11			78.3%
OTB Activity (Out of 50)		39.76 + 9.46			79.5%

The session showed a 56.9% improved comprehension of subject from pre test in Part 1 and 57.8% in Part 2 which were highly significant. ($p<0.01$)

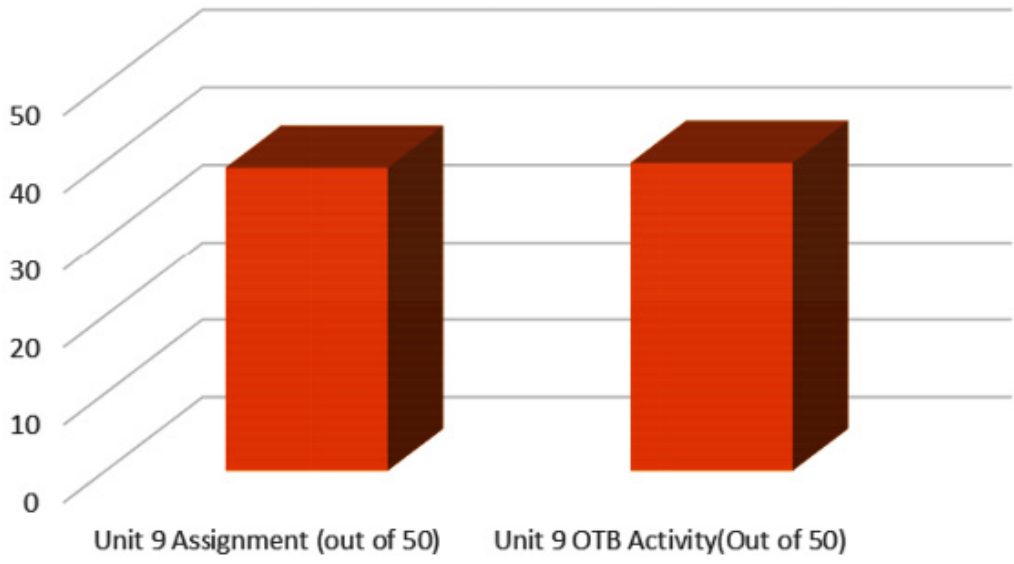


Fig. 3.3.15. Scores in acitivities Unit-9

3.4.3.12. Assessment of Unit 10

Table 3.4.24. Pre-post assessment Unit 10

Variable	Pre test (N=45)	Post test (n=45)	t-test score	p value	% Change
Formative Assessment Unit 10	0 + 0	9.86 + 0.50	18.75	0.001*	98.6%

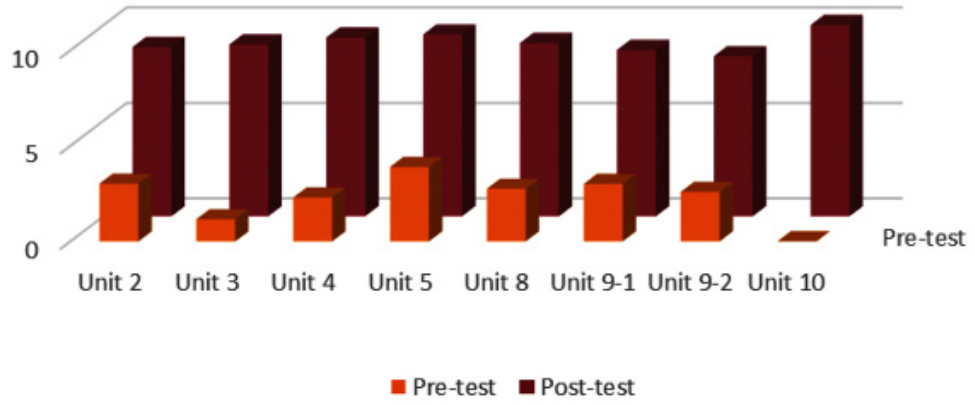


Fig. 3.3.16 Pre post assessment of Unit 2-10

The Symptoms of increase, decrease of Doshas was taken using case study, lecture and open discussion showed an improved comprehension of 98.6% in post test which was highly significant.

3.4.3.13 Formative Assessment - spot quiz (various units)

Table 3.4.25. Formative Assessment - spot quiz (various units)

Spot Quiz	Marks	% of Marks
Spot Quiz (Out of 10) – Unit 3	8.09+1.76	80.9%
Spot Quiz (out of 20) – Unit 4	17.36+2.88	86.8%
Spot Quiz (out of 15) – Unit 5	12.82+1.66	85.5%
Spot Quiz (Out of 12) – Unit 7	11.38+1.36	94.8%

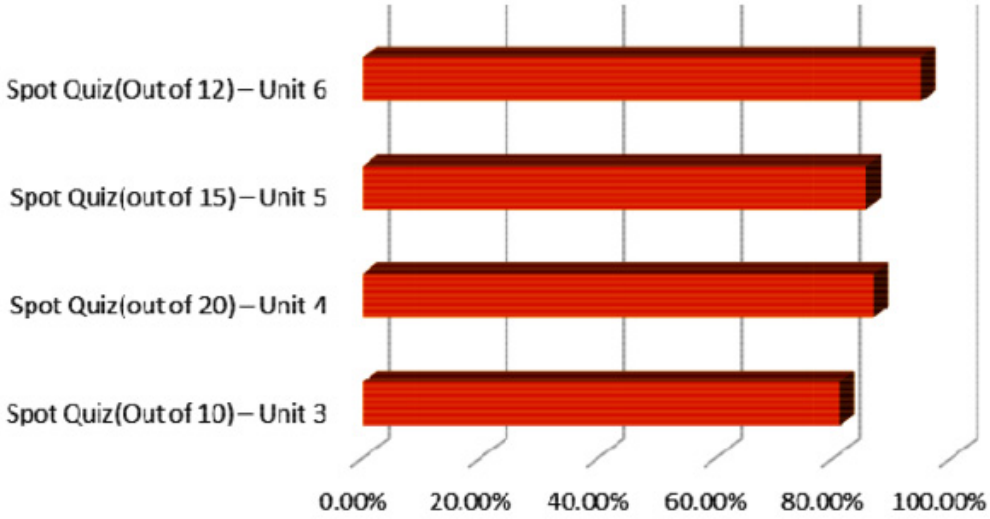


Fig. 3.3.17 Spot Quiz Assessment

Spot Quiz was used as a formative assessment tool as well as an educational model. The Spot Quiz assessment gave minimum of 81% and a maximum of 95% marks. This shows the effectiveness of the tool in enhancing learning.

Part - IV

DISCUSSION, SUMMARY AND CONCLUSION

Chapter - 1 **Discussion on Literary Comparison**

Chapter - 2 **Discussion on Development of New Model**

Chapter – 3 **Discussion on Experimental Part**

Chapter – 4 **Summary and Conclusion**

Chapter - 1
DISCUSSION ON LITERARY COMPARISON

4.1.1. Discussion on Methodology of comparison

One of the prime objectives of the study is to see congruence of principles and practices of ancient teaching, especially those described in Ayurvedic textbooks, with contemporary teaching. The one called ancient teaching method is not a unanimous discourse by nature and content. Radha Kumad Mukherjee, who extensively searched the nature of teaching and learning in ancient India, attempted the same by taking consideration of two distinct traditions – The Brahmanical (Vedic) and the Buddhist. Brahmanical tradition also was subdivided into finer traditions like – Rigvedic, Later Vedic, Darsanik, Puranic etc.[1]. Among these demarcations, the position of Ayurvedic style of teaching and learning is worth debating. Even though the educational patterns of the Brahmanical and Buddhist education are evident from the literature related, such methods are not dealt under specific headings there.But, Ayurveda attempts the same, presumably for the first time when compared to other direct sources like Arthasastra, Neetisastra,

etc. This reality suggests that it is wiser to consider Ayurveda education as a category separate from Brahmanical and Buddhist tradition, definitely influenced by both. Hence, this study attempts to demarcate the ancient education under three main headings: Brahmanical (Vedic), Buddhist and Ayurvedic.In the Vedic system, early Vedic and later Vedic systems (Upanishat system) are conventionally considered separately to denote their differences. Here also that system is followed. Later phases like medieval system, Modern system (Collegiate education) are considered by convention. It was during British rule the modern education system was introduced, specifically in 1830s by Lord Thomas Babington Macaulay, for creating Anglicised clerks for working under British East India Company[2]. After independence the education system still continued to be the same without many modifications. The modern era is still sub divided into two, i.e., modern (before 1980)and post-modern (after 1980's), considering the radical changes introduced by National Curriculum Frame work in early 1980's. So, finally, while comparing the system of education, the timeline has been divided into the following seven landmarks: Vedic, Upanishadic, Buddhist, Ayurvedic, Medieval, Modern (before 1980's) and Post modern (after 1980's).

Usually Indian historical timeline is subdivided on a political basis, but this division would not ideally serve to build up logical insights on Ayurveda history. There are a few attempts to divide historical timeline of Ayurveda on different criteria by masters like Dr Gananth Sen, Dr. P C Ray, Dr. A. Lakshmeepathy etc. A general consensus reached by such attempts

described history of Ayurveda chronologically as Pre-vedic, Vedic, Ayurvedic, Medieval and Modern[3]. The same pattern is relevant while considering the changing trends of education also. In general history of Education in India, Ayurvedic education or Vocational education is not considered separately. Even though the system followed is Gurukula by nomenclature in Vedic and Ayurvedic traditions, similar in Budhist tradition, nature of such system is the same in all the traditions. In the Vedic tradition itself, the system of Gurukula even changed on a later period (Upanishat era). While examining characteristics of Ayurveda education, as described in Samhitas, it can be well convinced that it has more affinity to the later Vedic education trends (Upansihath education) than early Vedic phase. This later development shaped the characters of Gurukula in Ayurveda at least in the fashion it got described in Samhitas. This transition was not properly addressed by historians. So, it was highly warranted to consider ancient education under different domains as portrayed in the present study.

Regarding sources of material collection,collection of material related to Vedic / Upanishat / Buddhist tradition of education was directly done by referring books and e-sources which dealt with ancient Indian education. In such books, there are lesser extent of description on Ayurvedic education and the description available was dealt under the heading “Medical Education In ancient India”. The description regarding education and teaching available in Ayurveda Samhitas especially Caraka Samhita was not regarded to be an important evidence of the structure of ancient education system.

Apart from direct references in Ayurveda Samhitas regarding teaching and learning, by structure, Samhitas themselves convey the sequence and structure of transaction. The term Samhita itself convey the meaning that implies "any methodically arranged collection of texts[4]" and "the proper and adequate description of the discipline[5]". Systematization of knowledge is vital in any discourse related to Vaidya. In Vedic system also, there was a transition in systematization of the knowledge contained in it. Division of Vedic knowledge into four Vedas, fixing Upaveda to each, standardizing Vedic learning through six Vedangas etc. can be considered as attempts for systematizing the extensive knowledge base in it. While emerging Ayurveda as an independent system, this systematic approach might have developed as a critical need of the society. In that way, the treatises (Samhitas) themselves are models of transactions. Starting from preliminary and fundamental knowledge in Sootrasthana, the content of transaction advances to knowledge of human body (Sareerasthana), causes of diseases (Nidanasthana), treatment of diseases (Chikitsasthana) and procedural knowledge (Sidhi & Kalpa sthana), in a general structure. Even then, the preliminary knowledge in Sootratshana, contains portions, through learning which, a learner can effectively assist his Guru in day to day affairs. That was why primary knowledge of plants (Bheshajachatushka in Caraka Samhita), primary knowledge of surgical procedures and instruments (in Susruta Samhita) etc. appear in the beginning of the textbook. This, perhaps, symbolize the early exposure of the learner to the practical and operative aspects of treatment, and it can be presumed as the method of transaction prevailed in the Gurukula of those times. Early

exposure to clinics is considered to be one among key approaches in medical education in general[6], taken to Ayurveda recently[7]. In such a way, sequence of topics in Samhita itself conveys the idea of how they were transacted in Gurukula then. The descriptions which are not directly related to teaching/ learning methods also conveyed some ideas about the different strategies of transaction, student-teacher relationship, theories of learning etc.

4.1.2. Domains of comparison

Domains of comparison were fixed chiefly based on how different aspects of education as reflected in Samhitas. Even though there are many different aspects of education to be compared, four major domains are selected for comparison, considering their significance in defining the whole character of the systems to be compared. The four domains viz. System of education, Philosophy of education, Principle and Process of learning and Methods of Transaction are considered. **System of education** meant to be the social and infrastructural pattern wherein the learner as well as the teacher is obliged to follow set of codes, conducts, procedures and customs laid down by the society. When Gurukula is a system, Pathasala is another system, and in an Anglicised society College is another system. Gurukula, Pathasala and College denote the infrastructural pattern of the system, previously dominated by Gurus. When comparing the systems of different periods, the attributes of comparison naturally appears as codes, conduct, content, social structure, autonomy, student teacher relationship, multidisciplinarity, scope of collective thinking etc.

Philosophy of educationis a particular discipline in Education, which deals with how key philosophical theories are reflected in the field of education. Theories of cognition, learning, epistemology etc. are usually some of the common areas dealt by Philosophy, both in western and Indian systems. The basic epistemological concerns in philosophies anywhere in the world considerably agree in content spontaneously, even in the absence of deliberate exchange of ideas between cultures. The fundamental purpose of philosophy is to find meaning in one's life and purpose to one's path, and there is no major difference between eastern and western philosophy according to that understanding[8].From such theories, recently, modern educational Philosophers developed specific approaches also. While comparing to the specificity of approaches and terminologies in modern educational philosophy, the ancient teaching philosophy seems to be unstructured and non-specific, in the sense, they didn't put specific terminologies for different approaches related to philosophical concerns of education, though the concerns have richness and diversity. Considering this imprecision, the comparison here is attempted by putting the philosophical ideologies in the modern education as baseline reference and samples of comparable references/concepts were identified from Ayurvedic literature. Extensive exploration of Ayurvedic references were not attempted to avoid elusiveness. It was only an attempt to hint on the comparability of philosophical traditions representing ancient and contemporary teaching.

Principles and process of learningas well as **Methods of**

transaction are two other domains being compared. These two domains are complimentary to each other. Each method of transaction will have a principle behind which indicates the method through which a learner imbibes the idea being transacted. As in the case of Philosophy of education, the methods of learning also is grossly classified and presented in educational Philosophy of the contemporary teaching. Such domains like Behaviourist approach, Cognitive approach and Constructivist approach are taken to consideration due to their primacy. Comparing such domains to relevant concepts in Ayurveda teaching was done. Constructivist approach was approached thoroughly considering its significance in the present study.

4.1.3. Discussion on results of comparison

4.1.3.1. System of Education

Comparison on system of education was done based on ten identified areas – Nomenclature of system of education, aims of education in each system, Nature of curriculum, relation to social structure, stages of education, nature of Guru-sishya relationship, role of student and teacher in transaction, students' autonomy, scope of collective thinking and scope of interdisciplinary approach. Nomenclature, such as Gurukula, Pathasala and Collegiate were considered during the comparison. Comparison of Gurukula structure with Kulaguru structure is worth mention here. The term Gurukula conventionally denotes an intimate family like system, more or less unstructured, whereas Kulaguru, the present day University structure headed by Vice-chancellor reminds more about a centralised and structure system[9].

The medieval teaching, primarily adopted its styles from classical age as Gurukula, and made some significant advancement in its structure through launching parallel structures like Pathasala, Madrassas and Maktabs which later offered better structure to the popular education[10]. In 18th Century, Macaulay called for an educational system that would create a class of Anglicised Indians who would serve as cultural intermediaries between the British and the Indians. After the introduction of British education, the numbers of these indigenous education institutes decreased drastically[11]. Even though The Jesuits introduced India to both the European college system and the printing of books, through founding Saint Paul's College, Goa in 1542, in the field of Medical Education, the first Institution was Madras Medical College established in1835. The educational system continued as the same after independence in structure, till 1988, when call for educational reforms became stronger in general education sector. National Curricular Framework (introduced as curriculum framework for quality teacher education in 1988) put forth some radical changes in the concept and content of education in general education, for some extent in medical education also. But, Ayurveda pedagogy remained as the class room bound, memory oriented and teacher centred one.

4.1.3.2. Comparison of Vedic and Ayurvedic methods of teaching

The gross comparison of Vedic and Ayurvedic tradition of teaching is given in the figure (Fig.4.1.1., Fig.4.1.2). Even though the gross system of education in Vedic and Ayurvedic teaching appears similar, by the system

and principles, Ayurvedic teaching is more based on practical demonstrative approaches, rather than the self-reflective practices mentioned in Vedas and Upanishats. Because, the aims of education in both slightly differ. This difference comes due to the difference in approach. In the initial phase of Vedic cult, represented by Mantra part of Vedas mainly dealt with the reciting of mantras as part of the yaga rituals, which necessitated mere utterance of the mantra. Mere memory oriented oral-hearing method was enough in this process. When the Vedic cult advanced to the Brahmana tradition, the mantras needed to be explained for their inner sense, their ritualistic application, and some sort of reflective practices came into the scene. Manana became absolutely necessary at this stage. It was during the next phase, where the masters went in search of the inner, deeper meaning that too in relation to the self-reflective mechanism, became imperative. Nididhyasana represented this need. Ultimately, when the seers enquired about the ultimate reality of the existence of the self and universe, in the Upanishat tradition, Nithyasana attained its most powerful personal enlightenment. After attaining such a personal self-realization, or even during the search of such a realization, during the later period of Vedic cult, also supported by Buddhist cult, paradigm was shifted to interactive practices, discussions (Parishath, Vakovakyam etc). Learning process attained the supreme status through this by this change.

In Ayurvedic learning, the process seems to be slightly different. Initial stage of rote learning was a basic requirement. The oral/memory oriented learning was the primary phase of learning. But, when advancing to

the higher level, Manana and Nididhyasana, self-reflective practices were replaced with early interactive practices and other types of reflective practices. Instead of introspective inquiry, Vaidyas needed inquiry based on man-nature mutuality and inclusive understanding of man in nature. External observation, simulative practices, demonstrative attempts, practical training and reflexive attitude became more important in medical practice. Immediacy in response became the most important part of learning. Even then self-reflective practices did not get withdrawn, but, shifted to the background. Nididhyasana, in Ayurvedic learning, is the attainment of clinical wisdom through practical experience and peer interaction. In that way, practical experience (karmabhyasa) and peer interaction (tadvidya-sambhasha) became the most advanced techniques of gaining wisdom in Ayurveda learning.

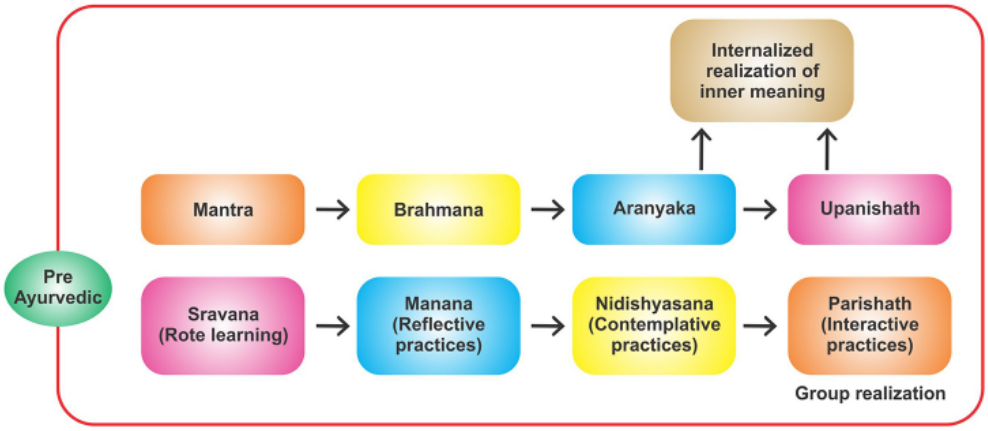


Figure 4.1.1 Comparison of teaching methods Vedic Vs. Ayurveda - 1

Even when learning / teaching methods in Ayurveda in its form and structure claimed to be the same as the Vedic cult sustained at the time of its emergence, there was substantial difference in the aim of the two.

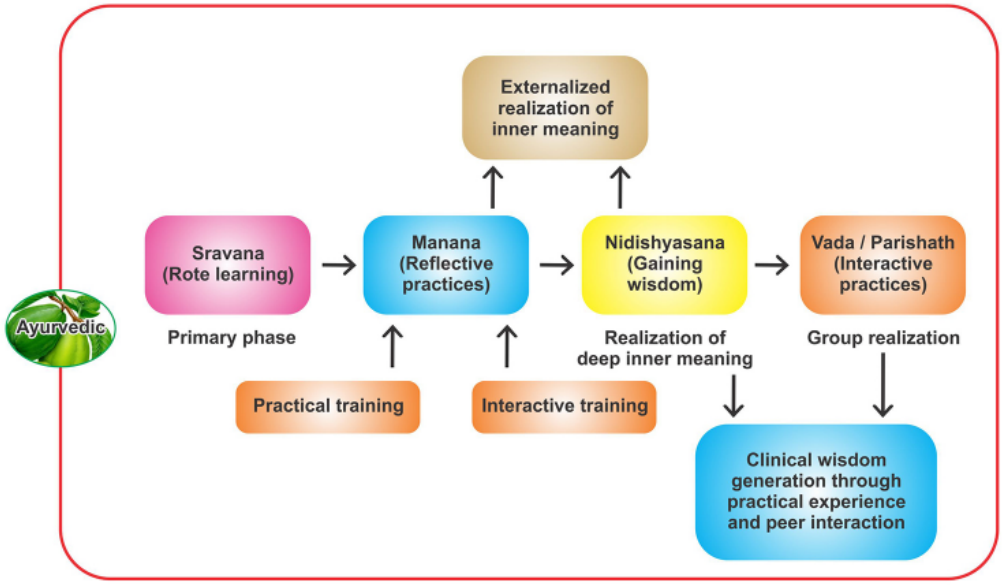


Figure 4.1.2. Comparison of teaching methods Vedic Vs. Ayurveda - 2

Starting with the same oral tradition, when advancing to the higher practices like Manana and Nidhyasana, their nature differed. The pre-Ayuredic style stressed on the self-reflective practices, suiting their aim of self-purification and attainment of ultimate emancipation. While coming to the mundane miseries related to diseases and their management, the practices totally was shifted to interactive demonstrative and externalized means, even though the spirit of manana and nididhyasana was preserved in all its learning practices.

4.1.3.3. Learning – formal and informal

On an early stage of civilization, process of learning was a truly informal discourse, something for adapting oneself to the life experiences to which a person was exposed. But later, learning became a formal discourse,

understood as being ultimately the nature of the Indian theory of knowledge and a part of the corresponding scheme of life and values. Such an education became structured into two main domains: Education for self-realization and education for livelihood. Education of self-realization was the superior one, designated as Paravidya, the superior learning, and the other as Aparavidya, the practical formal way.

Paravidya aimed at ultimate freedom from miseries, as described in Indian Philosophies in general, though the methods varied in different systems. Indian philosophies were called Mokshasasstra (Sciences for liberation) in this sense. The final settlement of such notions appeared in philosophical traits like Vedanta, where, the ultimate aim of education was thought to be realization of the Absolute (Brahma). Such knowledge (Brahmavidya or Brahma jnana) makes a man free from all sorts of miseries. In Sankhyadarsana the aim was freedom from three sorts of miseries (Trividha dukha) through identifying the nature as a combination of twenty five principles. In Yoga, practice of eight limbed Yoga (Ashtanga yoga) was the method, where the aim is same as the above. All other Darsanas, except Nastikas, agreed on freedom from miseries (emancipation, moksha, nirvana, nisreyas etc.) as the ultimate aim but the methods varied. Each system dealt with their own subject content (Prameya) stating that true knowledge on those content leads to proper liberation. In that way, content of each Darsana was strongly related to the ultimate aim of learning each of them.

Where Paravidya speaks about the ultimate philosophy of

education, Aparavidya speaks about attaining technical knowledge. In Ayurveda, terms like Jnana and Vijnana simulates the ideas of Paravidya and Aparavidya respectively. Jnana is self-realization (Atmajnana) and Vijnana is scientific knowledge (Saastrajnana). In the context of Ayurveda both are important. Ayurveda blends the utility of both the realms for practical purposes. Scientific knowledge without self-realization is said to be aimless. The healing property of Jnana and Vijnana is well explained. For treating diseases, especially those in mind, Jnana and Vijnana are equally considered[12] Atmajnana is explained to be one among the ways to get rid of diseases[13]. Aathmadivijnana, self-realization with reference to spatial and temporal orientation is said to be way to prevent any disease. In that sense, aim of attaining knowledge is to become resisted to any sort of disease both physical and mental. The same is said to be the aim of Ayurveda itself[14]. Knowledge is directly explained as the best medicine in Caraka Samhita[15]. Always, as dealt in Advaita, Avidya is said to be the cause for every misery. In Yoga avidya is mentioned to be one among five types of miseries (Panchaklesa). In all such situations, Vidya is the remedy. These facts are equally appreciated in Vedic system as well as Ayurveda.Buddhist system proclaims avidya as the root cause of misery (dukha). The master sentence uttered by Sreebuddha during his enlightenment declares Dukha as the nature of universe.

In short, the ultimate aim of education in ancient times was self-purification or self-realization, which can be attained through gaining practical and formal knowledge on different areas compatible for practically leading a positive life. The idea of “Tamaso ma jyotirgamaya” (not to the darkness, but

to the light) in Upanishats proclaims the ultimate aim of education. In Caraka Samhita, the same philosophy is stated as – Science is for showering light (S'astram Jyoti prakasartham).

4.1.3.4. Structure conveying levels of learning

The Vedic literature is divided into four main sections: Samhita, Brahmana, Aranyaka, Upanishath. The Samhita part, otherwise known as Mantra is meant mainly for memorizing and reciting the mantras. Brahmanas are their ritualistic interpretations. Aranyaka, as the name indicates, are more contemplative in nature, where the person should withdraw from mundane activities and reach in the forest to meditate on the meanings of the verses. Ultimately, Upanishats are the absolute search for knowledge about the real nature of the Universe. Simply, the four structural components of Vedas reflect hierarchical pattern of knowledge acquisition starting from simple memorization to complex contemplations. This highlighted a succession from simpler to complex hierarchy. Also, it is sequencing from rote learning to reflective and meditative thinking. In the same way, structure of Samhitas also conveys the method of learning the same. Samhitas usually adopt sequencing from simpler to complex, from fundamentals to applied and from preliminary knowledge to sophisticated knowledge. The classical learning method comprising of Listening (Sravana), Reflecting (Manana) and contemplating (Nididhaysana) also is related to different sections of Vedic literature. Sravana (learning, memorizing) for Samhita portion, Manana for Brahmana portion and Nididhyasana for Aranyaka and Upanishath.

4.1.3.5 Systematization of teaching methods

Brihat-trayee, especially Caraka Samhita is probably the first known source of systematic and sequential way of teaching and learning. In Vimanasthana 8th Chapter of Caraka Samhita, Roga-bhishak-jiteeya, the methods of learning (Adhayana), method of teaching (Adhyapana) and method of discussion (Tadvaidya sambhasha) are systematically explained. Explaining the methodological realm of the science was innate to the content of a Samhita, especially evidenced from Caraka Samhita. Not only teaching methods, other methods like discussion (vadamarga), methods of interpretation (tantrayukti), methods of research (chaturvidha-pareeksha) are also explained. Even though methods of transaction, system of education etc. are not direct content of Vedic literature (Vedic, Upanishat, Buddhist) reflections of the methods are abundantly available in the literature. Efforts of systematizing Vedic knowledge transmission can be seen in later addendum to the Vedic tradition namely Vedangas – Siksha, Kalpa, Vyakarana, Niruktm, Jyotisha and Chandas. Vedangas offer systematized understanding of Vedic material.

4.1.3.6. Process of learning

The classical method of learning explained in Vedic tradition are Sravana (listening), Reflecting (Manana) and Meditating (Nididhyasana). These three steps comprise of three stages based on the oral method of learning. Even though the above sequence is not directly accepted in Ayurveda as the method of learning, the three stages are mentioned at different accounts regarding the theories of learning. Mostly, these concepts are

described in the context of Smriti (recollection). Smriti is defined as the memorization of information gained through hearing, seeing and experiencing. Also, contemplation (satwanubandha) and meditation (jnanayoga) are said to be two among eight factors contributing to generate power of recollection (Smriti hetus). There is another hierarchy of learning viz. Adheeti (knowledge), Bodha (reflection), Acharana (practical application) and Pracharana (teaching, dissemination). It applies in Ayurveda also. Knowledge without application and application without knowledge are equally defective in medical practice.

4.1.3.7. Importance of collective thinking in knowledge dissemination

It was during later Vedic period and Buddhist period, importance came for collective discussions in knowledge generation and dissemination. Early Gurukulams typically proceeded with the domination of Guru, but later on turned to proliferate into small discussing groups, later to bigger groups and finally to Universities. This transition, widened in Buddhist era, which readily reflected in Ayurveda also. The Parishat system related to Vedic tradition, the Sangha cult of Buddhism typically repeated as Sambhasha parishath in Ayurveda. Importance of collective thinking was reinforced in Ayurveda in many contexts. The famous santimantra in Upanishats, “Om! Sahananavavathu…” proclaims the importance of being in a group for blissful existence.

4.1.3.8. Theories of cognition

Theories of cognition were a main subject dealt heavily in Upanishat literature, darsanik literature and naturally in Ayurveda. Process of cognition

described in Ayurveda has strongly influenced by those in Darsanik literature. Concept of collinear relationship of Manas, Indriya, Atma and Artha has been borrowed from similar principles in Upanishats and Darsana. Sankhya darsana, Yogadarsana and Advaita Vedanta influenced the formation of learning theories in Ayurveda. Involvement of Antahkarana, role of manas as Indriya, role of Atma in the process of cognition as the seer etc. came from Sankhyadarsana. Reflective practices like inference (anumana), analogy (upamana) takes the form in which it was described in Nyayadarsana. The debate practices which is well explained in Caraka Samhita as Tadvidya sambhasha in form simulates the way of Vakovakyam as evidenced in rough form in Upanishats (method of discussions as examples) and later formulated in structured manner in Nyayadarsana.

4.1.4. The comparative study as a resource to advance in the proposed plan of work

The comparison almost convincingly proved the comparability of ancient and contemporary methods and made sensible correlation between the two. When we plan to develop a new teaching model which adopts new generation teaching philosophy and strategies, naturally there emerge a suspect on how far an ancient knowledge system become compatible for modern teaching styles. But, the literary comparison sensefully corroborated the two systems to be at par in philosophy and methods. Moreover, by construct, Ayurveda seems to be more amenable for constructivist approach as well. So, the literary comparison could put a strong conviction about the feasibility of experimenting new teaching techniques to transact Tridosha sidhanta, especially through a constructivist approach.

Chapter - 2

DISCUSSION ON DEVELOPMENT OF NEW MODEL

The present study pertains to an area where there is a dearth of effective previous attempts, though the need and necessity was well received by Ayurvedic fraternity, especially after getting Ayurveda graduation streamlined with other medical streams in our country.Ayurveda education was a big concern in almost all the noteworthy efforts to renovate Ayurveda including different committees and councils. Standards of Ayurveda education, in terms of its content and infrastructure, were reviewed and redefined many times, especially after the inception of Central Council of Indian Medicine, but serious thoughts on teaching methodology were scarce. Recently CCIM agreed upon implementing student centered learning methods such as problem based learning, community based studies, case studies, self-directed learning. Kishor Patwardhan argues that suggesting teaching reforms without curriculum reforms is an unwarranted excercise. At the same time, from 1958 (Udupa committee report) onwards revival in teaching technology started as a point of discussion in educational scenario of Ayurveda Medical system. While medical education system, with reference to modern medicine, clearly identified the

necessity of new adult learning principles, Ayurveda couldn't sustain such practices in its teaching. The results from nationwide survey conducted by Kishor Patwardhan et al insisted on the same necessity to address the needs of new generation learners coming for learning Ayurveda. In a parallel scenario, from 1980's onwards, general education sector in India put much effort to revive priorities and practice of its pedagogy, which later in 2005 consolidated as National Curriculum Framework (NCF) clearly expected the learners to construct their own ideas by connecting new ideas with the ideas which they originally have, on the basis of materials/activities presented to them (experiences). Such a pedagogy, designated in different contexts as student centered, process oriented, activity oriented method, critical pedagogy etc. primarily assume constructivism as its basic philosophy. R H Singh (2015) aspired a reform which allows a transition from teacher-centered teaching (traditional) to student centered teaching and from directive teaching to inductive teaching to be vital in reforming teaching methods in the present era.

From the literary comparison of this study, it became evident that activity oriented learning system prevailed in ancient teaching as evidenced from Brihat-trayee. Teaching methodology is dealt as a distinct discourse in Brihat-trayee, especially in Caraka Samhita, as a system comprising of methods related to selection of a discipline by the learner (Sastrapareeksha), selection of teacher by the learner (Acharya-pareeksha), selection of learner by teacher (Sishyapareeksha), methods of teaching (adhyapana-vidhi), methods of learning (Adhyayana-vidhi), looks into every possible aspect related to pedagogy, in an

integrated way.The formation of such a system could have been influenced by the interactive nature of the then existed pedagogy, followed in Upandishath and Budhist traditions. Darsanas (Indian Philosophies) also have an intensive relationship with the concepts regarding materials and methodologies in Ayurveda.The epistemological narratives in those philosophies laid the foundations to process of learning applied in Ayurveda also. Knowledge (Jnana) and its accomplishment was one major concern of Darsanas. So, naturally, in the premises shaped greatly by such philosophies, Ayurveda also incorporated such considerations in its descriptions. As a naturalist discipline, Ayurveda observes nature as its resource for two important aspects:(1) in an ontological perspective; as one for obtaining materials (herbs etc.) for its applications and (2) in an epistemological standpoint; for understanding and explaining the human body in terms of different phenomena simulated from nature around. Such a naturalist learning always lays significant scope for constructivist approach of teaching and learning. Because, basically constructivist methods allow the learner to observe the surroundings, experience nature's changes and reflect on those experiences. There are valuable attempts to read constructivism as a naturalist paradigm in education and research[1]. Reflective practices play a great role in such learning processes, which, according to D.K. Srinivas et al (2009) is one of the desirable features of medical teaching. In such a background, as internally consented by the traditional system of transaction, potentiated by the contemporary practices related to the constructivist method, the present study introduced a new model, ideally featuring the principles adopted therein.

4.2.1. Why is the new model designated as "innovative"?

From many meanings/synonyms of the term "innovative", those relevant here are: "unconventional", "futuristic", and "radical"[2].The new model is "unconventional" in two ways: (1) that in relation to Aurveda pedagogy (2) that in relation to models of instruction, explained in contemporary teaching

(1) In relation to Ayurveda pedagogy, the new model tries to introduce many new practices such as modular teaching, constructivist approach, unconventional teaching strategies, adoption of proven theoretical constructs related to education, adoption of newer methods in assessments and activities etc.

(2) In relation to models of instruction, though the present model adopts the structural integrity as a conventional model, it tries to integrate traditional methods related to Sloka learning with contemporary methods of instruction. Hence, the model was designated as an innovative new model instead ofcutting it to suit a ready-made one.

The model is "futuristic" in the sense;it travels ahead of its time, by providing sense of direction to the future endeavors related to curricular reforms. Vision document prepared by Central Council of Indian Medicine envisages some important change overs in the curriculum in future, which, as already discussed, are reflected in the present model.

The new model offers “radical change” in the present pedagogic practices in the form of (1) strengthening participatory and constructivist nature in learning of Ayurvedic concepts (2) reversing the direction of instruction from “sloka to meaning to application” to “application to meaning to sloka” (3) integrating various epistemological constructs, relevant in the context of teaching and learning, to the concept learning process in Ayurveda.

4.2.2. Tridosha as a model concept

Tridosha sidhanta typically bears the philosophical and biological identity of Ayurveda. It is a single theory to explain human biology with reference to multitude of attributes to which it is related such as physiology, psychology, pathology, personality, environmental influences, climate, life cycle, cognitive mechanism and so on. When modern science count precision and specificity as benchmarks of an ideal concept, concepts like Tridosha, owing to its complexity stands away from such premises. It is always better to consider theories like Tridosha as an abstract type of concept. While coming to the method of transaction, it will be always ideal to consider some assumptions regarding the probable phases of its development (Fig. 4.1). It starts from the prime assumption that human being is an epitome of universe. By this rule, natural phenomena replicates in the human body. Such three principles are primarily assumed, nominated by terms denoting prime characters (movement, digestion and accumulation),then put for further enquiry about the differences they show while functioning inside human body. Derivation of further offshoot concepts (like five divisions, their interactions etc.) are

formulated as a part of advancement in the content of the theory.The conceptual basis of Ayurveda was an extension of then existed philosophical platform (Darsana). When theories like Panchabhuta, Triguna etc. were adopted directly from such philosophical systems, Ayurveda formulated its own theories like Tridosha as derivatives of the former theories. As already explained, Tridosha is a single concept to explain human body in relation to as much variables to which it has exposure as possible. Such an indefiniteness of the concept put itself to the category of abstract concept. The derivation of the theory can be represented as follows.

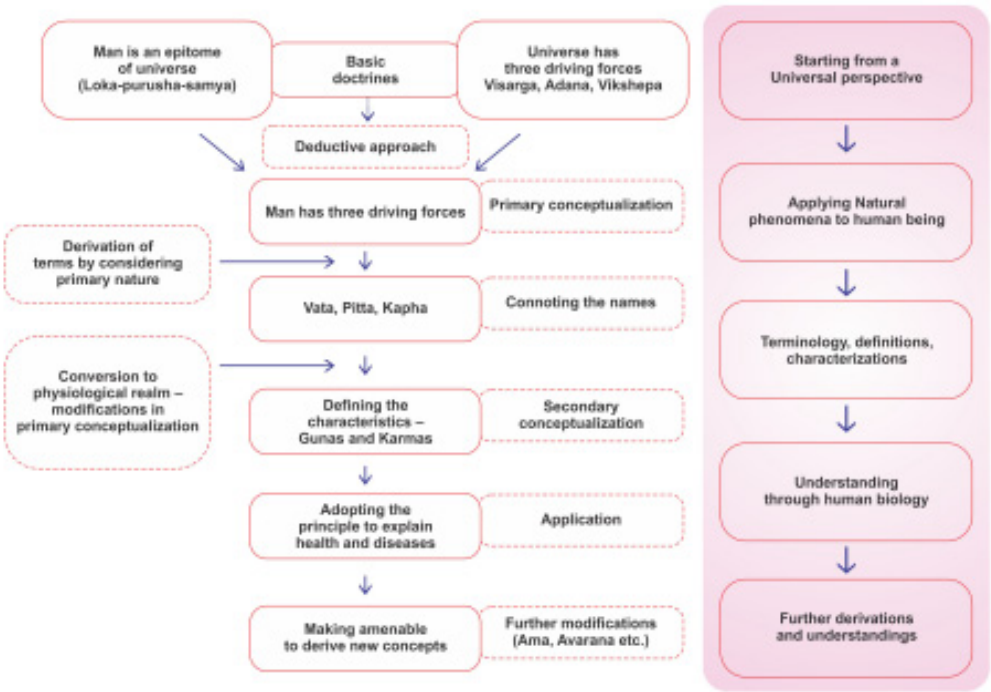


Fig 4.2.1. Theoretical deduction of Tridosha Sidhanta

4.2.3. Evaluation Research – in the context of the present study

Evaluation research is defined as a type of research that uses standard social research methods for evaluative purposes as a specific research methodology and as an assessment process that employs special techniques unique to the evaluation and social programs[3]. Of the two types of evaluation such as formative and summative, in formative evaluation, programs or projects are typically assessed during their development or early implementation to provide information about how best to revise and modify for improvement. This type of evaluation often is helpful for pilot projects and new programs, but can be used for progress monitoring of on-going programs[4]. In the present study, formative evaluation pertains to a new program.Steps in formative evaluation are: (1) Needs assessment, (2) Evaluability assessment, (3) Structured conceptualization, (4) Implementation evaluation and (5) Process evaluation[5].

4.2.4. Discussion on the steps involvedin development of the new model

In this study the concept, content and construct of the new model have been developed through a series of steps which come under qualitative research. As per Tashakkori & Teddlie (1998:47), in the context of Social Research, researchers may start with “qualitative data collection and analysis on a relatively unexplored topic, using the results to design a subsequent quantitative phase of the study”. This phase,technically known as pilot study might involve using in-depth interviews, focus groups, questionnaire survey

etc.[6]In the present study, which is more reasonably a research in social domain, that too in a minimally addressed area, such methods of qualitative research seemed to be highly significant. According to Berg, Bruce L,Qualitative Research approaches are employed across many academic disciplines, focusing particularly on the human elements of the social and natural sciences such as political science, sociology and education[7].

In the preparatory phase of the new model, the qualitative methods were adopted in such a sequence that made a successively consistent consolidation of ideas. The first exercise, brainstorming, was conducted among students. Students, being the ultimate beneficiaries of any new program in education, can be considered as a resource for providing gross comments on necessity and nature of a new program, even though they prevail with marked imprecision and lack of authority. This problem was overcome by the second phase, where teachers, who are competent to make precise comments, are engaged to make more specific comments through conducting a survey based on a predesigned questionnaire. The third phase Focus Group Discussion panelized experts from different areas related to pedagogy and discussed the scopes and issues in realistic grounds and to derive practically feasible outline. In the fourth phase, a pilot trial, a miniature of new model was practically implemented to assess its feasibility.

Instead of in depth interview, brainstorming, a group creativity technique, is selected as an effective method, by which efforts are made to

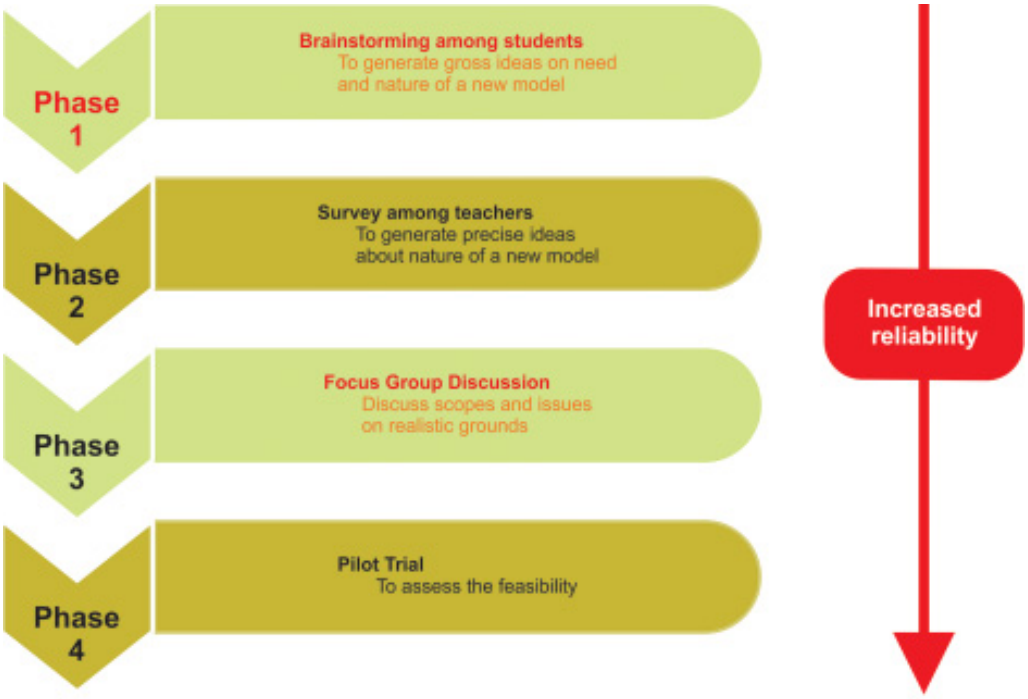


Fig. 4.2.2. Successive consolidation of ideas through Qualitative methods

find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members[8]. The spontaneous response from the student community was invited through the sessions. Apprehension towards the learning experience varies in UG and PG levels. So, it was conducted in separate groups.

4.2.4.1. Survey among teachers

The survey among teachers was conducted as a part of evaluability assessment of the proposed program. Evaluability assessment tried to derive an idea about the feasibility of the new model and how experts can draw an idea about the usefulness of the program. Survey invited more concrete ideas regarding the need, methodology, content, style and nature of the model to be evolved. To make it more concrete and specific, a structured

questionnaire was used which addressed different aspects of feasibility, content and construct of the new model. Teachers with a good range of teaching experience participated in the survey, irrespective of the department. Tridosha sidhanta, being a basic concept in Ayurveda, applies to all the specialties, so that, any teacher from any department has their own apprehension on the subject. The questionnaire directly put their contemplations to specific issues related to the development of a new model such as agreement with the need, feasibility of the new model, probable content of the new model considering it as an induction program, feasible learning outcome, probable teaching strategies, and nature of assessment.

4.2.4.2. Focus Group Discussion

Focus Group research, as per experts in the field of social research,draws ideas about the feelings, attitudes, experiences and beliefs on the reactions which are practically unattainable through other methods such as observation, interviewing, or surveys[9].Powell et al define a focus group as a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research. (1996: 499). Focus groups depends on interaction among the discussants related to the topics suggested for discussion. (Morgan 1997: 12). Hence the key characteristic which distinguishes focus groups is the insight and data produced by the interaction between participants(ibid). Kreuger (1998) explains the advantage of Focus groups to be useful different stages of implementation of a new program such as

preliminary or exploratory stages. In the present study, Focus Group Discussion was conducted not as an initial experiment, but as an intermediate application to evaluate the outcomes from previous steps like brainstorming, survey and preparation of the pilot module. Race et al 1994, substantiate such sequencing by observing “Focus Group can be done perhaps to evaluate or develop a particular program of activities” (ibid). The discussants of the present Focus Group are homogenous in the sense, all of them could discuss on a new model on the basis of their experience.Inputs from multiple corners were inevitable in developing new model, because such attempts were rare in the field of Ayurveda. Students’ participation also was compulsory to get the feelings and attitudes reflected from the part of receiver end of such program.This exercise helps stakeholders define the package, the population targeted and probable effects. Defining the program was considered vital among them.

In Focus Group Discussion sociogram is used toconceptualise group dynamics, draw comparisons between focus groups as well as to reflect on facilitator technique. While observing the pattern of interaction, the lines in the sociogram are not symmetrically distributed, but, definitely all the participants responded at least once. Nine out of twelve discussants had almost equally distributed participation in bringing out discussions whereas the others attempted minimally in the discussion (D3, D4, D5, D6). By weightage, those who participated actively (D1, D2, D3, D8, D9, D10) had almost equal contribution to the discussion. Moderator could equally divert the discussion not to become skewed to one side. One subject expert, one

physiology teacher, UG student and PG student are those who had lesser participation in the discussion. All other experts actively participated. As per the report, even those who did not participate actively in the discussion also had ideas contributed in their own turn. The group dynamics shown by sociogram promises the quality of observations made in the discussion.

4.2.4.3. Pilot Trial

The pilot trial was done as a part of implementation evaluation to monitor the dependability of the package in a real situation. The following reasons for conducting a pilot study, as reported by Edwin R Van Teijlingen et al are highly significant in the present context: (1) Developing and testing adequacy of research instruments (2) Assessing the feasibility of a (full-scale) study/survey (3) Designing a research protocol (4) Assessing whether the research protocol is realistic and workable (5) Establishing whether the sampling frame and technique are effective (6) Assessing the likely success of proposed recruitment approaches (7) Identifying logistical problems which might occur using proposed methods (8) Estimating variability in outcomes to help determining sample size (9) Training a researcher in as many elements of the research process as possible (10) Convincing other stakeholders that the main study is worth supporting[10]. A pilot module for three hours was developed for the pilot trial, as a miniature of an extensive module to be developed. The module incorporated as much interactive strategies as possible within three hours duration. Previously unexposed learners were selected for the program. +2 students and I BAMS students were selected

for the study, not intentionally to compare the results, but to have a gross impression on how the effect of delivery varies if the learners are predetermined to receive Ayurvedic content when compared to a group which receives the content as additional information to the existing pedagogy.

4.2.5. Discussion on observations from different stages

The brainstorming set forth ideas such as absence of real life examples, disregard to the previous knowledge of the learner, undue importance to memorization, lack of conformity with ideas learnt in higher classes, discouraging the questioning attitude of the learners, non-adoption of newer methods to transact concepts. Kishor Patwardhan et al (2009) already observed the issues of undue importance to memorization, discouraging the questioning attitude of the learners, non-adoption of newer methods to transact concepts etc. in a survey conducted among students all over India[11]. In the recommendations National Curriculum Framework it significantly ascertains the importance of real life examples (connecting knowledge to the life outside the school) in educational system[12]. Disregard to the previous knowledge of the learner comes to the context of Ayurveda in the form of neglecting the PCBM basis of the learner, especially during the induction period.Ambiguity created by abrupt introduction of new concepts without considering learners level of understanding was frequently reported by learners during different discussion platforms[13]. While describing the need of Transitional Curriculum, Richard L Butt, the famous Educationist from

Canada observed that one of the guiding principle of this method is "to start from where the learner is"[14]. The question of integration of Ayurveda knowledge with the modern science was a point of debate in almost all discussions regarding educational reforms in Ayurveda. Even though Ayurveda and Modern Science have two epistemological identities, the scope of integrating them is trialed well by a few authors[15]. Adoption of newer methods, as stipulated by the students, is what the new model all about.

Survey among teachers generated more precise ideas about new model in relation to the need, feasibility, probable content, probable teaching strategies, and nature of assessment. Degree of agreement among teachers varied in different points of discussion. Great majority agreed with the need and feasibility of a new model. Even though, criticism on the present teaching methods was raised in previous survey attempts with a stronger evidence[16], agreement of the teachers with new method and its gross feasibility was not addressed there. In the present survey, almost all teachers agreed with the idea that Tridosha should be transacted in activity oriented fashion and they deemed it to be feasible also.In the FGD (Focus Group Discussion), this agreement was considered to be valid and discussed the practical implications of realizing the new model. The pilot trial implemented it in realistic grounds. In principle, the literature review strongly suggested the agreement of our classical literature in favour of activity oriented learning.

Regarding the theoretical orientation suggested for teaching Tridosha to a new comer, during the survey,majority of teachers agreed to

stick on to the Gunas and Karmas of Doshas in normal human body that too with a biological perspective. In FGD, the same notion was reinforced, by suggesting to create a Guna paradigm first and then to proceed onto Tridosha. Some of the topics like symptoms of variations of Tridosha (Vridhi-kshaya-lakshana) were suggested to be learnt through CBL (Clinical Based Learning). Yet, minimal agreement was noted for "eliciting doshik symptoms in patients" while selecting the learning outcome of new teaching model. Early exposure to clinics is claimed to have positive effects on the performance and confidence of medical students[17]. As reported in previous studies, in modern medicine, non-clinical subjects like Anatomy and Physiology are better learnt when they are transacted through clinics[18].In Ayurvedic field, many experts opine to choose early clinical exposure as an ideal method, but, never came out with a model. The vision document prepared and recommended by CCIM in 2016, emphasized the importance of an early exposure to clinics[19]. That simply means, for a new comer, as a part of an induction program, clinical observations can be used for convincing the ideas conveyed. Further, during FGD, this point was discussed and suggested not to introduce new comers to clinics at an early phase such as three months of their admission. While dealing with Ayurvedic content, which is unfamiliar for the learners, speaking an entirely different language about a preconceived object, ie human body, may create cognitive dissonance very easily. Cognitive competences of a person represent one of the major psychological resources by which person actualizes oneself, exercising initiative and creative behavior, on which depends the

achievement of performance effectiveness[20]. In such a situation, building a logical background of the new paradigm through observations in the physical premises (ie, the nature around) will be more ideal than direct exposure to clinical settings. This becomes more important in the very early phase of their study. So, in nutshell, even though exposure to clinics is important in learning Tridoshasidhanta, initially the learners should be exposed to natural premises to build up a new paradigm, then exemplify them and healthy individuals and finally taken to clinical settings.This approach absolutely adheres to the methods mentioned in Ayurveda viz. *Nature is the best teacher*[21]. The concept of Prakriti can be easily adopted to build up Tridosha paradigm through observing healthy individual or even oneself. So, in the pilot trial, which was a miniature of the new model, this step was considered to be primary, also considering easiness in implementation.

Regarding **importance of sloka learning**, two aspects are usually discussed: (1) The importance of sloka as a content of learning (2) The importance of *by hearting* as a method of learning. In the present survey, the question was, when Tridosha learning is moving on to a new method, an activity oriented method, should the sloka learning be a part of the new method or should it be a separate exercise? Majority (65%) agreed with the first option. This indirectly reinstates the importance of sloka learning in Ayurveda. But, question of how to make sloka learning activity oriented is unanswered. Usually, slokas are learnt through rote method (repetition). Repetition (*Abhyasa*) is said to be one among methods for creating good memory[22].

While commenting on the **probable scheduling** of the new model, majority of the teachers agreed to couple the module with the prevailing time table of BAMS, at an initial phase. A separate induction program was the other option given. Teachers as well as students had been placing a long term demand before the syllabus policy makers for introducing an induction program or fresher's course, which aims at familiarizing Ayurveda to new comers,to avoid abrupt transition from their previous learning experience.As a result of such a long cherished aspiration, in 2016, while recommending reforms in graduate courses in ASU, two weeks' Fresher Orientation Course (FOC) had been visualized with an aim of preparing a student to study Ayurveda[23]. While framing such a course, definitely Tridosha sidhanta could have been considered as its prime subject because Tridosha sidhanta by itself is a theory which would familiarize almost all aspects to be introduced to a fresher such as – man-nature mutuality, Ayurveda biology, concept of health and disease, philosophical dimensions of Ayurveda and even introducing Sanskrit (by dealing with relevant slokas). But, unfortunately, the Council failed to implement such recommendations in time. Hence, suggesting a separate induction program for introducing Tridosha was practically impossible. Moreover, during the Focus Group Discussion, educational experts suggested not to put an extra burden on the students by implementing the new program, which is not a part of routine program and assessment.So, implementation of the new model was considered along with the prevailing curricular framework.

Regarding **assessment**, during the survey, majority of teachers selected achievement test (objective) and students'feedback proforma as the most suitable methods to assess the effect of the new model. Since any new intervention intends to make changes in learners' knowledge, skill and attitude, conventionally, evaluation also needs to address these three domains separately. Evaluation is formative when it identifies areas where teaching needs improvement and summative, where one judge the effectiveness of teaching[24]. According to Edwards, evaluation seeks to "describe and explain experiences of students and teachers and to make judgments and (interpret) their effectiveness"[25]. Primarily, two types of evaluation makes the purpose served – one is the evaluation of knowledge attained through the program and the other is change in attitude measured by the learners themselves. The achievement test and feedback proforma respectively serve the above purposes as agreed by the teachers in the survey. In FGD also, these two methods were recommended for assessment. In pilot trial, for practical reasons, feedback assessment only was performed.

During the survey, responses on selection of teaching strategies were inconsistent. This may be resulted from unfamiliarity of teachers about different types of teaching strategies. Still, some of the selections are noteworthy. Didactic lecture in transacting etymology of Tridosha, Clinical Based Learning and simulation techniques in transacting unnatural variations of Tridosha (vriddhikshaya lakshana), role play in teaching Prakriti, case simulation in subtypes of Tridosha are examples. Need of shift from didactic lecture to illustrative methods is evident in such suggestions. The survey

results definitely reflect teachers'aspiration to bring out changes in teaching strategies. Failure of present teaching methods in inculcating scientific spirit and scientific values in young students was a serious point of concern among teachers as reported in nationwide survey conducted by Kishor Patwardhan et al (2009)[26]. This survey reported the same need from the part from students with increased intensity.In the present study, spirit of students participated in the brainstorming also was the same. The FGD strongly recommended technology enabled teaching while preparing the new model. The pilot trial incorporated these suggestions in their limited feasible scope with the content delivered.

Content of the model for transacting Tridosha sidhanta was another area of discussion in survey and FGD. In brainstorming, this aspect was not discussed, considering learner's incapability in commenting on such a technical aspect. Strictly speaking, subject experts are the right persons to comment on content of the new model. In the case of Tridosha sidhanta, owing to its formative nature, it pervades to almost all clinical subjects dealt in BAMS curriculum so that any teacher can authentically comment on the content of the subject. Moreover, comments from teachers dealing with clinical subjects and specialties were considered decisive, because they could share their views based on the clinical / practical utility of the topic. That was why selection of ideal content was put in the survey as a question. Teachers were asked to classify the given subtopics into two groups – those suitable for an induction course (within one month of admission) and those suitable for an advance course (within six months). Almost all teachers agreed to the same

group wise allocation of subjects.The sequencing of the topics in the induction course, as agreed by majority of teachers was etymology, biological understanding advancing to Guna, Karma, Prakriti, symptoms of variations (vridhi-kshaya lakshana) and subtypes of Tridosha. In FGD, further minute aspects were not discussed; instead, there was a general agreement to build up the concept of Tridosha in the background of Guna. In pilot trial, minimal content such as etymology, biological understanding and Gunas of Doshas were introduced. Here, instead of putting Guna, Prakriti was put as the background, to make an easy and appealing entry to the subject, within a session of three hours. Prakriti was considered to be more compliant in making instant impression on a new comer in a minimum time span when compared to Guna spectrum.

Focus Group Discussion, being a forum of experts in the fields concerned could offer deeper contemplations on some specific issues to be taken care of. **Importance of reflective practices** in process of learning was one among such an area stressed on by FGD. Reflective practices impart special notice of the practical values and theories which pertains to daily activities, by examining it reflectively and reflexively, which leads to developmental insight[27].In this practice, a teacher who approach their own role as that of "facilitator of meaning-making" can succeed well and to organize instruction and class room practice so that students are the producers, not just the consumers, of knowledge[28].As an important strategy of teaching reflective practice is highly relevant in classes which makes health

professionals who embrace lifelong learning. Health care sector is an ever changing and continually growing sector; hence,it demands expertise from its professionals. Definitiely they will be highly benefitted through the reflective practices[29].Reflective practices become an essential component of constructivist model because in that model learners are producers or constructors of knowledge.

Another area deserving deliberation was **defining nature of conventional teaching**. Ayurvedic literature is in the form of Sanskrit slokas, especially in Ashtangahridyaya, the textbook prescribed for learning Tridosha sidhanta for a beginner. Conventionally slokas are taught in a particular sequence such as recitation of sloka, construction of prose order (anvaya), connoting the meaning of the prose order (anvayartha), other implication of the sloka (bhaavartha), knowledge of relevant commentaries on the sloka (vyakhyana) and by-hearting the sloka. As per Paribhashendusekhara of Nagesabhatta, an authentic textbook describing methods of preparing commentary for Slokas, the methods of interpretation is said to have components like splitting of words (padacheda), exposition of meaning (padarthokti), elaboration of combined words (vigraha), proper arrangements of words to make a sentence (vakyayojana), discussions in the form of queries (akshepa) and clarifications (samadhana)[30]. This was traditionally the method adopted during Sanskrit education all over India, especially in Gurukula system and early Pathasala system. A standardized explanation of slokas were enabled in classical scientific literature with the help of Tantrayukti, which

can be presumed to be a system prevailed during classical learning of Ayurveda as evidenced form major classical textbooks like Brihat-trayee[31]. This method is more or less related to the linguistic exposition of Ayurvedic materials, where as in the contemporary Ayurvedic classes, teachers try to incorporate their own interpretation based on clinical experience and logical reasoning. Along with that the linguistic approaches like semantics, semiotics, tantrayukti etc. were relegated with respect to their application in regular Ayurveda classes now a days. On the other side, the explanations of concepts and principles like Tridosha or Pancha Mahabhuta varied to larger extent from one teacher to another, making these theories further confusing and vague[32]. The ancient method of sloka learning had its own standards even though it kept a linguistic approach to learning, but, the teaching styles presently available as convention in Ayurveda classes are weakly standardized and less systematic in both linguistic and interpretation aspects. According to the reports of the above survey, memorizing the classical Sanskrit verses is unduly emphasized in Ayurvedic method of teaching, making the process of learning difficult. When students agree with the above observation, teachers tend to disagree significantly[33]. In the survey conducted in this study also, teachers mostly insisted to include sloka learning as a component in the new model. During FGD, it was pointed out that it is not the problem with by hearting sloka, but that with lack of bridging between by hearting and its application.

Regarding **theoretical orientation**, in teachers' survey, Guna and Karma of Doshas are mentioned as the areas to be stressed during the

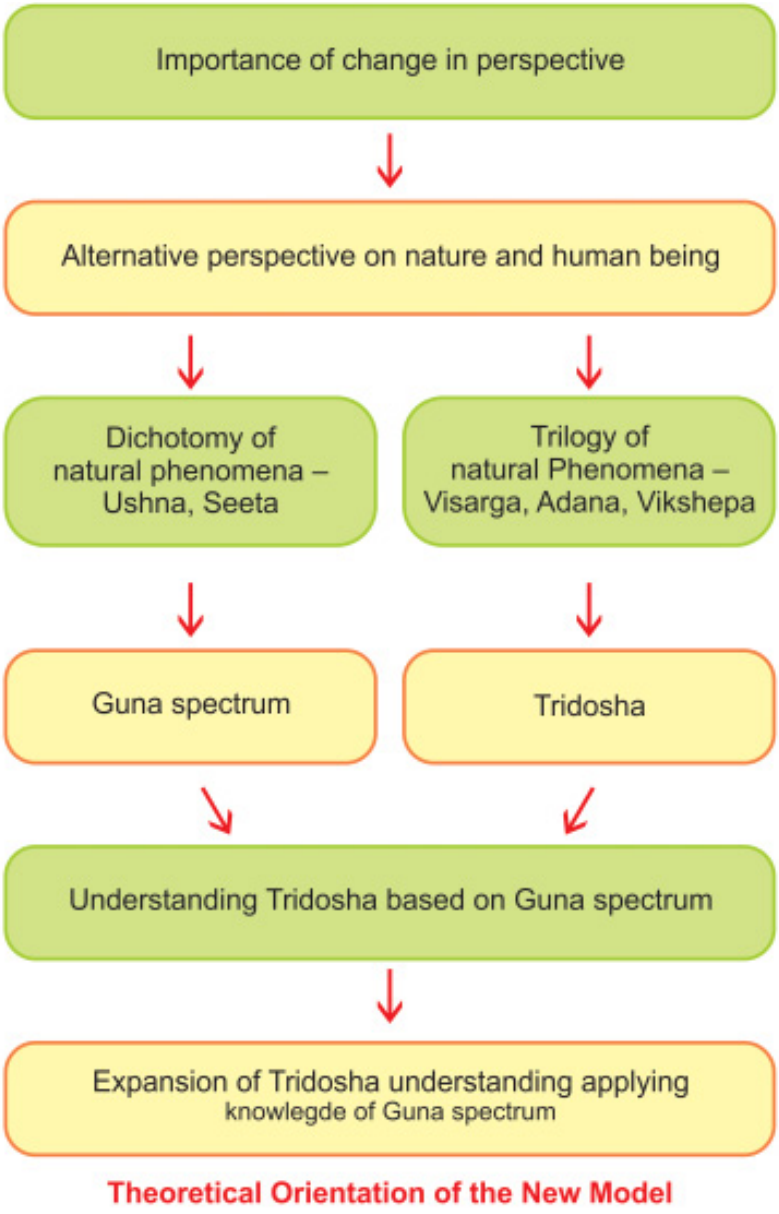


Fig. 4.2.3. Theoretical Orientation of the New Model

introduction of new model. Further in FGD, Guna based learning of Tridosha was suggested as the best method. Guna is a broad perspective through which concepts regarding external environment as well as internal environment are developed. External environment includes food, drugs, climatic, diurnal

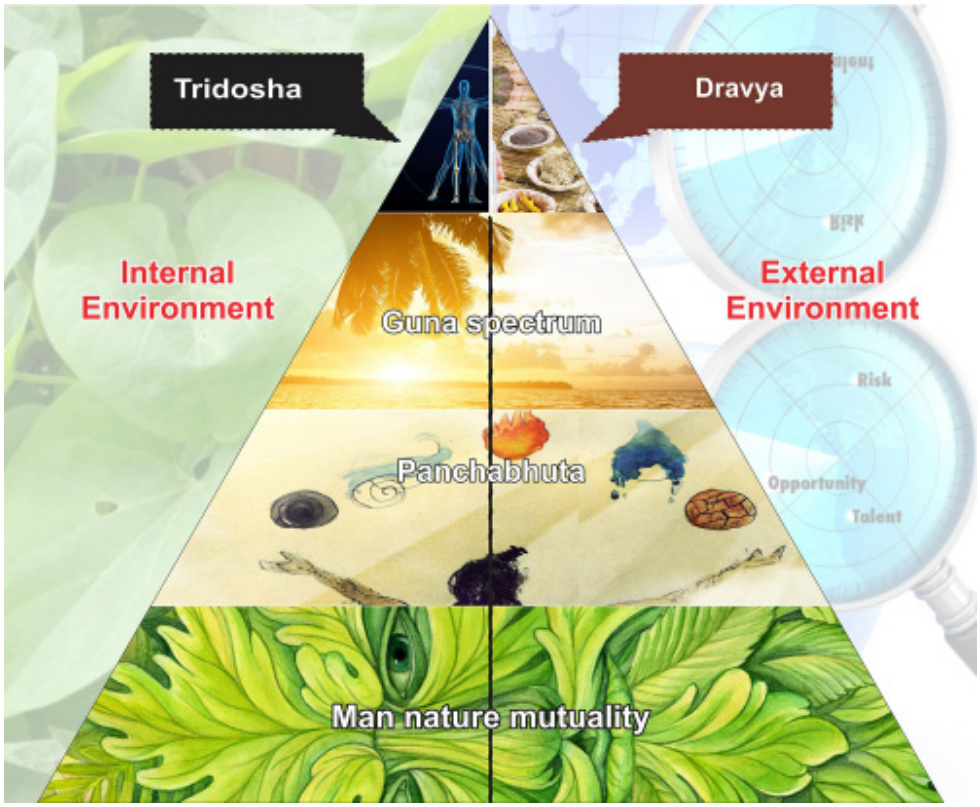


Fig. 4.2.3. Hierarchy of Man-nature mutuality

influences etc. which readily affect the internal environment of human body sustained through Tridosha, Dhatu, Mala etc. Guna is the common base for both. To make it clearer, the external environment represented chiefly by Dravya consumed as food and drug makes changes in internal environment represented by Tridosha on account of the common base, ie, Guna. In such a situation, when planning a new method for transacting man-nature mutuality, it is always ideal to generate Guna perspective initially and then proceed to Tridosha. In the pilot trial, it was tested in a minimal level, where Guna perspective was built up based on the Dehaprakriti concept and then proceeded to Tridosha concept.

Table 4.2.1. Summaryof inputs from different stages of developing of the new model

Topic of discussion	Brainstorming	Survey among teachers	Focus Group Discussion	Pilot trial
Need of the new model	Strongly suggested the need by commenting on the problems in present teaching technology	100% agreed with the need either strongly or moderately	Discussed the need with probable solutions	Addressed the need with a feasible solution
Feasibility of a new model	Was not an intention of the discussion	Agreed the feasibility either strongly or moderately	Considered practical aspects to make the new model feasible	Tested the feasibility with a miniature model
Defining the gross nature of new model	Should ensure active learning, questioning attitude, adopting new teaching methods	Formulated skills expected after learning through t new model	Should promote reflective practices, better combine traditional method and newer strategies	Activity based approach combined with sloka learning
Content of new model	Not addressed	Suggestions received on prioritizing he content	Clarity on sequencing the content	Minimal content fixed in the module
About clinical based learning	Hinted on early exposure to clinics	Stressed on clinical learning, especially some important topics	Agreed with CBL but discussed its limitations for the beginners	Tried pre-clinical introduction of Tridosha considering the practical implications
Putting Guna as the central idea of constructing new concept of Tridosha	No comments	Importance of Guna and Karma was stressed	Guna basis was suggested as the background to learn Tridosha	Tried to bring out Guna pattern of Dosha as a baseline
Selection of teaching strategies	Real life situations should be incorporated during teaching	Strategies selected according to content being delivered	Strongly suggested technology enabled transaction	Transaction based on Praktiti to put real life situation
Gross theoretical orientation of the new model	Not attempted	Guna-Karma based learning of Tridosha	Learn Dosha through Gunas	From Prakriti to Guna, thento Doshas
Methods of assessment of the new model	No comments	Achievement test along with feedback from learners	Agreed with the same	Feed-back proforma only included

4.2.6. Discussion on methodology of structuring the new model

Structuring and implementation was taken as the final step of the development of the new model, technically, the stage of Process evaluation. Findings from all the previous exercises including the inputs from literary review influenced the final formulation of the new model in one way or other. Steps involved in this process was (1) Framing guiding principles (2) Fixing the content and construct (3) Writing as a document (4) Review by experts (5) Experimental trial using the new model.

All the reports of the previous steps were considered while preparing the guiding principles. Finalization was done after discussion with educational expert. This was to (1) ensure the consistency and reliability of the opinions collected and (2) to decide the authority and priority of different suggestions obtained from previous exercises.

Fixing the content of the module needed intensive deliberation from the part of scholar and guide, because, the present teaching premises related to Tridosha sidhanta does not support topic wise study of the content, instead, offers chapter wise study (chapters in Ashatnaghridaya sootrasthana) where different aspects of the concept fall at different points of the whole span of content delivery. For example, Gunas of Dosha, normal fluctuations of Dosha, relation to geographical pattern etc. fall in first chapter of Sootrasthana, normal and abnormal activities of Dosha in 11th chapter, locations and types in 12th chapter etc.Collection and consolidation of content from different corners

was the first attempt in preparing the new model. Essential background learning about perspective change, concept of Trilogy, natural influence on Tridosha etc. are not a customary content of the present teaching practice. In the new model, which aims to formulate a transition curriculum, such contents are highly necessary. Sometimes, relevant contents from other textbooks like Caraka Samhita, Susruta Samhita need to be adopted to get a comprehensive form for the new model. Concept of configuration of human body from Caraka Samhita, etymology of Tridosha and Concept of Trilogy from Susruta Samhita etc. are a few examples. The above observations intensifies the necessity of (1) converting the preference of pedagogy from textbook oriented learning to subject oriented learning, especially in the initial stage of Ayurveda curriculum (2) incorporating essential background knowledge for preparing the learners to redefine their perspective thereby accommodating new paradigm.

The model was written as a document, which is a self-explanatory, ready reference document to facilitate open implementation by another instructor in a different setting. Usually a teaching module has five components such as (1) Aims and learning objectives (2) Course content (3) Teaching methods and resources) (4) Assessment (5) Monitoring and review[34]. The present model follows this typical pattern, with necessary modifications as demanded by the situation. In the current scenario of Ayurveda pedagogy, modular teaching is presumed to be atypical and unfamiliar to the instructors when compared to their regular teaching activities. When a new module/

model is introduced to such a teaching community, it should contain transparent descriptions to convince them each and every aspect of the model.This need was met by (1) inserting precise and ready to use materials in the form of power-point slides (with pictures and diagrams) (2) portraying the scene-by-scene incidents expected in the classes and (3) summarizing the expected outcomes of different activities.

Defining and stating the learning objectives, though considered as the primary step of any instructional plan, is not dealt seriously in Ayurveda curricular framework so far[35]. This lapse affects the precision of the content and assessment. Learning outcomes have become pervasive within worldwide curriculum policy in recent years. There are many potential benefits for this move, as it shifts the focus from providers to users of education, and it introduces a common language, addressing issues of progression, transparency and equity (CEDEFOP, 2009)[36]. The importance of integrating the curriculum with goals, general objectives and specific objectives had been vividly explored while preparing the guideline for Graduate Medical Education (1997) by Medical Council of India[37]. The present model made a clear attempt to define the overall and unit wise learning objectives, more or less measurable and precise.

Background of the new model, described in the introduction part in the document, precisely describes (1) relevance of reviving teaching technology (2) concept of teaching model in education (3) key principles adopted in the preparation of new model (4) method adopted for developing

new model and (5)sequence in structuring the model and credentials of the model. This description along with note to the instructor serves to (1) edify a new instructor about the relevance; sequencing, background and purpose of the content in the model(2) fill the gap that instructors suffer in the absence of educational training in their educational career.Teachers' training is becoming more and more essential in medical teaching. As reported in the medical education sector, until recently teachers used to teach as they were taught; no formal training program existed, and is really not trained to teach[38]. As a result of long lasting demand for rectifying this dearth, Medical Education Departments were established in medical colleges in India. In Ayurvedic education sector, recently Central Council of Indian Medicine organizes training sessions for teachers on teaching methodology. Still, there is acute demand for teachers' training sessions in AYUSH stream.

Review of the written document was done by three experts. Extensive review procedure or validation process was not attempted for the new model considering high efficiency of preparatory steps involved in the development of new model.

4.2.7. Discussion on structuring and implementation of innovative model

4.2.7.1. Model, Module and Package

As per definition, an Instructional Model describes the how to specify and produce specific environmental scenes which makes the student

to interrelate in such a way that specific change occurs in his behavior. There are many models enlisted by Joyce and Well (1972). Since the present study attempts to merge newer methods with traditional sloka based methods, a predesigned model was seemed to be insufficient to address the needs of the new enquiry. Still, to be called as a Model of Instruction, as mentioned in the title of this study, the new frame also need to be structured with the essential components as described for a model. Models have their own pre-designed structure with five components such as syntax, the social system, and principles of reaction, support system and effects. Instructional Module (Teaching Module) is defined as a unit of work in a process of teaching that is self-contained which can build up skills and knowledge in specific units, which has its own title, objectives, nature of transaction, materials, teaching strategies, learning activities and method of assessment. Instructional package is a series of instructional modules on different aspects of the same subject. In the present study, Innovative Model was implemented through a package of ten modules comprising of 15 teaching hours, complying with the on-going curricular structure offered by Kerala University of Health Sciences.

4.2.7.2. Structuring the model

As per Dr. V K Maheswari et al (2013), adopting models of teaching enables the teacher to develop new educational innovations[39].She defines model of teaching as a set of inter-related components organized in a sequence to provide parameters to attain specific goal. It helps in designing instructional activities and environmental facilities, carrying out of these

activities and realization of the stipulated objectives. Syntax is the systematic sequencing of the model. While making a systematic sequence for introducing a new concept, in a constructivist model, two things are important. One is honoring the present knowledge base of the learner and the second one; it should make an easy transition from the paradigm to the new one. The paradigm the learner tends to attain through the new content is different from that he/she is previously exposed to. A change is inevitable. There should be a buffer period where the learner is prepared for the transition.

4.2.8. Discussion on Guiding Principles of the new model

The first exercise was formulating the guiding principles. This stage was imperative in the present exercise because such principles were not readily available as a ready reference. Guiding principles are considered as the blue print of the new model, which practically consolidated the key ideas evolved from the previous stages. When confronted with a challenge in medical teaching, a set of guiding principles based on evidence or long term successful experience are required[40]. The prime aspire of the new model to offer an easy, fast and smooth transition from the previous learning experience to the new during the inception stage of a graduate student in Ayurveda. For accomplishing such a challenging outcome, it needed multi-level inputs, as discussed, in the form of brainstorming, survey among teachers, FGD and finally pilot trial which gave off realistic grounds on the aspirations. The cardinal understandings derived from these exercises belong to different aspects such as:

1. Role of the new model as a transition program
2. Nature of a “pre-clinical”learning in Ayurveda
3. Adjustment of the timeframe of the new model within the existing frame
4. Incorporation of Piaget’s principles on assimilation and accommodation
5. Rationale of teaching strategies
6. Student centeredness of the new model
7. Creating a constructivist ambience through the new model
8. Importance of reflective practices
9. Incorporation of traditional teaching to the new model
10. The structural integrity of the model

4.2.9. Role of the new model as a part of transition curriculum

In general education, transition points, such as advancing from one phase to the higher phase, on which educators and school reformers pay specific attention considering students’ changes in their academic, social, emotional, physical, or developmental attitudes that may have undesirable effects on their educational performance[41]. These transitions points may leave chances to encounter new teachers, peers, academic expectations, social issues, and school configurations that augment chances to feel overwhelmed, anxious, frustrated, or even insecure. Most attempts to conceptualise and develop transition curricula have focused on the abrupt and often devastating transition from one to another (Edgar 1985, Halpern 1985, Hazazi Gordon &

Roe 1985, Will, 1985). Leon Festinger's (1957) view of cognitive dissonance (the discomfort of a person when confronted with new information contradicting existing ones) which disrupts teacher-learner relationship, may lead to frustration with the new settings which demand a "shut down" thus preventing any viable flow of questioning and discussion for the purpose of learning[42].

In Ayurveda, the term transition speaks with a louder voice, because of the global unfamiliarity of the learners admitted to graduation course.Moreover, the situation in Ayurveda is drastically different from the erstwhile hypothesized approach, because here transition is not merely from phase to another but from one paradigm to another. This phenomenon is rarely addressed in general education. One approach to reduce the need for developmental education is bridge programs. These programs, which usually take place on a college campus, provide interventions that help targeted students aspire to, prepare for, and achieve college enrolment[43]. Bridging of a student from +2 to Ayurveda is necessitated in two aspects: the transition from (1) school atmosphere to College atmosphere (2) PCBM orientation to Ayurveda.CCIM (Central Council of Indian Medicine) rightly appreciated the necessity of a bridge program, designated as Fresher Orientation Program (FOP), as a part of its curriculum, which unfortunately failed to get implemented yet[44]. If at all it was implemented, it should have been tailored for inculcating new frame of ideas without generating cognitive dissonance. Concept of bridging is not a new one in Ayurveda. During later phase of classical age (Samhita period), students were allowed to

familiarize the methods of Ayurveda for a period of six months, after which, if found attuned with the new field, they were selected for advanced learning[45]. This period, better nominated as a buffer period, was not described in earlier textbooks like Caraka Samhita and Susruta Samhita. The probable reason for this is worth debating. While reaching to learn Ayurveda, learners need to build up a new perspective, which by nature will be a little wider and largely different than the one they acquired during their education till then. Wider in the sense, it does not exclude the current knowledge, but includes additional perspectives. Friedrich Nietzsche, a nineteenth century philosopher, proposed perspectivism as a view that all conceptions take place from specific perspectives; there can be many possible conceptual schemes, or perspectives in which judgment of truth or value can be made[46]. The transition from a preoccupied perspective to a new one is the aim of implementing the new model. Need of such a metamorphosis also may be discussed initially to put curiosity to the studentsthereby making them prepared for the changeover. Unit-1 of the new model “Change your perspective” makes an attempt in this direction.This may be considered as a buffer zone, where the inhabitants realise themselves to be in a zone of ill-defined demarcations between two different zones, gradually approaching to the new zone safely and confidently.

4.2.10. Definition of “pre-clinical” learning in Ayurveda

The term “Pre-clinical” typically means the first, chiefly theoretical, stage of the medical education[47]. With respect to modern medicine, preclinical training is often alleged to be wastefully obsolete, especially amidst abundant

chances of exposure to e-based self-study resources[48]. In the case of modern medicine, the pre-clinical phase is typically the extension of learners' theoretical exposure attained till their +2 classes. Early clinical exposure, in the background of the previous knowledge, is acceptable and feasiblein such a platform. But for a student who enrolls for graduation course in Ayurveda, there is radical change in the paradigm accustomed by them in previous classes. The paradigm to which Ayurveda belongs was structured centuries ago in a different historical context by incorporating Darsanik interpretations about the world, which, by content and construct, have a different composition when compared to modern science[49]. Man-nature mutuality (Loka-purusha samya) is the prime understanding on which Ayurveda develops it theoretical platform[50]. Theories in Ayurveda are developed through a sequence of epistemological phases such as (1) Putting human being in a universal perspective (2) Understanding human biology as analogous to natural phenomena and (3) Proposing modifications in the proposals[51] Such a paradigm necessitates the same sequence in the learning process also. This explains what does the term "pre-clinical" mean in Ayurvedic pedagogy. "Pre-clinical" means, the initial phase of learning where a beginner simply starts redefining his perspective regarding the universe, then reaches in its biological implications before advancing to applied aspects related to health and diseases. Such a preclinical learning is imperative as far as Ayurveda is concerned. This approach once again suggests the relevance of constructivist approach because, learning the nature leave ample opportunities for constructing new ideas by observation and reflection.

4.2.11. Fixing the time frame

While planning a new model, the primary question asked was whether the new program is a separate one or a part of existing time table.During Focus Group Discussion, priority was given to follow the present timetable while adopting new model. Putting an additional burden to an otherwisetough schedule will be embarrassing to the beginners. Apart from the ease of implementation and viability in managing the schedule, it was worthwhile to consider enabling smooth assimilation and adaptation of the learners to the new ideas learnt. Being a new subject, the time factor plays much role in assimilating the content being delivered. Key concepts and texts will adhere better to memory and understanding if their presentation is slowed down[52].

4.2.12. Significance of concepts - Assimilation and Accommodation

The terms assimilation and accommodation are highly technical in the context of learning, especially related to Jean Piaget's theory of cognitive development. Piaget's (1936) theory of cognitive development explains how a child constructs a mental model of the world. Assimilation means usage of existing schema to deal with new object or situation. That means interpreting the new object with learner's existing knowledge. Accommodation (adaptation) works when the existing schema fails to interpret the new information. Then the existing schema needs to be changed to accommodate the new information. Even though Piaget did not explicitly relate his theory to education,

later researchers have explained how features of Piaget's theory can be applied to teaching and learning. According to this approach, assimilation and accommodation require learners to be active in the class room. Within the class room learning should be student-centred and accomplished through active discovery learning. The role of the teacher is to facilitate learning, rather than direct tuition. Since, the new model makes changes in existing schema of the learner, problem of assimilation and accommodation sounds prominent in this context. When assimilation puts new information to the old schema, the same thing happens in constructivist approach also, where the teacher makes sure that he/she understands the students' pre-occupied concepts, and guides the pursuit to address them and then construct on them. Assimilation is fitting the information to the existing perspective and accommodation is constructing a new perspective to fit the information. This model ultimately tries to construct a new perspective; that means, it tries to enhance the accommodation power of the learner.

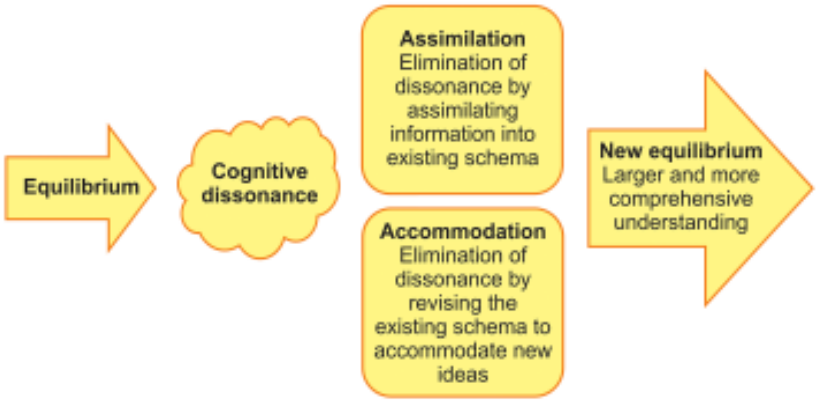


Fig. 4.2.4. Process of Assimilation and Accommodation

Adoption of constructivist techniques in concept learning has been already discussed. Since Ayurveda developed its theories from natural phenomena, discussions on Tridosha starts from creating a new view frameabout nature.While speaking about the nature, to overcome cognitive dissonance, he/she tries to assimilate new ideas to his old scheme, pre-occupied as physical impressions on nature. By this process learner tries to reach in equilibrium. The discussion leads the learner to create a new impression on the nature - i.e., dichotomy of constructive and destructive changes. Further, when the Guna terminology is introduced, again cognitive dissonance arises, which when assimilated to the dichotomy reaches in equilibrium. Widening the impression on nature based on Guna spectrum (a new scheme) lead to an accommodation process, which avoids further cognitive dissonance. When introducing Tridosha the dissonance aroused is easily overcome through the assimilation of new concept to the new scheme (Guna scheme). When the learner reaches in a Guna scheme, further

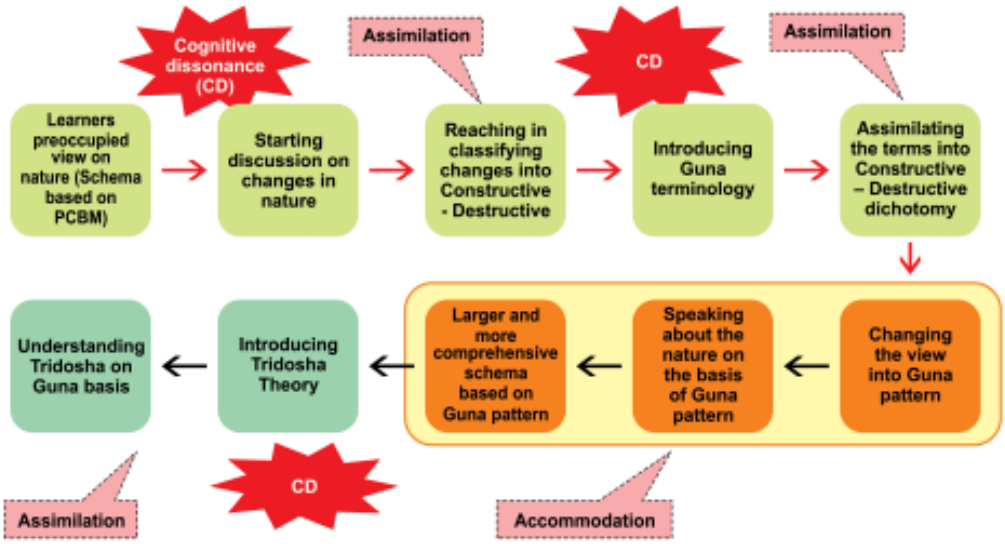


Fig. 4.2.5. Illustration of Cognitive Process adopted in the model

assimilations become easy. Guna scheme, being a common base for almost all the conceptual patterns in Ayurveda, changing to such a scheme primarily set a firm and stable platform for proceeding towards further concepts. Tridosha is one among them. As per constructivist approach new concept is built on the pre-existing conceptions, agreed on by Piaget through principle

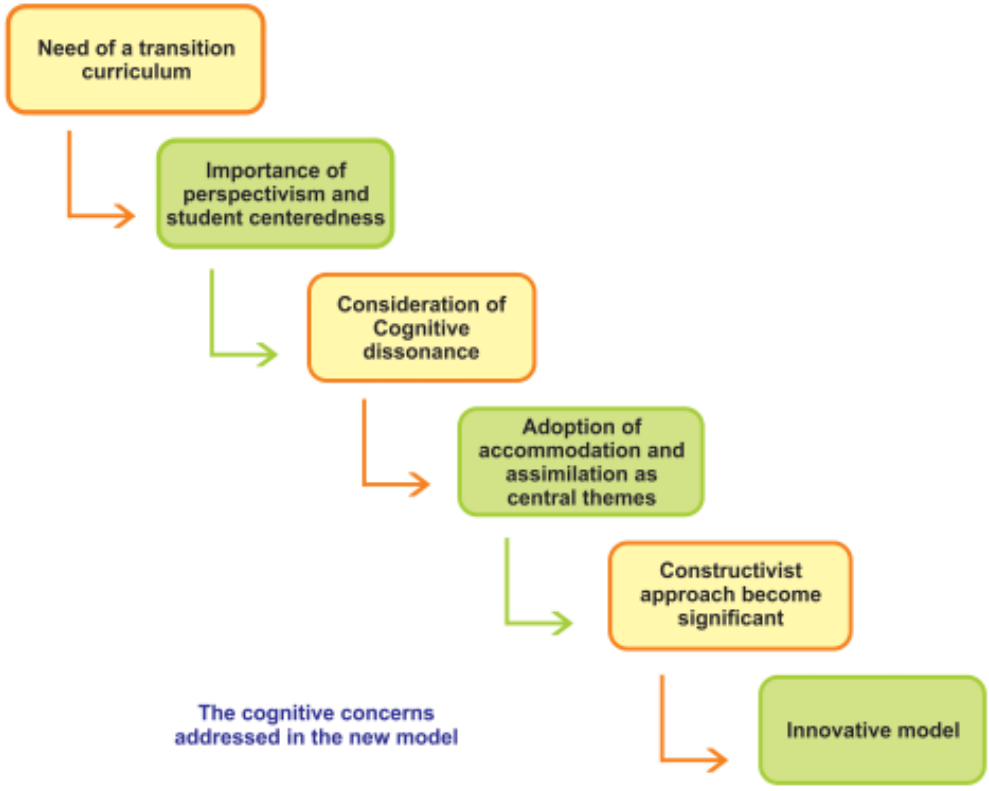


Fig. 4.2.6. The cognitive concernsaddressed in the new model

of assimilation, where, new information is assimilated to the pre-existing schema. When the pre-existing schema is inadequate to assimilate the new information, the schema itself is subjected to modification to contain the new information. Such a process is called accommodation. The teaching strategy adopted, whatever it may be, enhances either assimilation or accommodation

with learners' participation. For example, when the discussion starts from brainstorming, learners continue to be in their old schema. In many of the lecture discussions, the session starts from the knowledge learner already had about the topic of discussion. Almost all units start with the level which originally the learner possesses (assimilation) and ends up in a new frame which can readily accommodate further information to be gathered in the next units (accommodation). While considering the total package, gross transition in schema happens when to orientation changes from physical understanding to Guna based understanding (Unit-3). From unit-3 onwards, almost all the ideas converge to the concept of Guna, almost all exercises try to strengthen the Guna scheme in the cognitive process. Change of cognitive orientation to Guna pattern is the most vital component of the new package, which builds a strong platform to assimilate concept of Tridosha avoiding cognitive dissonance.

4.2.13. Teaching strategies adopted in the model

Teaching strategies were selected primarily considering their role in making a constructive ambience through assuring interactive, participatory, activity oriented atmosphere.The following table explains the probable rationale behind selection of teaching strategies in relation to the topics selected for them.

Table 4.2.2. Rationale of Teaching strategies used in the model

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
Games	(1) Nine dots game - to build up new perspective (2) Picture puzzles – to speak about perspective change (3) Card game – Understanding Gunas by meaning (4) Comparing Gunas of Doshas	Games create an enjoyable atmosphere in the class room wherein the learners participate and learn things naturally, especially when the assimilation process becomes overloaded with new ideas. Also helps to minimize stress and frustration due to cognitive dissonance. It enables better student-teacher relationship from the beginning itself.
Interactive lecture with or without the help of pictures	(1) An egg, but, something beyond – for out of box thinking (2) Broader perspective of human being (3) Man as an epitome of nature (4) Trilogy governing nature (5) The opposites within (6) The guna spectrum (7) Guna pattern of lifestyle and environmental factors (8) Gunas of Doshas (9) Identifying major landmarks of Tridosha (10) Specific locations of Tridosha (11) Dosha kshaya lakshana	Building up new schema in the participants, and to accommodate new information to the new schema; is very important in bringing out smooth transition to a new paradigm. Raising learners from the old schema is an act where role of instructor is critical; still it attempts to make a democratic and participatory ambience in the class room. Interactive lecture tries to surmount the limitations of a didactic lecture through its interactive nature but never loose authenticity since it tries to put the instructor at the centre. Pictures make the understanding more smooth and clear. The topics selected are vital in strengthening the new schema.
Group discussion/ Guided discussion	(1) The PCBM basis of life (2) Trilogy in human body	Guided discussion helps the learner to discuss a theme in order to assimilate new ideas with their previous schema,

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
		where instructor intervenes to keep the integrity of the ideas. Role of instructor restricted to intervene only when the discussion advance to undesirable outcome. Primarily this method is student centred. Learners feel free in associating the ideas to the new situation.
Case simulated Learning/ Case studies	(1) Is there anything beyond physical (2) Practical implications of locations of Tridosha	Learners get an opportunity to relate their knowledge to a given situation, mostly a real life situation, thus to assimilate the ideas to their existing schema. It brings out problem based approach in learning where logical reasoning and interpretation skill are more important. The practicality of the concepts also isproved in this practice.
Brainstorming	(1) Change is inevitable (2) Features differentiating living organism (3) To list out the features considered during Prakriti assessment	Brainstorming was used to create an environment where the learners could ponder on some specific issues related to an area to which they are exposed previously, thereby to invoke readiness in receiving new ideas, especially, in the beginning of a session, prior to advancing to a new concept. Participants' self-confidence is boosted up through such exercises. Regarding the topics selected for this strategy, leaners could easily list out items, getting the ideas consolidated black and white and they could factually participate in the generation of further ideas.
Spot quiz	(1) Guna spectrum – Applied aspect (2) Identifying Tridosha in physiology (3) Normal fluctuations of Tridosha	Spot quiz is a sort of formative assessment as well as an activity. It works on reasoning capacity of the learners, typically bridges for accommodating the information to the

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
		new schema. Critically important in accommodation process. The selected topics contains applied aspects of the concepts learnt in the previous class, raising the reasoning, application and interpretation attitude of the learners. Almost it suits with application level in Bloom's taxonomy.
Didactic lecture	(1) Etymology of Tridosha (2) Why "three" (3) Bhautik configuration of Tridosha	Conventional lecture method sometimes become inevitable where learners themselves are simply incapable of constructing ideas; especially highly technical aspects of the subject. Technical linguistic lessons like etymology, numerical significance of three, Bhautik configuration etc. are topics where learners are incompetent to contribute by themselves.
Group activity	(1) Identifying physiology in terms of Tridosha	Group activity ensures global participation of the learners, ensures peer interaction, brings out collective ideas and fills up cognitive gap among learners without being intervened by the instructor. It boosts up confidence level of the learners also.
Concept building through analogic approach	(1) Horse rider approach (2) Tea sugar approach (3) Concept of principles behind (4) Tridoshas are inferable (5) Bicycle approach (6) Geometry box approach	Concept learning with the help of analogy was a customary method used in Ayurvedic classics. Maxims used in Nyaya system also enabled the same learning process.It helps attaining concepts through analogy with real life objects/ experience. Complex concepts may become easily understood through this approach. The analogies are meant

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
	(7) Concept of structural basis (8) Man as an inverted tree (9) Gut theory of Tridosha (10) Dosha samya and dosha vaishamya	to put a simple entry to complexities of the concepts. Usage of analogy as an instructional strategy is becoming more and more important in sciences like Ayurveda where the fundamental concepts need a higher imaginative power than those related physical sciences. Academic analogies are useful for teaching and learning because they require students to analyze a thing (or things), and then transfer that analysis that analysis to another thing. This kind of transfer requires at least some kind of conceptual grasp– understanding.
Concept mapping	(1) Functional subtypes of Vata	Learning of concepts with the help of hierarchical diagrams helps easy understanding of the relational aspects of a concept/s; drawing different aspects in segments connected with logical relationship brings out easy learning. Understanding of functional division of Dosha, especially that of Vata, becomes easy by making logical hierarchy among the subtypes by starting with identifying human body as circles representing major chambers in it; then connecting them logically to a functional hierarchy and structural constitution as well. Such a mapping can be easily extended to further more details regarding subtypes of Vata.
Role play	(1) Simulation role play – dynamic equilibrium (2) Three personalities (Prakriti) (3) Symptoms of increase of Vata	Role-play is a technique that allows students to explore realistic situations by interacting with other people in a managed way in order to develop experience and trial

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
		different strategies in a supported environment. Apart from imparting suggested piece of information this method readily generates empathy, reflexivity and empowers the affective domain of the learners.
Video lesson	(1) Dynamic equilibrium – video of heart functioning (2) Cartoon video – for explaining Prakriti (3) Videos to explain different types of animals and personalities featuring characteristics of different Prakritis	Video lessoning primarily aims at multi-sensory input, which enhances learning outcome. In the present model video films are not directly used as a teaching tool, but to feature situations/sequences from which learners could build up reflections thereby enriching quality of learning experience.Using such videos and identifying specific features (like prakriti) in the video brings out a notion of ordinariness to the concepts conveyed. Description of Prakriti in textbooks, especially those related to body language, character and consistency of behaviour, attitude etc are easily and effectively dealt in video lessons. Animal behaviour also could be linked to the concept of Prakriti through videos.
Story telling	(1) Story of a car mechanic – establishing the dynamic equilibrium	Story telling makes the learning entertaining, finally conveys a message. While introducing a story, the information conveyed easily a flavour of message, that too with a lifelong lesson.
Constructionist exercise	(1) Constructing a proforma for assessing Prakriti	Constructionism represents a higher order learning ie, “learning through making.”Constructing a tool (here, a

Teaching strategy	Contexts in which the strategies are adopted	Purpose in the present model
	(2) Constructing a table "dosha vriddhi in common life experience"	proforma) is the most advanced activity that can be assigned to learners to make themselves involved in the process of learning. Instead of filling up a prepared questionnaire, they construct a questionnaire based on the knowledge they have attained till then. As per As per Bloom's taxonomy, "synthesizing" lies at the top while considering the hierarchy of learning process. Here, Prakriti assessment questionnaire is constructed by the learners after being exposed to key features of Prakriti assessment. Dosha vriddhi kshaya-lakshana becomes a questionnaire incorporating the ideas as they feel them in real life situations.
Exercise - Proforma filling	(1) Prakriti proforma	Proforma filing gives a real to life notion to the content transacted
Exercise – Graded Terminology Tabulation	(1) Normal functions of Tridosha (2) Symptoms of increase of Tridosha	While learning technical terminology or simply a list of terms in Sanskrit, where learners are less familiar with the conventional/technical meaning of such terms, it is always advisable to introduce the terms and make sense of them in a graded manner rather than imposing the whole bunch of meaning all on a sudden. It's better to let them attempt to sense the terms by themselves initially and torelate it with terminology already learnt. In the second and third phases they will try relating the terms with the help of instructor's connotation and explanation.

4.2.14. Creating a constructivist ambience through the new model

Apart from the theoretical design of a constructivist teaching, roles of instructor and leaner are greatly redefined in constructivist ambience. According to the social constructivist approach, instructors have to adapt to the role of facilitators and not teachers. In a conventional instructivist ambience a teacher *tells*, but in constructivist settings a facilitator *asks*; a teacher *lectures* from the front, a facilitator *supports* from the back; a teacher gives answers according to a set curriculum, a facilitator provides guidelines and creates the environment for the learner to arrive at his or her own conclusions; a teacher mostly gives a monologue, a facilitator is in continuous dialogue with the learners.In the present model the social system is primarily designed to be participatory. All the teaching strategies, except a few,characteristically concede with participatory learning.

4.2.15. Student centeredness of the new model

Student centeredness largely composed of methods of instruction that transit the focus of instruction from the instructor to the learner.This approach is based on constructivism which emphasizes the learner's capacity to construct meaning from new information and previous experience[53]. This model, being a constructivist one, by principle agree with student centered learning. In practice also, the feedback of the learners also agree with this nature. Discussion on the feedback.

4.2.16. Importance of reflective practices

Reflective practice accounts greatly for ability to reflect on one's own actions so as to engage in a process of continuous learning. Here experience alone will not affect into successful learning, but, reflections count more.[54].During the implementation of the present model, learners got ample opportunities to reflect their impressions on the knowledge they attain time to time. Some specific practices like spot quiz, construction of tools, reflection of real life experience etc. deliberately recorded the reflective ability of the participants. The results show its efficacy. Apart from these specific tasks, during interactive lecture sessions, the instructor creates an atmosphere in the class where the learners could express freely the impressions attained through reflections on the areas previously discussed. The following graph represents the intensity of reflection attained by the learner through adopting different teaching methods.

4.2.17. Incorporation of merits of traditional teaching to the new model

In Ayurveda pedagogy, traditional teaching means sloka-centred teaching, especially in the case of basic principles. In the curriculum of I BAMS course, basic concepts are dealt in the subject Maulikasidhanta, which is recommended as textbook (Samhita) based teaching of Ashtangahridaya Sutrasthana. Samhita based learning conventionally goes along with traditional approach in transacting the content. Traditional teaching of sloka consists of different steps like (1) reciting the sloka, (2) exposition of its meaning, and (3) exploration of its application. Unlike other sections of Ashtangahridaya,

slokas in Sutrasthana are condensed verses rich in technical terminology, their definitions, classifications, explanations, enlistment and comparison. Most of them typically carry some core concepts which later are applied in different contexts like diagnosis, therapeutics, and procedures etc. which are dealt in other sections. In such a way, slokas in Sutrasthana are conventionally considered as “essence” of the science; hence, need to be remembered always, simply like multiplication tables in mathematics, reaction formulae in chemistry, equations in algebra, mnemonics in medical learning etc. Usually, slokas are taught in a direction starting from recitation of the same to end up in their meanings and implications. This pattern typically suits for didactic lecture method. But, in the present model, since it is construtivist in nature, instead of the above approach, it tried sloka based learning in four distinct methods:

(1) Conventional method, as described above (2) Reverse sloka learning (3)Graded table method and (4) Open Text Book practice:

1. **Conventional method** was chiefly adopted where new concepts were introduced in Units 1 and 2. This was done as a supplementary to learn sloka related to already postulated concept in Units 1 & 2.

2. **Reverse sloka learning:** This method was adopted in Units3, 4, 5 and 8 where mostly some features/structures/characters are enlisted in slokas for example, normal functions of Doshas, locations of Doshas, Gunas of Doshas etc. The process consists of sequence of steps like (1) explaining the concept (2) preparing the list of terms (3) connoting Sanskrit terms (4)

classifying the items, if necessary and (5) finallycomposing the Sloka as seen in the textbook. It resembles the deduction of mathematical formulae in Algebra. During the stage of deduction, learners are well aware of the logic of the steps involved; once the formula is derived, it will be kept by heart for further applications.

3. Graded table method as adopted in Units 7 & 8 is another innovative method where learners work out the meaning of items with their own pre-assimilated knowledge about the terms enlisted. In this method, natural capability of the learners to apprehend the meaning by their previous linguistic aptitude and common sense.

4. Open Text Book method: Even though the learning content of OTB activity was about Guna pattern of different state of functions of Tridosha (discussed elsewhere), the method introduced another way getting acquaintance with textbook material and slokas.This method will be ideal to other textbooks like Carakasamhita in higher classes also.

This approach has many limitations. Such constructivist practices are not assumable if (1) content is very large (2) the content is too much narrative. If the content is precise and specific, like definitions, classification, simple processes, core list of ideas etc. the method is desirable. OTB activity seems to be adaptive in resolving the problems in dealing with the textbook oriented studies in Ayurveda.

In the feedback on the total package, grand majority (89%) strongly agreed with the fact that sloka learning became easier in the methods adopted

in the new model. Results of graded table exercise also (Table 3.26) showed significant attainment of knowledge on slokas. However, in the summative assessment, scores in sloka portion did not show significant difference between the groups. That means, even though learning sloka through the new activities is easier, retention of sloka was not significantly improved when compared to conventional teaching.

4.2.18. Structural alignment of the model

Structure of the model is intensively connected to (1) flow of content to be delivered (2) sequencing the content so that it makes a "lighter to heavier" alignment (3) abiding the customary structure of model developed by educationists and (4) consideration of easy transition to the core content.

Phase – 1: Need of changing the perspective was dealt initially, through simpler games and pictures, which can be taken as the buffer zone of the model. It was envisaged to prepare the participants to widen their perspective for accommodating a change (result feedback). The next step was to create a different perspective on nature around. Ayurveda related itself with the Darsana tradition of ancient India, which initiated radical changes in viewing the nature in content and construct. The above two steps constituted the first phase "Changing the perspective".

As a part of feedback of the total package, learners fully agreed (100%) with the fact that it let them convince that out of the box thinking is essential for medical learning, especially Ayurveda. 91% agreed it strongly

and the rest agreed moderately. The spot test of Unit-2 yielded 58.3% increase in their knowledge level which is highly significant statistically. Also, they 98% of the learners agreed that they are understood the concept of Visarga-adana-vikshepa trilogy. So, it is assumed that Phase-1 could effectively attain its proposed objectives.

Phase – 2: The next phase was to build up background knowledge for advancing to the core content i.e, Tridosha. Knowledge of Guna spectrum was selected as the main content of this phase. This selection was done considering the recommendations from Focus Group Discussion. This phase was deemed to be the most vital in the whole model because, the change in cognitive schema and inception of accommodation process starts from this phase.

During the feedback assessment, 87% understood very well the idea of Gurvadiguna explained with real life examplesand 9% understood it moderatelyIn the spot assessments in this phase (pre-test-post-test) they attained 78.3%, 70.5% with high significance statistically. So, it is assumed that the gross objective of this phase ie, to build up back ground knowledge to the core content of the model had been attained effectively.

Phase – 3: Introduction of the core content (Tridosha sidhanta) was done in the next phase, through biological perspective. Gross biological understanding on Tridosha was attempted initially, in order to facilitate assimilation of new ideas to the existing schema, before advancing to the technical understanding in the form of etymological derivation etc.

As per the findings from feedback, 84% of the participants very well understood the biological implications of Tridosha sidhanta. Results of the spot assessments (pre-test-post-test) showed 56% and 64% increase in knowledge base, both highly significant statistically. Hence, this phase of the model was found to be effective in attaining the gross objective, ie, understanding Tridoshsidhanta in a biological perspective.

Phase – 4: Fourth phase attempts on bringing out further more connections between the two main concepts introduced so far: Guna and Tridosha. Primarily, the sessions put effort on comprehending the Guna spectrum in human biology, later on this comprehension evolved to incorporate Guna spectrum into Tridosha.

Logical connection between Gunas and Karmas of Doshawas very well understood by 75% of the participants and moderately by 21%. The spot assessment (pre-test-post-test), 56% increase was noted in knowledge attained with high statistical significance ($p<0.01$). Hence, it is assumed that this phase could succeed in attaining prime objective i.e, bringing connection between concepts of Guna and Tridosha.

Phase – 5: In the final phase, further proliferation of Tridosha concept were discussed, in terms of normal activities, fluctuations, symptoms of increase and decrease, locations, subtypes etc. All these items were conceivably related to the Guna spectrum as a part of assimilation process. Almost all the exercises related to the above areas let the learners to arrive at more concrete relationship of Tridosha with Guna spectrum.

Feedback assessment showed that all of the participants (100%) understood the influence of lifestyle and environmental factors over Tridosha and role of Tridosha in Prakriti constitution of man. Scores in different assessments such as spot assessments, proforma construction, prakriti assessment, graded table, OTB activity etc. also proved the same. So, it is concluded that the fifth phase also could deliver its content effectively.

4.2.19. Inductive phase and deductive phase

Induction and deduction are two basic methods in scientific enquiry. Induction is based on observation, generalization and theorization. Whereas deduction tries to deduce new ideas from the previously existing theories. Scientific discourses generally start in an inductive reasoning and advances through deductive reasoning. The same can be applied to the transaction of new ideas also. Inductive phase gives importance to observations to natural phenomena, comprehending on the similarities and dissimilarities and framing ideas from those observations. Concept of Guna and Tridosha are constructed almost in an inductive mode. After comprehending such theories, further explanations and relationships are deduced on the background of the previously established concepts. This is the deductive phase.

4.2.20. "Guna" as the central theme

The whole content of the present model regards Guna spectrum as its central point, on which further understanding of Tridosha was developed. In Ayurveda, concept of Guna, especially Vimsatiguna works as

Table 4.2.3. Guna spectrum reflected in different phases of the innovative model

Unit Name	Details of item/Activity	Nature of Guna reflection
Unit – 2 Man as an epitome of universe	Lecture discussion "the opposites within" introduce opposite principles such as Ushna/Seeta, Sthira/Chala and constructive/destructive	Gives entry to the concept of dichotomy in explaining Guna
Unit – 3 Guna spectrum	(1) Understanding Guna by meaning (2) Guna spectrum – identification of 20 Gunas through picture discussion. (3) Spot quiz – identification of Guna through simple logical explanation (4) Identifying Guna pattern in lifestyle and environmental factors such as food materials, diurnal cycle, seasonal factors, geographical areas, psychological factors	(1) Enlisting 20 Gunas by names and precise nature. (2) Identification of Guna spectrum in different factors which human body is exposed to. (3) Establishing Guna spectrum in naturalist perspective.
Unit – 4 Bringing Tridosha approach to human body	Bicycle approach of Guna and Karma establishes the relationship between Guna and Karma.	Basic understating on role of Guna in bringing out activities of Tridosha. This approach is further reinforced in coming units.

Unit Name	Details of item/Activity	Nature of Guna reflection
Unit – 5 From Gunas to Doshas	(1) Guans of Doshas - Establishing and enlisting Gunas of Dosha on logical and realistic explanations (2) Comparing Gunas of Doshas – logically identifying common Gunas among Doshas	Translating the knowledge on Guna spectrum to the understanding of Tridosha and comparing Tridosha on the basis of Guna pattern.
Unit – 6 Tridosha basis of personality	Discussion on probable Guna behind prominent characters of Prakriti	Identification of Guna in personality features
Unit -7 Normal functions and fluctuations of Tridosha	(1) Spot quiz to identify increased mark of Doshas in different variables like diurnal variation, stages of digestion, geographical pattern etc. (2) Geometry box approach – to explain differential roles of Guna in different states of Dosha functioning	(1) Explaining influence of different variables like stages of digestion, state of gut (koshta), appetite (Agni), geographical predisposition (desa), season (Kala), age (Vayas) etc. in the light of knowledge about Guna spectrum. (2) Explaining how Gunas are becoming dominant and dormant at different states of Dosha functioning
Unit – 9 Disturbance of Dosha equilibrium	(1) Tabulation – Increase of Dosha in common life experience – tabulating the Guna behind increase of Dosha (2) OTB activity – identification of Gunas behind normal, increased and decreased functioning of Doshas	(1) Identification of increase of Doshas in terms of increase of corresponding Gunas in respective Doshas (2) By tabulating the Gunas behind normal, increased and decreased functioning of Doshas learners get convinced about differential involvement of Gunas of Doshas in different stages.

a common base for different theoretical explanations regarding human body as well as drug action. On one side, while explaining human body, Tridoshas are explained as composite of Gunas, whereas on the other side, different drug actions (aushadha-karma) are assumed to be induced by Gunas contained in such drugs. The homogeneity between Tridosha and Drvaya (drugs) in terms of Guna explains how and why drugs bring out desirable effects in human body, abiding rule of similars and dissimilars (Samanya-visesha sidhanta). In classical literature, these two entities ie, Tridosha and Dravya, are explained directly on Guna basis. These two entities represent internal and external environment respectively in relation to human body. Hence, the association of Guna spectrum can be very well extended to broader considerations of human body and nature around. With respect to human body, the broadening of Guna reflection can be attributed to other components like Dhatu, Mala, Srotas, Agni and even psychological dynamics (Manas). On the other side, Guna reflection of nature can be extended to environmental factors, climate, geographical pattern and even interpersonal interactions. The present innovative model considers this broadened perspective on Guna as its operational theme. This model tried to explore different aspects of Tridosha for an underlying Guna pattern as tabulated in table 4.2.3.

4.2.21. Concept learning – scopes and limitations

The basic question regarding Tridosha concept is whether the concept is abstract or concrete. Instead of providing a precise definition for

Tridosha, almost all masters tried to explain the same through some attributes (Gunas and Karmas) through which Tridoshas are identified in human body. Such an identification is neither a one-time effort nor self-contained. Tridosha sidhanta typically is a formative concept, in the sense; ideas about the concept are gathered at different levels of learning process and even during the implementation of such gathered ideas in practice. This challenges the concreteness of the concept. Apart from physically enumerated/measured attributes like physical structure, organs, gross structural components, almost all other concepts in Ayurveda are more or less abstract.Use of instructional analogies are said to be a better method to learn abstract concepts. The purpose of analogies is to allow connected input of information to be shaped from a source which is known to that which is unknown.. From a constructivist point of view, the analogy serves not just as a representative template used to compare and map base domains attribute to the target, but as a dynamic process which influences and is influenced by alterations in conceptual understanding.The prime understanding of Man-nature mutuality (Loka-purusha samya) itself laid down many choices of analogical descriptions to learn exact nature of human bio-functioning. The most famous analogy used for introducing Tridosha sidhanta is Surya-Soma-Anila (Sun-Moon-Air) analogy, explained in unit-2 of the new model. Apart from this analogy, the new model proposes many other ones (Table 4.2.4) to widen the understanding of Tridosha sidhanta.

Table 4.2.4. Instructional analogies used in the new model

Instructional Analogy	Intention of the analogy	Idea conveyed in the present context
Geometry box analogy	To explain how Gunas of Doshas are working	All the Gunas are not actively active in all situations
Tea-sugar analogy	To explain, Doshas are not always visible	Doshas need to be infereed through their actions or qualities as if inferring sugar by tasting it
Bicycle analogy	To explain relationship between Guna and Karma of Dosha	Cycle wheal is round (Guna) to perform its action (Karma)

4.2.22. Reflection of NCF guiding principles in the present model

The guiding principles roughly credits the importance of apprehending the life outside the school; which stands away from rote methods; keeps the curriculum sometimes beyond textbooks; take examinations more integrated with life; and nurturing democratic polity of the country[55]. In the new model, every advanced knowledge is firmly connected to the background of learner's apprehension on the nature around, so that, there are many chances for them to connect the new knowledge with the world outside. Even though the content of learning primarily bases on the textual descriptions, in the form of slokas, the new model try to take the knowledge out from the text and put them in the world outside. In a way, this itself is a limitation of the new model, because while putting things out from the textbook, the content needs much more time to complete the transaction properly. As suggested by NCF, the new model try to make the examinations (assessments) more flexible and integrated to the classroom life. The formative assessments used in the model is more a learning strategy than an assessment strategy.

Chapter - 3
DISCUSSION ON EXPERIMENTAL PART

Four Ayurveda Colleges from different parts of Kerala were selected for the study with a total volunteered participants of 211. The study group (Case) received new model and the other three centres (Controls) followed conventional teaching. Among the controls, one centre was from Government sector and the other two from self-financing sector.

4.3.1. Discussion on demographics

Age distribution in both the groups is found to be comparable ranging from 17 yrs to 21 yrs with a mean of 19.02 + 0.84 in study group and 18.98 + 0.84 in control group. The minimum age for admission for BAMS is 17 years. In an overall gender pattern, percentage of male participants considering the three groups together is 20%, whereas, as per the final allocation list of Controller of Entrance Examinations[65], the percentage of male aspirants is 16%. The difference is justifiable. The rank number in entrance pertaining to case and control-1 was comparable whereas there is a significant difference in rank number of the participants admitted to the

case group and control-2 & 3. This difference was considered to be influential to the learning capacity of students in those groups which can affect performance in outcome variables. It was to overcome this bias, the whole control group was divided into two groups Control-1 and Control-2. Comparison in outcome variables was done between case and these subgroups separately. Prior knowledge in Sanskrit was taken as a data to verify whether prior knowledge of Sanskrit substantially contribute to the understanding in a better way. Since there was comparable percentage of Sanskrit knowing students in all groups, the difference in achievements seem to be not affected by prior knowledge in Sanskrit.Other demographic data including parent education, parent income did not show any significant difference among groups.

4.3.2. Discussion on summative assessment results

The summative assessment questionnaire was done in three parts. Questions in section-1 was MCQ and fill in the blanks type questions relatively direct, partially memory-oriented and partially logic based. Part-2 was purely understanding and application level questions. Sloka part was intended to test the recalling capacity of the learners on the sloka they learnt. The comparison of total scores among the groups showed highly significant difference compared to both the sub-groups in control ($p<0.05$). Since there is significant improvement in the study group the hypothesis of experimental part “the newly constructed innovative model is more effective in transacting Tridosha sidhanta when compared to conventional teaching” is accepted.

Part wise comparison also was done separately between the groups where, in all parts Case had improvement compared to controls in all groups. But, there was lesser difference in Sloka recalling capacity among the groups. On the other side the difference in part-1 & 2 was highly significant. That means, sloka recalling was not significantly improved by the new model, but highly significant improvement is shown by students receiving the new model in understanding and application levels. That means there is no significant effect of the new model in recalling slokas.

Elements of traditional teaching was incorporated in the new model by way of putting slokas as a content of the model. Slokas were learnt in a constructivist approach i.e, apprehending the sense and application of the proposed sloka initially through various activities and subsequently connoting Sanskrit terms and finally putting them in order to make slokas as depicted in prescribed text. It brings out a reverse order of conventional sloka learning method where the learning starts from sloka and proceeding to the meaning, sense and application in that order. The method was evaluated strongly to be imparting more comfort in sloka learning. But, in the summative assessment, there was no significant change in performance related to sloka recalling. Even though the ease of learning sloka is enhanced in the new model, it did not make any difference the power of recalling slokas, when compared to conventional teaching. At the same time, understanding and application levels were found to be effectively enhanced, which means learners could imbibe the sense and applied knowledge of slokas more effectively in the new model.

Present pedagogy is accused to be highly memory-oriented and less application oriented[66]. Reciting the slokas as such without proper understanding of its meaning, sense, application and interpretation is said to be the problem in today's learning. The new model and conventional teaching are equal in recalling capacity, but new model put an additional capacity of having applied knowledge of the content of the sloka. That is a desirable outcome in the present scenario.

4.3.3. Discussion on feedback on the total package

Feedback on the total package was taken with the help of a structured proforma with three domains, the items reflecting perception of the participant on the method of delivery and content of the package. The general delivery of the package was perceived to be clear, good and creating urge to know more about the subject. Items related to the specific perception on the delivery of the program could internally assess how the package proceeded as a constructive and activity oriented model. Those items specifically assessed the perception of the package in relation to how well it created constructivist and activity oriented atmosphere through encouraging learners participation, leaving chances for constructing learners' own ideas, easiness of concept learning, richness of real life examples, enabling critical thinking, apprehension of Ayurvedic concepts in real life situations, easiness in sloka learning, appropriateness of activities and non-imposing attitude of the instructor. For all these items, participants showed either strong or moderate agreement or minimum disagreement. These perceptions

substantiate the role of the new model in rectifying the draw backs of conventional teaching reported by different authors.

From Udupa committee (1958) onwards there was logical aspire for improvement in teaching methods in Ayurveda[67]. Limitations of lecture method was well admitted by Dr. Santilal Mehta and shift to discussion based interactive model was suggested well in his reports (1983)[68].Development of learner centred approaches in medical education was insisted by Mark Barrow (2010)[69]. Connecting the content to the world outside the class room was taken as the basic requirement of burden-less education as proposed by Prof. Yashpal while submitting his reports on national advisory committee[70]. Importance of constructivist approach was re-in forced by National Curriculum Framework in 1993[71]. Meena Shamrao Deogae looks into the problem of lack of analytical critical thinking in Ayurveda students[72]. Kishor Patwardhan, Deepti Singh et al identified the burden of memory oriented learning in formal Ayurveda premises, which deprive the learners from critical and logical thinking[73]. Bhushan Patwardhan argue for a shift from teacher centred to student centred learning, and that from directed teaching to inductive learning as well[74].This shift was again supported by Meena Shamrao Deogae[75]. The problem orientation of pedagogic practices was considered to be vital in the present scenario by authors like J Narayan and Kishor Patwardhan. Student community comments on the present pedagogy as to feel studying Ayurveda/ Siddha /Unani hypothetically and suggests strongly for real life explanations for Ayurvedic concepts[76]. In draft curriculum CCIM suggested for supporting problem oriented approach in Ayurveda education[77].

All these shortcomings were well addressed in the present model and participants' perceptions on the model reflects the competence of the new package in resolving them. The perceptions altogether draw a strong positive note on the feasibility of constructivist approach in transacting Triodosha sidhanta. These observations generally let us infer the merit of constructivist approach in transacting the concepts. On the other side, 98% of participants agreed (89% strong agreement and 9% moderate agreement) with the fact that Ayurvedic constructs, as delivered in the package, are different from those learnt to the level of +2. But at the same time 100% of them agreed (32% strong agreement, 68% moderate agreement, 0%d disagreement). Perceiving the constructs to be different and at the same time considering them to be reasonably agreeable suggests the easy building up of accommodation to avoid cognitive dissonance. Another significant perception made by the participants regarding the package is that they disagree with an idea that instructor imposed his ideas forcefully (disagreed by 61% of the participants.). These observations put significant evidences to let us confirm that it helped to minimize cognitive dissonance by accommodating the schema to imbibe new information received. Also, the competence of the new model in addressing the shortcomings in a beginner's curriculum is almost addressed properly, in all its limited scope, in the new model.

From the results, it was evident that the new model could enhance understanding and application levels of the learning when compared to conventional teaching. From the feedback it is evident that methods of transaction could ensure constructivist ambience in the class room. So, in

nutshell, the new model could transact Tridosha sidhanta in a better way than conventional teaching through creating constructivist ambience.

Regarding the perception of the content of the new model, almost all the vital elements are well transacted as evidenced from the feedback regarding the same. The learners very well understood the importance of out of box thinking, importance of trilogy (Visarga-adana-vikshepa), definition of human body beyond mere physique, necessity of learning Gurvadiguna as the background knowledge, influence of such gunas on the presence and functioning of Tridosha, importance of Prakruti concept as the vital evidence of Tridosha etc. These aspect actually describe how a biological theory develop itself as a dynamic entity and keep relationship with other theories as well.In a way, these corroborations explain how biological theories in Ayurved relate themselves with natural phenomena.

4.3.4. Discussion - unit wise observations

4.3.4.1 Discussion on class events (Unit-1)

The session started with a game, nine dot game. A participant drew nine dots on the white board in a 3X3 fashion. All others were requested to draw four continuous lines to connect all the dots. Some of the learners knew it before. They were directed not to attempt. All others tried it on their own fashion on paper. Two participants could complete it properly. At the end, the solution was displayed as video. Instructor asked the participants about what made them fail in the puzzle. They agreed that their thoughts were constrained to the 3X3 square formed by the dots, whereas those who succeeded kept an

"out of the box" thinking. After viewing the solution video they seemed to be convinced about the need of thinking out of the frame. Next was a picture puzzle, where four pictures were displayed on screen. Each picture was tagged with specific questions. Each question hinted on different aspects of "framing of thoughts". The term "perspective" was discussed in between. Each picture portrayed the ways in which perspectives are influenced. At the end of discussion, learners nodded to be convinced about the ways in which perspectives influence observations. The next activity was a discussion based on pictures, "An egg, but something beyond" where picture of an egg was given. Randomly three learners were called for describing the egg. They described the shape, color, content, biological features etc. The discussion was guided by the instructor to be more specific, by defining egg in different perspectives. Learners identified different perspectives – Biology, Physics, Chemistry, Bio-chemistry and Morphology. Details of each perspective were collected through discussion. The ideas were compared with the prepared power-point slides. Omitted details were added. In such a way, egg was described in the above five perspectives separately. Then the discussion was shifted to the question "is there anything left out?". Some aspects which are not referred in the previous discussion were raised here (as shown in the power-point slide). None of them were readily explainable through the perspectives shown above. The discussion concluded with an idea that there are many things related to egg which are beyond commonly explained perspectives.

In the next activity human being was taken to the centre to discuss different perspectives. It was conducted by dividing the whole class into four

groups– Physics, Chemistry, Biology and Mathematics. Each group was allowed to have a brief discussion to identify the role of their subject (say, Physics) in human body. Group leaders presented their views at the end. Instructor added some more details through a power-point slides.Next question was “Is there anything beyond physical?”.Five situations were illustrated with the help of power-point slides. Each one of them featured conversation of patients with doctors/persons with their colleagues about their health issues. Instructor randomly selected a participant each to read each slide. At the end of reading of each slide, students were instructed to think over the role of “extra-physical” agents, if any, to cause those health related problems. They could readily identify Psychological, spiritual, environmental, social, familial realms of disease causation hinted on the conversations. The discussion was concluded by stressing on the role of “extra-physical” agents causing diseases and role of this approach in managing diseases. This conclusion was compared with WHO definition of health, where psychological, social and spiritual realms are equally described apart from physical.

Next activity (Broader perspective of human life) initiated discussion on identifying the four components of Life (Ayus). The components were easily identified through comparing dead body, unconscious body and living/responding body. The exercise simply derived the idea of defining Ayus as Sareera-Indriya-Satwa-Atma samyoga. Learners found it easy to familiarize with the terms like Indriya, Atma and Manas and also to construct the sloka (Sareera-indriya-satwatma-samyogo etc.) from

the ideas dealt hitherto. Afterwards, sloka in Caraka Samhita was explained in classical method viz prose-order (Anwaya), meaning (artha), implications (bhavaartha) etc.

4.3.4.2. Discussion on class assessment (Unit-1)

The main objective of the unit was to make learners become aware that "thinking out of the box" is inevitable part of medical learning, especially Ayurveda. From the final assessment it became evident that 91% of learners very well understood the idea that "out of the box thinking" is essential in learning Ayurveda. 9% learners moderately understood the same. In that way it is expected that learners could widen their perspective on human body. And also, they could be familiarised with the definition of Ayus as described in Ayurveda. 68% strongly and 27% moderately agreed to the idea that they could recognize Ayus as conglomeration of Sareea, Indiriya, Satwa and Atma. In this regard 5% participants disagreed to be convinced about the same. Pre-test post-test assessment was not done since the session was an ice breaking session. Almost all the parameters in feed-back assessment showed strong agreement among the participants, which indicate assimilation process to the new frame went on rather smoothly. Introducing a new idea with the help of game, puzzles and simple discussions seem to be ideal in inculcating a strong background about a new topic. Thinking out of the box was well received by the participants. New thoughts sprouted from their previous ideas seem to build up easy assimilation of new ideas to their existing schema.

4.3.4.3. Discussion on class activities (Unit-2)

This unit intends to place human being in a universal perspective abiding the rule of man-nature mutuality (Loka-purusha-samyata). The initial activity was a discussion based on agreement of participants with the statement "Man as epitome universe."Almost quarter of the students grossly agreed. Almost 10 students have a weak agreement and majority disagreed. The instructor started to tabulate the terms describing different phenomena in the universe such as matter, energy, states of matter, movement, heat, water, changefulness etc. Students were requested to examine whether these phenomena apply to human body also. Slowly, students' attitude seemed to change and became more agreed to the initial statement. Then the session turned to a brainstorming on "Change is inevitable."Discussion started with a statement of Heraclitus "the only unchangeable is change". Then started a brainstorming: "Enlist some phenomena in the world which are subjected to change". Apart from usual comments like time, climate, states of matter, life, age, emotions etc. some interesting responses came, such as friendship, sleep etc. Then the discussion advanced onto some bases on which changes are classified. Students stated reversible/irreversible changes with examples. Instructor explained some more classifications like cyclic/linear changes and constructive/destructive changes with examples. The discussion concluded with an anticipation to advance with constructive/destructive changes during the next sessions.

Then the class proceeds into lecture discussion on "trilogy governing nature." Discussion focused on the constructive/destructive dichotomy which is opposite, still, complementary, explained with examples

of cooking sambar and making a table. Complementary in the sense, destruction of a material contribute to the construction of another material. In between instructor coined two terms: Adana for destructive change and Visarga for constructive changes. A third factor, which controls or co-ordinates these changes was also identified like carpenter in making table, cook in cooking process etc. which was coined as a third principles termed as Vikshepa (means one who projects). So, the trilogy was established. The trilogy was reinforced through some more examples. The terms Visarga, Adana and Vikshepa was then correlated to Moon, Sun and Wind. Sloka depicting the trilogy was explained afterwards.

In the next discussion, “Trilogy in human body,” the above trilogy was illustrated in human body. A list of 19 terms, related to human biology, was displayed on screen and the participants were instructed to classify them on the basis of trilogy (Visarga-Adana-Viksehpa) by their own logic. Participants classified some of them easily, but, some other terms put them in confusion. Such situations were resolved by instructor. Terms like birth, storage, conservation, accumulation, synthesis etc. could be easily listed under Visarga and the opposite terms were listed under Adana. Control and co-ordination came under Viskshepa. At the end, participants appeared to be convinced about the extension of the trilogy to human biology.

4.3.4.4. Discussion on assessment (Unit-2)

The main objective of this unit was to let the learners identify human being as the epitome of universe, through the concept Trilogy

(Visaraga-adana-vikshepa). From the general feedback it is understood that 80% and 18% participants have understood this idea very well and moderately respectively. 2% of participants poorly understood the same. Results of the spot assessment (pretest-post test) show that participants acquired highly significant improvement in the knowledge related to the content delivered in the unit and at the same time the feed-back shows the delivery of the content also ensured participation, critical thinking and easiness in assimilation of ideas. Accommodating the concept of trilogy is vital as a background to the advancement to further details of Tridosha sidhanta. So, it can be assumed that this session paved a firm background to the concept of Tridosha sidhanta.

4.3.4.5. Discussion on class events (Unit 3)

The next session was intended to bring out familiarity with the Guna spectrum (Vimsatiguna) described in Ayurveda, which is essentially a prerequisite to the knowledge of Tridosha. The technical terminology of Vimsatiguna was familiarized through card game. Twenty students were selected from the participants and each one of them was asked to collect one card each from the table. The cards have English meanings of Gunas printed on it. The card holders were asked to identify their counterpart from among themselves. No clue was given about how they can select the counterpart. While searching in the group they eventually noted the counterpart as the term opposite to what written on their own card. Thus, they could make 10 pairs from the 20 cardholders, by pairing opposite qualities. So, 10

pairs were identified. In the next turn, two participants bearing cards written as “Constructive” and “Destructive” stood in front of the class. The rest of the participants in the class classified and allocated the 20 card holders into two groups ie, constructive or destructive. Here, some terms like dry, wet, heavy, light etc. could be easily classified. Terms like hard, sticky, flowing etc. put the participants in confusion; needed instructor’s guidance to complete the allocation. After grouping the terms, Sanskrit terminology was introduced by replacing the cards with another card with names in Sanskrit. All the participants repeated loudly the names in Sanskrit. At the end card holders were arranged in a sequence which the Sanskrit terms appear in the Sloka explained in AH Sootrasthana. Sloka was recited afterwards. Students felt it easy and enjoyable to learn names and meanings of Gunas by the exercise.

After getting familiar with list of Gunas, and identifying the dichotomy among them, the next activity was to understand Gunas in different objects around us. For each pair of Gunas (viz. Guru-Laghu, Snigdha-Ruksha) a set of pictures was displayed, from which the cardholders selected picture suitable for their corresponding Guna, other participants supported the selection. Participants could complete the task easily, without much ambiguity. There were multiple set of pictures for the same pair of qualities, each set denoted different aspects of Gunas – Physical, Biological, Environmental, Food related, Pathological and sometimes even Psychological. The exercise threw different possibilities on appreciating Guna, though precision and accuracy was not intended. Selection of exemplars and non-exemplar from the given list of items was the method adopted in the above

exercise. As an extension to the above exercise a spot quiz was conducted, where, participants were given an object/ a situation related to real life, from which they can identify a Guna and select it from the four options given. In a way it was part of formative assessment. They could relate Gunas to their premises. In the spot quiz average marks scored was 81% (8.09 marks out of 10), which means, participants could generate Guna implications of different situations very well even without prior instruction about the same. Even though the MCQ model was usually a memory testing method of previously acquired knowledge, here it is not used in that conventional intention. On the contrary the spot quiz tested higher order thinking capacity of the participants, and could carry out a formative assessment also. This typically indicates the participants' ability to align themselves with the flow of content in the package.

The next activity was a lecture discussion to identify Guna pattern of lifestyle and environmental factors. Out of the 20 Gunas, 10 Gunas such as Seeta, Guru, Snigdha, Manda, Sthira and the opposite were selected, which are frequently used for practical applications. Participants were instructed to compare probable Gunas in Milk, Red chilli and Ghee, from the above set of Gunas. Most of the time they selected the exact Gunas by their own logic, rarely instructor intervened to bring out desired outcome. Comparison of Milk with Ghee effectively revealed how identical materials (both are Guru, Snigdha, Seeta and Manda) differ in some typical characteristics (when Grtita is Sthira, milk is Sara). Likewise, the Guna pattern in diurnal cycle, seasonal variation, geographical dispositions, age related changes in Gunas, lifestyle variables like sleep, personal relationships, emotions etc. were considered. Participants

were motivated to identify the Guna pattern with minimum facilitation from the instructor. Participants were randomly selected for responding to the queries from instructor. The session was summed up by reinforcing man-nature mutuality in terms of Guna pattern. From the class room response from the students, instructor could comprehend the aptitude of participants in identifying Guna spectrum from their surroundings.

4.3.4.6. Discussion on assessment (Unit – 3)

The main objective of the unit was to be familiar with the Guna spectrum in their physical, biological and environmental parlance. As a part of summative assessment spot quiz was performed to assess the ability of participants to identify Guna pattern of common physical, biological and environmental entities. The results showed significant acquirement of such an orientation evidenced from the average score attained by them in spot quiz. The gross feedback showed that 87% participants (38 out of 45) very well understood the real life significance of Guna spectrum, 9% (4 participants) had understood moderately, 2% each poorly and not at all understood the real life significance of Guna spectrum. The unit feed-back proved more interest, interaction, and agreement with interest for further learning than previous units. From the results of pre-test post test assessment, it is clear that there is a highly significant improvement in comprehension of the familiarity with Guna spectrum. The results of spot quiz affirm the understanding and application skills of the participants in relation to the Guna spectrum in environmental and lifestyle factors. This achievement is deemed

to be utmost crucial in making changeover (ie, accommodation) from the previous schema to the new schema.

4.3.4.7. Discussion on class events (Unit-4)

This unit was intended to understand Tridosha sidhanta in biological parlance through activities and examples with which they are already familiar with, bridging with the trilogy (visarga-adana-vikshepa) they have already acquainted with. Brain storming Lecture discussion, spot quiz, activity, video demonstration, role play and story-telling were selected as teaching strategies. Brainstorming was conducted on “differentiate living organism from non-living organism”. Being a matter familiar from their primary classes, almost each participant could contribute in the session. The points raised were enlisted on the white board. Apart from usual features like movement, metabolism, reproduction, growth, respiration, excretion, responding to stimulus etc. some noteworthy points like dreaming, repair, thinking, death, consciousness were also raised. Importance introducing a new concept from the present level of understanding is well addressed in this activity.

In the next activity **t**he terms enlisted at the end of brainstorming were enlisted. On the other side of the white board three terms – Visarga, Adana and Vikshepa were written. The term Visarga was interpreted to be the accumulative principle (growth), Vikshepa as the Movement principle and Adana as disintegrative principle chiefly brought out by digestive breakdown

inside the body. In that way, three new terms were coined – Movement, Digestion and Growth. A discussion was initiated by the instructor to find out the role of these three principles in the terms enlisted. Each term was analysed to identify how much the three principles are present in each. Participants could easily and directly relate the terms movement, growth, digestion with the trilogy, whereas in the case of terms like respiration, excretion, repair, reproduction etc. instructor could easily make them convinced of the roles of the Trilogy. Also, the discussion easily transpired to a notion that all the term has got involvement of all the three principles, with varied involvement, even though precision was not insisted. The discussion ended up with a conclusion that whatever feature differentiate living organism from non-living organism, the three principles – Movement, Digestion and Growth prevail as the governing forces behind. After establishing the three terms – Movement, Digestion and Growth, these prime notions were driven to derivation of three terms – Vata, Pitta and Kapha by explaining their etymological derivations as per Susruta Samhita. The etymology was related to the primary functions adopted by Tridoshas in human body.

It was followed by a group activity of "Identifying physiology in terms of Tridosha."

The whole participants were divided into three groups – Vata, Pitta, Kapha. Twenty eight terms related to common physiological activities in human body were displayed. Each group was instructed to select the terms from the list which they feel to be most related to the respective Dosha. They

wrote the terms in a paper and presented at the end. There was a discussion to get the agreement of other groups for the inclusion. Some terms like energy production, elimination, excretion, repair, digestion etc. were subjected to more discussions to identify the exact group to which they belong to. Some of the terms like excretion, immunity, fertility etc. were typically claimed by all the three groups. Instructor admitted such ambiguities and reinforced the mutuality of the three forces in bringing out activities in human body.

A spot quiz was conducted as a formative assessment as well as a method of transaction enlisting 20 picture spots displaying structural or physiological events in human body as well as some other organisms like amoeba. The pictures were amoeba capturing food, structure of eyeball, structure of knee joint, structure of blood vessel and fertilization Participants were instructed to identify Doshas in each of the spots. The exercise, as appreciated by the participants, could create an impression that anywhere in the body there is presence of Tridosha in varied proportions. Out of 20 marks, average score gathered by participants was 17.36+ 2.88, which marked highly significant understanding in the subject, especially at its application level.

A concept building session aimed to build up impressions on nature of Tridosha concept, with the help of some approaches based on newly developed maxims like “horse & horse rider approach”, “tea-sugar approach” “bicycle approach” etc. The maxims tried to explain nature of Tridosha concept with the help of some illustrations in picture form. The concepts intended to be attained were “Tridosha are inferable”, “Tridoshas are principles *behind*

the activities", "Guna and Karma of Tridoshas are inter-related" "Tridoshas are mostly intangible in nature" etc. Examples selected for illustrations were familiar to their understanding. Use of maxims (nyayas) are frequently employed in Ayurveda to explain complex principles. But, most often such maxims are becoming incomprehensible to the contemporary group of students due to unfamiliarity with the objects referred in the maxims. So, constructing newer versions of maxims seems to be a pedagogic requirement in contemporary Ayurvedic education. This exercise hints on the feasibility of such newer maxims.

The next activity, a game, showed how Dynamic equilibrium of Tridosha is important in maintaining health. Session aimed to make the participants demonstrate what is meant by "dynamic equilibrium". A biological system is basically not a static one; instead it is demanded to adapt itself with different changes which it is continuously exposed to, by keeping a dynamic equilibrium within it. The game was introduced to signify this idea. Three participants were invited to hold three threads attached to a ring and to balance the ring in air by holding the threads. This state was explained as static equilibrium. Then they were instructed to move around in the class room keeping the balance of the ring. While moving, they maintained the balance by making adjustments on the force they applied and its direction. This was explained as the dynamic equilibrium. The three volunteers were deemed as three doshas, so that, the equilibrium (homoeostasis) was explained to be maintained through the internal adjustments they bring within

themselves to balance the system in the process of adapting to the changes to which it is exposed to. The volunteers explained how difficult is the process of maintaining the balance while moving around in the class.

Next activity, a video lesson displayed an animated film explaining cardiac function. Balanced function of Vata (movement), Pitta (metabolic changes) and Kapha (structural integrity) was explained with the help of video.

The session was concluded by explaining the sloka which depicts Tridosha sidhanta was explained by the instructor. It explained the importance of balanced state of three doshas in maintaining health.

4.3.4.8. Discussion on results of assessment (Unit 4)

The overall aim of the unit was to bring out the biological understanding on the nature and functioning of Tridosha in human body. Transaction was made easy through adopting a range of strategies starting from brainstorming to video lessoning. The multitude of strategies was necessitated since the unit was conceived to mark the transition from biological understanding about human body to the Tridosha perspective. Majority of participants (84%) reported that they very well understood the idea that biological activities in general can be understood and explained in terms of Tridosha. The spot quiz could appraise how well the participants could accommodate themselves to the new realm of knowledge in a formative fashion. The appraisal was highly significant with 17.36+2.88 marks out of 20 (86.8%). The questions in spot quiz addressed not the cognitive level but,

the understanding/interpretation level in which participants tried to develop understanding by their own interpretation on the subject based on the previous information collected. In the pre-test post-test assessment 56% enhancement was noted in the information gathered and the change was statistically significant. Participants perceived the whole unit to be highly agreeable with respect to its capability to build up interest, to ensure participation, to impart interactive nature, to display clarity in ideas as well as slides, to generate interest for further learning and to encourage critical thinking. Among the above parameters, strongest agreement was imparted to the ability to generate interest for further learning (80%).

4.3.4.9. Discussion on the content of module (Unit-5)

This unit aims to build up connection between two previously learnt concepts – Concept of Guna and that of Tridosha and to make list of Gunas of Doshas. Finally, it led to make comparison among Doshas with respect to their Gunas. The teaching strategies adopted were guided discussion with the help pictures and descriptions, and game. There was an introductory lecture (Activity 5.1) to signify the word meaning of Dosha and importance of the number *three* while enumerating Doshas.

During the first activity, the whole participants were divided into three groups, Vata, Pitta & Kapha. One among each group was selected to read the descriptions in the display (with pictures). Each description hinted on a particular Guna, which, the participants could identify with the help of prior knowledge about Gurvadi-guna. The descriptions and pictures were

mostly related to real life experiences which enhanced logical reasoning to arrive easily at Gunas hinted therein. Participants could deduce the list of Gunas on the basis of the descriptions easily. Gunas, like Visra in the case of Pitta, Mritsna in the case of Kapha which are not present in Gurvadi guna were explained by the instructor. After identifying all the Gunas related to a particular Dosha, instructor arranged the terms (Gunas) in a particular sequence which formed sloka as appeared in Ashtangahridaya sutrasthana chapter-1. Sloka was chanted two or three times by the participants.

The next activity, a card game, aimed at comparing the Gunas of Doshas and to be aware how Doshas can become mutual regulators. In the three groups named as Vata, Pitta and Kapha, when card holders of Guna in one group stood up, corresponding similar/opposite card holders stood up in other groups. For example, when card holder with rooksha stood up in Vata, Snigdha and Sasneha card holders stood up in Kapha and Pitta respectively, so that visually the presence of similar or opposite Gunas in the three groups became evident. Likewise, Laghu guna was identified in Vata and Pitta, Seeta in Vata and Kapha, as opposed by Ushna in Pitta etc. The idea derived was, there are some Gunas which are opposite and some other Gunas which are similar among Doshas, through which Doshas can either support or control each other.

4.3.4.10. Discussion on the results of assessments (Unit – 5)

The chief aim was to build up the Guna basis of Doshas through identifying Gunas in each Dosha through simple logics. Most of the

explanations given were real life examples. Apart from the conventional method of introducing list of Gunas directly, this unit attempts to derive probable Gunas through simple logical explanations of various features of Doshas. This was a reverse process of the conventional method. In conventional methods usually, the Gunas are enlisted first and the meanings are explained consequently. The above method illustrates how constructive approach can be well adopted in learning characterization of Ayurvedic principles. The activities in this unit made majority (75% participants) to understand the intended idea very well. 25% (11 participants) understood the idea moderately. There was no participant who did not understand the idea. As per participants' feedback, the activities let the participants to strongly agree with all positive criteria evaluated, with greater intensity with the interest shared by the class. This session was important in the way, in which two streams of understanding (Tridosha and Guna) meet to make a comprehensive understanding of both, which, pave way for ideal correlated understanding between different theories.

4.3.4.11. Discussion on class events (Unit – 6)

This unit tried to widen the knowledge of Tridosha through concept and application of Prakriti in Ayurveda. Praktiti explains the range of human characters such physical, physiological, psychological and behavioural with which Tridohas are related. Also, it provides a medium appropriate in building up realistic and humanised account of applying Tridosha sidhanta, in a pragmatic fashion. Description of Praktiti satisfies itself as the extension to

the prior knowledge attained by the participants, by assessing Tridosha in their own body and that of their nearest friends and relatives through different proforma. The strategies adopted were role play, constructionist approach, video lesson, proforma filling activities etc.

The first activity was a role play, “three personalities”, in which A few volunteers were selected for it. They were instructed to enact a suitable plot with three or four characters. Instructor suggested the characters in the skit to be typically representing the three Doshas by behaviour, speech, body language, attitudes and whatever they can express through the conversations and reciprocations. After 15 minutes of discussion, four volunteers came up with some ideas and they staged it in the class. There were four characters in the skit. Three class mates planning for a tour the next day, the discussions being carried out near a tea shop, with the fourth character as the tea shop keeper. Three classmates characterized themselves with Vata, Pitta and Kapha features in speech, attitude, and behaviour, some specific interests, conversation, planning etc. as given in table 4.3.1.

After the play, participants in the class were asked to write down the prominent Dosha in each character with the justification of the selection. The instructor randomly called some of the participants to explain their selection and took agreement among other participants regarding the selection. Almost all the respondents made the selection correctly. Characters 1,2,3 were selected with Vata, Pitta and Kapha Prakriti respectively.

Next was Video lessoning “Characterization of Prakriti”In this activity different videos featuring animal behaviour, human behaviour etc. were displayed to identify different Prakritis. The sessions started with the famous turtle-rabbit story, advanced with animal behaviours (monkey, cow, tiger, elephant, sparrow, eagle, duck etc.). Another set of videos featured speeches/ stage performance of famous persons (chief minister, famous anchors etc.). Participants rightly responded by correctly identifying the Prakriti as featured in the activities, by appearance.

Subsequently there was a preliminary discussion to discuss and enlist the features of Prakriti. Three pairs of volunteers were invited to the dais and in each pair one was asked to describe the other person in terms of

Table 4.3.1. Characters and their features in role play

Characters	Characterization
Character – 1	Fast and interrupted speech, Simply talkative, hypermobile Changing the ideas fast Eg: ordering tea, suddenly changed to coffee, ordering snacks, suddenly changing the order, unstable ideas suggested while discussing about the tour etc.Ordering hot tea
Character – 2	Easily irritated by the attitude of character-1& 3. Interested in specific points only over sweating, ordering cold tea and cold items, keen and fast in the planning; becoming aggressive while others oppose the plan
Character – 3	Slow in movements, expressions and reciprocations. Almost stable in position, less body language, ordering tea/snacks

physical appearance, behaviour, appearance, daily regimen etc. They were allowed to include any feature they want to include. After completing the above description, there was a discussion on the features those are included in the description. Participants were invited to spontaneously enlist the features (attributes) described in the previous exercise. The attributes were written on the white board. Finally the list was finalised with the guidance from the instructor through discussion as follows:

Table 4.3.2. Physical & Psychological / behavioral basis identified

Physical	Psychological / behavioural
Physical appearance, Physical strength, Body language/body movements, Sleep Appetite, Speech, Skin, Hair, Eyes	Grasping & Memory, Planning, Concentration, Making friendship, Completion of task, Sensitivity, Excitation

After enlisting the major attributes to be assessed as a part of Prakriti assessment, they were entered to a table, with minor additions to the list. The whole attributes were broadly classified into Physical/Physiological and Psychological. The attributes were entered to the first column of the table and three other columns namely Vata, Pitta and Kapha were left blank to be filled by the participants with the Doshik features corresponding to each attribute. The printed table were distributed among the participants and they were instructed to fill the table by their own logic, within 20 minutes in the class. After completing the exercise, each proforma was compared with a

standard proforma already prepared by the instructor. The proforma filled by the candidates were evaluated by the participants by exchanging it among themselves. The score was tabulated and analyzed statistically (Appendix – sample sheet).

After this exercise, standard Prakriti profroma was distributed among participants to do an assignment ie, doing Prakriti assessment of at least three persons from their family/hostel/neighbourhood. Three days were allotted to complete the assessment. The assignment were evaluated by the instructor and scored later.

Through the above exercises, participants seem to understand Tridoshas as reflected on their own and their friend's physical body and behavior. This made a different order when compared to conventional teaching, where, Prakriti is usually taught directly from Slokas. The constructionist approach becomes the hall mark of this session, where the participants construct a tool through which they evaluate human personality. This makes more concrete ideations regarding a concept. Another attraction of these practices was imparting due consideration to the affective domain of the participants where they find the content to be directly linked with their life on a realistic ground.

4.3.4.12. Discussion on assessment (Unit – 6)

Due to the intense participation from the part of learners in the activities, all the parameters in the feedback showed maximum agreement

in this unit. They found the session most interesting, participatory and invoking critical thinking among all the sessions. They themselves identified, experienced, experimented and appended new features to Tridosha, which, thoroughly became part of their knowledge about the subject. All of them agreed (52% strongly, 48% moderately) to the fact that they could learn more about Tridosha through concept of Prakruti. The constructed proforma were evaluated to see their conformity with a standard proforma prepared by the Instructor. The results show significant conformity with a standard proforma, indicated by the marks (out of 50). It shows the quality of understanding attained by the participants so far about concept of Tridosha. The standard proforma was then used for Prakriti assessment of three persons outside the class (friends and relatives) and was evaluated (out of 50 marks). The results show significant improvement in understanding.

4.3.4.13. Discussion on Class events (Unit– 7)

The objectives of this unit were to enable the participants to explain how life cycle and factors in nature make fluctuations in Tridosha and to enlist normal functions of Tridosha in human body. Apart from adopting constructivist learning methods, this unit let the participants to work out on a readily available list of attributes, in the form of terminology as per Sloka depicting the respective ideas. The list of terms in the textbook was put as the basic material and apprehension of their meaning was attempted by the participants in a graded manner with minimum intervention by the instructor. The graded apprehension of meaning was done through explaining the terms

in three steps: (1) Simply putting the terms without meaning (2) Connoting simple meaning of the terms (3) Explaining the meaning with its implications. In each step, participants got opportunity to relate the terms to Tridosha with their own logic.

As an initial activity, a spot quiz was conducted to elicit how much the participants by themselves could relate environmental factors (geographical dispositions), life cycle (age related phenomena), physiological events (digestion) etc. with Tridosha. Such a discovery was followed by familiarizing the practical implications of such phenomena also. Leaners are already familiar with the Guna pattern of such influencing variables, hence, in that back ground,comprehension with the new area was quite easy, as reflected in the scores attained in spot quiz. The score of spot quiz was taken as a measure on how much the learners advanced in generating their own ideas related to the topic specified. On an average the participants scored 94.8% marks in spot quiz, which itself explains they could comfortably land on to the new area without being instructed by the instructor.

The most important exercise in this session was use of a terminology table to apprehend the meanings of normal functions of Tridosha. A table was prepared with the first column enlisting 21 terms enlisted as Karma of Tridosha in Ashtangahridaya Sootrasthana 10th Chapter. Three columns each grouped in three domains, “Mere Sanskrit terms”, “Sanskrit terms with meaning” and “Sanskrit terms with explanation” representing three levels of participants’ understanding – identifying the Doshas related to the

terms after (1) simply reading the term (2) getting the simple meaning of the term from instructor and (3) by getting the terms explained by the instructor. This method is usually adopted in language classes to build up the knowledge from what the participants appreciate themselves and advancing through the help offered by the instructor. The filled up tables were scored later. Out of 21 marks (1 mark each for 1 correct entry) after the first phase, an average mark of 11.65 + 2.86 was scored, the score percentage was 55.5%. The maximum score attained was 15 by three participants. In the second phase, where the participated were allowed to make entries after getting the meaning of terms, average score raised to 14.33 + 2.89 with a percentage of 68.2%. In the final phase, where the instructor explained the terms elaborately, average score enhanced to 19.45+2.31, reaching a percentage of 92.6%. The scope of phase-1 significantly reveal a fact that from the terms enlisted, without connoting their meanings, an average 55.5% marks could be gathered by the participants, which indicates natural capability of the learners to apprehend the meaning by their previous linguistic aptitude and common sense. Another interesting observation obtained during the exercise was maximum scores were attained by participants who did not learn Sanskrit previously. These facts could build up the confidence level of the participants who were anxious about being illiterate in Sanskrit. This exercise stressed on linguistic approach of learning Ayurvedic content, which also is important in this context. Sanskrit, being an unacquainted language to majority of the participants, as reported in demographic data (Table 3.4.1.), the results in the tabulation puts important insight on the method to be adopted in learning

Ayurvedic list of terms in a constructivist way. At the end of the tabulation, the terms were arranged in a sequence as they appear in the sloka explaining normal activities of Tridosha as seen in Ashtangahridaya Sootrasthana 10th chapter.

4.3.4.14. Discussions on results (Unit-7)

Sloka writing was the exercise given in this unit. Participants gathered 88.3% marks, which indicate significant increase in their apprehension on Slokas prescribed. Their feedback revealed the perception related to the mode of delivery of the module. Class was reported to be interesting, ensuring participation, interactive, clear, communicative, and building up interest for further learning.

4.3.4.15. Discussion on class events (Unit - 8)

The unit tried to construct the structural notions related to Tridosha on the basis of the idea they attained through previous sessions, avoiding direct instructions by the instructor. Naturally the class went on with identification the structural basis (ie, locations, landmarks, relationship with other structural components, structural hierarchy etc.) with the help of some clues given with the help of pictures. Before this exercise some of the basic structural approach was discussed as concept building through some analogies.

Initially human body was compared to an electric engine to explain how the structural integrity becomes important in its function. Structural brokenness makes the function difficult. So, structure is important. Concept

of “inverted tree” put light on how man represents the nature. This concept is important in explaining structural basis of Tridosha (putting Kapha in upper part and Vata in lower part). Gut theory of Tridosha is another central idea which further elaborates the structural connections of Tridosha. These three basic concepts put a basic introduction to the further details to be dealt in the class. At the end of the concept building participants seemed to become receptive to the forthcoming ideas.

The succeeding activities, in the form of picture discussions, prompted the participants to relate their previous knowledge to some new ideas of structural basis. The discussion started with a point on the healthy structural make-up of the body. They could easily identify, with the help of picture, that body which is broader (stouter) in the upper part and narrower in the lower part is healthier. Also they identified that upper part is comparatively heavy, less mobile compared to lower part of the trunk. Also, upper part is the feeding centre, lower part is the evacuating centre. Middle part always stands for intensive digestive activities. Correlating these ideas well with their previous ideas participants easily could derive the relative positions of Tridosha – Vata (light, mobile) in lower part, Pitta in the middle part (intensive digestive process) and Kapha in the upper part (heavy, relatively stable). Also the concept of Inverted tree helped them to formulate the new idea. The new idea was re-in forced by explaining the corresponding Sloka (AH Soo 1/7). The Bhautik configuration of Doshas were discussed by asking the participants to relate the Doshas with Bhutas by their own logic. Most of them related precisely without much ambiguity, with the help of ideas they gathered so far.

For identifying specific locations, the ideas were constructed in three stages. In the first stage, asked the participants to enlist some important organs in the three regions (upper, middle and lower) of the body; wrote them in the white board. In the second stage, Dhatus were enlisted on the white board and participants were let to relate them to Doshas. In the third stage, Indriyas were listed out and let them relate with the Doshas. In these three stages, participants freely associated the structures and instructor interfered in the selections whenever needed. Almost half of the selections could be completed by the participants rightly, the rest with the help of instructor. Some of the relations like Rakta – Pitta, Asthi – Vata etc. were specifically explained by the instructor. Finally, the selected items were enlisted as Sanskrit terms and made in the form of the sloka explaining the locations (AH Soo 12/1-3).

The next activity was illustration of the significance of locations of Doshas through some specific cases. Each case explained some clinical conditions in which the location of Dosha plays important role either in understanding the pathogenesis or in treatment. All of them are simple and practically applied in clinics. This exercise tried to address logical reasoning and application aptitude of the participants. After this session, participants seemed to be convinced about the practicality of the concepts learnt.

4.3.4.16. Discussion on assessments (Unit-8)

The main objective of the unit is to learn the structural basis of Tridosha. The pre-test-post-test questionnaire chiefly aimed to assess how

much the participants could recall the association of Tridosha with different structural components of human body. The difference in score was statistically highly significant ($p<0.001$), with an increase of score by 63% in the post test. The class was rated with strong agreement in relation to interesting nature, chance for critical approach, ensuring participation, clarity of ideas and further interest in more to learn. The assessments show the efficiency of the transacting the content intended without creating cognitive dissonance, through a constructivist approach. The transaction relied more on interactive methods than instructionist methods. Slokas were learnt as a part of the constructivist model as well.

4.3.4.17. Discussion on class events (Unit - 9)

This unit aimed at building up idea about the states in which Dosha equilibrium is primarily lost, in the form of increase (vriddhi) and decrease (kshaya). After introducing the concept of such variations, their symptoms were familiarized through role play and tabulation of symptoms using graded table. To relate the symptoms of increase with real life experience, an exercise was done to correlate different causes of Dosha increase (vriddhi) to their probable symptoms and probable Gunas behind each, by taking participants' real life experience to consideration. Similarly, symptoms of decrease (Kshayalakshana) also were introduced. To make deeper understanding on the role of Guna in bringing out normal functions and increase/decrease symptoms an OTB (Open Text Book) activity was also done. In this activity, participants could refer textbooks to list out the features (normal activities,

symptoms of increase and decrease etc.) and can trace out probable Gunas behind each activity.

The session started with an activity of explaining the concept of health in relation to Saamya, Vriddhi and Kahaya with the help of diagrammatic representation. Vridhi and Kshaya were explained to be occurring in two ways: Natural fluctuation (shallow wave) and abnormal fluctuation (deep wave). To illustrate the symptoms of increased Vata, a role play was introduced. Two volunteers were invited to play a skit. One was a Doctor and the other a patient. Patient who travelled continuously for the last three days in a damaged road, without proper rest and food approached the doctor. Doctor asked about his feelings and the symptoms were enlisted by another participant on the white board. The following symptoms were enlisted: tiredness, giddiness, skin dryness and darkness, shivering, flatulence, constipation, loss of strength, loss of sleep. Instructor added two more symptoms: loss of orientation (sometimes as disoriented speech) and sensory dullness. Then asked the participants about how many of them felt these symptoms in such circumstances. Majority of them raised the hands. Again asked the probable Dosha increased in the above instance. Majority agreed for Vata. After completing the list instructor translated the terms into Sanskrit and wrote on the white board. Karsya, Bhrama, Kaarshnya, Kampa, Aanaaha, Sakrit graha, Balabhramsa, Nidrabhramsa, Pralapa and Indriyabhramsa. Finally, added a term ‘like towards hot objects’ (Ushnakamitwa) to the list, by hinting on the cold nature of Vata. So, the list was finalised and restructured as sloka describing Vata vridhi lakshana in Ashtangahridaya (A H Soo 11/1-2).

Graded table method was prepared by randomly enlisting 26 symptoms (in Sanskrit) mentioned in Ashtangahridaya as vridhilakshana of Tridosha (A H Soo 11/5-8). Participants were allowed to relate each term to Doshas which they feel to be appropriate in a graded manner. Selection can be made in three phases – Such as “Mere Sanskrit terms”, “Sanskrit terms with meaning” and “Sanskrit terms with explanation”. The selection was made by the participants independently by applying their own logic. Finally three separate Dosha wise lists were prepared and were converted to a Sloka form.

Next was an assignment “Dosha-vriddhi in common life experience”was done with an aim to relate the symptomatology of Dosha vriddhi with real life experiences. Symptoms of increase of Doshas were given ready to refer and some etiological factors, which a person usually get exposed to and causing Dosha vitiation were enlisted in the table. Participants were asked to identify Dosha having a chance to get increased due to 13 commonest aetiological factors and to select probable symptoms from among the list of symptoms given as ready reference.There was an option in the table to mark whether the aetiological factor/symptoms are experienced by them. For those questions they agreed that most of the aetiological factors and the symptoms were experienced by the participants. Some aetiological terms like “excessive anger”, “Starvation”, “Suppression of natural urges” created some sort of ambiguity in fixing the Dosha connection.

Symptoms of decrease of Doshas was done by asking the participants to classify the terms of Doshakshaya into Vata, Pitta and Kapha.

English meaning of Sanskrit terms were introduced first and after they getting classified Sanskrit terms were introduced. Some of the terms like Hriddrava was a little confusing to relate the meaning and also to get classified. All other terms were satisfactorily attempted by most of the participants, during discussions.

Next was an Open Text Book (OTB) activity to convince the participants about how Gunas take part in bringing out symptoms of decrease and increase of Tridosha. With the help textbooks, the participants were instructed to list out normal functions, symptoms of increase and decrease in a table. For each activity, may it be normal or abnormal, they were let to identify probable Gunas behind. Almost all participants satisfactorily succeeded in identifying the Gunas more or less precisely. Enlisting such Gunas was proceeded by classifying the Gunas into two groups: dominant and dormant. Gunas which show clear presence in respective activities were classified as dominant and naturally the other qualities were dormant. By this classification, participants could derive an idea about the presence of Gunas in different situations viz. the Gunas dominant in normal activities may not be dominant in abnormal activities and vice versa. For example, Chalaguna of Vata is dominant in normal activities, but, Ruksha, Seeta, Laghu gunas are dominant when Vata is increased and vice versa. As a part of assessing the ability of participants to connect Dohas with Gunas, the OTB activity was scored and evaluated.

4.3.4.18. Discussion on assessments (Unit – 9)

There was some special methods of activities in this unit which in one way was a method of transaction at the same time a form of formative assessment. The main aim of the Unit was to introduce abnormal variations of Tridosha in the form of Vridhi and Kshaya through exemplifying their own real life experience. The pre-test-post-test assessment was intended to assess the improvement in knowledge level where as the assignment was aimed at assessing how much the participants relate Tridosha in their daily life. The graded table appropriate the attainment of knowledge in a linguistic approach as it was done in the previous unit. OTB activity serves multiple purposes by imparting textbook orientation. As a part of feed-back on the total module, 75% of participants (33) reported that they could very well understand the idea that “Gunas of Dosha are logically related to their functions in the body”. Results of pre-test and post-tests highly significant enhancement of knowledge through the module. The scores in OTB and assignment significant enhancement of understanding in the respective subject content. The unit feedback, it is evident that grand majority of the learners strongly agreed with the interactive nature, critical thoughts, interest generation, participatory nature and communicativeness of the methods followed in the session.

One of the main complaint against concept learning raised usually by BAMS students is the hypothetical presentation of symptoms related to Dosha vitiation. This session enabled easy translation of such symptoms to real life experience and from the feedback and assessment this method

seems to be effective in resolving such an issue. The linguistic approach adopted in learning core slokas repeated its effectiveness in this session also. OTB activity seems to be adaptive in resolving the problems in dealing with the textbook oriented studies in Ayurveda. Such activities are more adaptive to other textbooks like Caraka Samhita, which appears in the formal syllabus of BAMS in subsequent years.

4.3.4.19. Discussion on Class events (Unit - 10)

In this unit the prime objective was to familiarize the division of function of Tridosha taking Vata as a sample. The exercise done was to map five divisions of Vata with the help of symbolic diagrammatic representation of human body into five circles. Concept mapping was the technology used here. This exercise was done with the active participation of participants. The concept mapping was done in six steps:

Step – 1: One of the participants was asked to draw four circles on the white board from above downwards. Participants were asked to imagine the circles as four chambers of human body.

Step – 2: Then asked another participant to name the chambers after inviting suggestions from other participants. She named them as: Head, Chest, Abdomen and Pelvic cavity.

Step – 3: A question was posed “What will be the direction of chief flows in human body, will it be from up downwards or from down upwards?”. Instructor explained the questions with examples of major flows

in the body digestive flow. After the explanation one of participants was asked to draw the direction in the white board. The arrow was from up downwards.

Step – 4: Instructor once again explained the above direction taking digestive process as an example. From above downwards the food moves. Then posed a question: which direction represents the flow after assimilation of food ingredients: Would it be upwards, downwards or as oblique. Most of the participants agreed with an oblique direction. An oblique circle was drawn on white board. Finally, number of circles became five.

Step – 5: Participants were asked to discuss and enlist major activities in each chamber. Active discussion was taken place, one of the participants marked it on the board. Finally, instructor concluded as to make the list to the following terms: (1) Head – Control of vital centers, Mind (2) At the junction of Head and chest – Phonation (3) Abdomen – digestive activities (4) Pelvis – Excretion, reproduction (5) Oblique circle – voluntary involuntary activities, circulation

Step – 6: Explained the five physiological events as the ones driven by the chief motivator of the body: Vata. So, there are five functional subdivisions for Vata. Names of each were coined here – Prana, Udana, Samana, Apana and Vyana.

Step – 7: As a conclusion to the above exercise particpants were allowed to tabulate chief name, location and function of five subdivisions of Vata.

On the basis of the outcome of the above discussion, the instructor delivered a lecture on the further details of five subdivisions of Vata with the help of details available in the textbook.

4.3.4.20. Discussion on assessment (Unit – 10)

The assessment was based on pre-test post test scores of 10 mark, to write down subtype of Vata responsible for ten given functions. The pre-test revealed that learners were absolutely ignorant about the concept initially, but the post test showed highly significant change in their knowledge. From the feedback, it was evident that all the participants agreed with all the parameters assessed. But, strong agreement was noted with comparatively lesser frequency, frequency of simple agreement was comparatively more than other sessions and there was increased frequency of disagreement also when compared to other sessions. The subject content of this session stands distinctive from the rest of the package, because it conveys an idea which is incoherent with the previously attained knowledge background. This phenomenon is reflected in the global ignorance indicated by the results in pre-test. Subtypes of Vata only is considered here in order to make the transition as smooth as possible.

4.3.5. Discussion on the basis of feedback parameters

The parameters used in expressing the feedback in different units broadly belongs to – whether the session was (1) interesting (2) offering

participation (3) interactive in nature (4) equipped with communicative slides (5) creating interest for further learning (6) was clear with ideas conveyed and (7) encouraged critical thinking. Broadly all the parameters had shown almost comparable frequencies across all the units with some commendable differences in between. While comparing the parameters, all of them typically showed maximum agreement in Unit-6. The interest shared by the participants typically showed gradually increasing frequency from Unit-1 to Unit-6, and then gradually declining. This observation stands with some critical insights about the nature of transaction adopted in Unit 6. It dealt with understanding Tridosha through concept of Prakriti. The strategies adopted richly contained participatory methods like role play, proforma construction, proforma filling and on the other side effective use of multimedia in the form of video lessoning, where participants could relate different behavioural patterns naturally to different Prakritis and in turn to Tridosha. Appraising oneself through the method of Prakriti assessment seemed to be interesting, especially in the adolescent age, where the participants usually are more concerned about their own image and personality. In a way these exercises enriched the affective domain of the learners where they could accept Tridosha more precisely and sensefully as a part of their own personality. Even though frequency of disagreement (either moderately or strongly) is very low in all parameters, some of them are apparently significant. Maximum dissatisfaction level (18%) was shown in the response to the criteria “interest for further learning” in Unit-1. In Unit-1, strong agreement with almost all parameters shown lesser frequency when compared to mere agreement. Being the first

module, it is well expected that there will be moderate resistance to receive a new content. This resistance seems to be reflected in the above pattern of feedback.

4.3.6. Discussion based on how much the new model met the proposed guiding principles

Tridosha, being a theory which represent Ayurveda in the entirety of its approach towards human being, along with the multidimensional approach towards the same, is considered to be corner stone of its understanding on normal and abnormal functioning of human body. Bridging a learner from an empty space to the core ideations regarding Ayurvedic approach of human life is easily attained while posing Tridosha as a medium for such a transition.

One of the guiding principles of the new model, as aspired in different stages of its development, was to place the new model as a transition curriculum, at least in a preliminary sense. As a beginner, through this model, the learners approached Ayurveda from their own surroundings and real life situations, that too by facing minimum cognitive dissonance. This attribute declares this model as to fulfil such an aspiration positively.Hence, the third hypothesis proposed for this study i.e. “It is feasible to develop a transition curriculum for beginner learner in ayurveda graduation course” is accepted.

Pre-clinical learning, as defined during the conception phase of the new model, comprise of learning the concept in the natural surroundings

of the learners, rather than approaching patients in the clinics. Placing a knowledge in natural surroundings is the primary step of learning of Ayurveda, as proposed by Caraka in proposing human body as an epitome of universe. So, pre-clinical learning in Ayurveda is defined as the learning of things by putting them in a universal perspective. This approach is convincingly laid down through the above model.

Piaget's principles of assimilation and accommodation could be ideally correlated to the present flow of contents. During the feedback on total model, learners strongly admit the strangeness of the concept conveyed but at the same time strongly agree that the transacted concepts are not much difficult to learn. This almost suggest easy accommodation to the new subject by safely surmounting the cognitive dissonance.Reflective practice is the capacity to reflect on one's own actions so as to engage in a process of learning. This process was maximum supported through teaching strategies like role play, constructionism, assignments, spot quizzes etc. Paying critical attention to practical values of the theories is the typical way of such practices, which was ensured richly in the model. The scores gained in such activities show the effectiveness of the strategies in inculcating reflective practices in learners.

Most of the teaching strategies used in the new model are usually not adopted in Ayurvedic classrooms at large. Especially some of them like OTB method, graded table method, costructionist practices etc. are found to be more appropriate in the context of Ayurveda. Open Text Book practices

may be ideally used as a common practice in teaching and evaluations, where, learners could be more familiarised with classical textbooks (preferably Sanskrit versions), even in higher classes, especially in subjects where Samhita learning becomes mandatory (Caraka Samhita in second year and third year BAMS). Constructionist practices which enable the learner to apply all the accured knowledge at a single activity can be taken as a practice for inculcating high order reflective learning. The agreement of the constructed proforma with standard proforma (Prakruti assessment activity) was significant, which indicates the enhancement of reflective capacity of the learners to implement their previous knowledge in devising a new instrument. While defining different levels of learning objectives, Bloom's taxonomy place "to create something (synthesis)" at the top of the hierarchy, the other four being (from bottom upwards) knowledge, understanding, application and analysis[78].

Ayurveda is a rare kind of subject where linguistic approach towards learning the content becomes imperative as a part of transaction, that too with most of its complexity. Usually learners are presumed to be illiterate in Sanskrit while approaching to learn Ayurveda, because most of them usually would not learn Sanskrit formally as a part of their school. The relationship of most of Indian languages with Sanskrit by origin is not properly communicated to the learners in this context. The graded table practice typically convinces the extent of learners' natural familiarity with Sanskrit through its relation with their mother tongue, where they could comprehend meaning of many of

Sanskrit terms by considering the sense of using their mother tongue i.e, Malayalam. In a way, this can enhance confidence to surmount the preoccupied strangeness feeling against Sanskrit. The results of graded table definitely reflects their capacity to build up sense of Sanskrit terms without any formal introduction to the language. This approach is seldom practiced in Ayurveda classes.

Chapter - 4
SUMMARY AND CONCLUSION

SUMMARY

This study titled *"Comparative assessment of models of instruction for Transacting Tridoshasidhanta"* broadly aims at putting a simple enquiry on feasibility of teaching reforms in Ayurveda, especially in a manner which befit to a beginner learner joining to learn Ayurveda graduation course in making a smooth transition to the core content of the new subject. Ayurveda has a unique content which makes it different from other streams of contemporary applied systems by way of projecting an ancient system of knowledge to a contemporary context, where the contexts radically differ. This difference pertains to the form, content and transmission of the knowledge base. Ayurveda Samhitas deemed method of transmission (transaction) important by way of describing such methods along with the scientific content of the system they documented. So, this study started its expedition from such basic contemplations to explore the nature of ancient education, to see how it is similar/dissimilar to the present system and to incorporate such methods to formulate a new model which enable beginner learners to surmount hardships

of learning a strange subject, especially its basic concepts like Tridoshasidhanta. Obviously, the above journey advances to the next level by developing new model for transacting Tridoshasidhanta and comparing the new model with conventional teaching prevalent in Ayurveda colleges.

For attaining this aim, an initial attempt was made for a critical analysis of Ancient Indian Methods of Instruction, especially as depicted in Brihat-trayee and its comparison with those in *contemporary teaching* and learning. Subsequently, an *innovative model* of Instruction was developed for transacting Tridoshasidhanta, in the form of a package, suitable for beginner learner in Ayurveda graduation course. Then the effectiveness of the innovative model was compared with *conventional teaching* for transacting Tridosha-sidhantaThese steps put an effective probe on the feasibility of developing a *transition curriculum* for beginner learner in Ayurveda graduation course.

To fulfil the above objectives, the study was planned in three stages:

(1) Literary comparison

(2) Development of new model

(3) Experimental part (comparison of the effectiveness of the new model with conventional teaching)

Summary of literary comparison

Literary comparison was aimed at comparing ancient teaching

methods with contemporary teaching. Ancient teaching methods comprised of system of teaching from four sources such as Vedic, Upanishat, Buddhist and Ayurvedic. Initially an intra-system comparison was attempted in the ancient system based on the above streams and finally Ayurvedic teaching methods compared with principles and practices of contemporary teaching.

(1) The comparison was structured through a historical timeline comprising of six phases: (1) Vedic/Upanishat phase (2000 BC – 1000 BC) (2) Buddhist phase (1000 BC – 600 AD) (3) Ayurvedic phase (500 AD – 600 AD) (4) Medieval phase (700 AD – 1700 AD) (5) Modern phase – teacher centered (1800 AD – 1980) (6) Modern phase Student centered (1980 onwards).

(2) Gross comparison among different phases based on the following domains were made: (1) Nomenclature of system of education (2) Aims of education in each system (3) Nature of curriculum (4) Relation to social structure (5) Stages of education (6) Nature of Guru-sishya relationship (7) Role of student and teacher in transaction (8) Students' autonomy (9) Scope of collective thinking (10) Scope of interdisciplinary approach. Subsequently, thorough comparison between ancient system of education (based on Brihat-trayee) and contemporary principles and practices were made based on the following doamins: (1) Philosophy of education (2) Principles and process of learning (3) Methods of transaction (4) Specific comparison with constructivist teaching practices

(3) Comparison between different historical phases of Ayurvedic education was summarized and it showed the real transition in education from ancient phase to the modern phase.

(4) Summary of comparison of Brihat-trayee teaching with contemporary teaching.

The comparison based on philosophy of education makes a conclusion that, different ideologies developed on a later period such as Idealism, Naturalism, Realism, Scholasticism, Pragmatism, Existentialism, Critical pedagogy and Progressivism, though are devised on a later period, their sprouting can be seen in ancient methods. During the comparison of principles and methods of learning three main approaches such as Behaviorist approach, Cognitive approach and Constructivist approach were considered. Through the comparison it could be convincingly traced out the presence these approaches in Ayurveda also. Ayurveda seemed to accept both the internal and external features related to learning, which in turn roughly correspond with the cognitive and behaviorist approach. Tracing out the presence of constructivist approach also was done effectively. Learning methods like rote learning, associative learning, exemplars and non-exemplars, classical conditioning etc. were identified in relation to the Methods of Recollection (Smritihetus). Auditory, Visual and Experiential (Kinesthetic) types of learning also were explained in this context. During the comparison with constructivist theory, its main features such as participatory nature, encouragement offered, towards questioning mentality, democratic

environment, student centeredness and scope for experimentationwere identified with sensible integrity. Constructivist instructional strategies like constructionism, guided instruction, and problem based learning, inquiry based learning, anchored instruction, co-operative learning, reciprocal peer teaching, jigsaw teaching etc. also were studied for their clear presence in Brihat-trayee. So, The hypothesis proposed for literary comparison was “Basic elements of ancient teaching is similar to the principles and practices of contemporary teaching” was found correct. This agreement was assumed to be vital while formulating guiding principles of developing the new model.

(5) Development of new model for transacting Tridoshasidhanta

New innovative model for transacting Tridosha was developed through a series of exercises following methods of Evaluation research coming under social research methodology with five steps. The above steps, except the last one, evolved more and more precise ideas regarding the form and content of the new model, as shown in the table. The last step was conducted in the form of experimental study, summarized later.

Table 5.1. Summary of inputs from different stages of developing of the new model

Item compared	Brainstorming	Survey among teachers	Focus Group Discussion	Pilot trial
Need of the new model	Strongly suggested the need by commenting on the problems in present teaching technology	100% agreed with the need either strongly or moderately	Discussed the need with probable solutions	Addressed the need with a feasible solution
Feasibility of a new model	Was not an intention of the discussion	Agreed the feasibility either strongly or moderately	Considered practical aspects to make the new model feasible	Tested the feasibility with a miniature model
Defining the gross nature of new model	Should ensure active learning, questioning attitude, adopting new teaching methods	Formulated skills expected after learning through t new model	Should promote reflective practices, better combine traditional method and newer strategies	Activity based approach combined with sloka learning
Content of new model	Not addressed	Suggestions received on prioritizing he content	Clarity on sequencing the content	Minimal content fixed in the module
About clinical based learning	Hinted on early exposure to clinics	Stressed on clinical learning, especially some important topics	Agreed with CBL but discussed its limitations for the beginners	Tried pre-clinical introduction of Tridosha considering the practical implications
Putting Guna as the central idea of constructing new concept of Tridosha	No comments	Importance of Guna and Karma was stressed	Guna basis was suggested as the background to learn Tridosha	Tried to bring out Guna pattern of Dosha as a baseline
Selection of teaching strategies	Real life situations should be incorporated during teaching	Strategies selected according to content being delivered	Strongly suggested technology enabled transaction	Transaction based on Praktiti to put real life situation
Gross theoretical orientation of the new model	Not attempted	Guna-Karma based learning of Tridosha	Learn Dosha through Gunas	From Prakriti to Guna, thentoDoshas
Methods of assessment of the new model	No comments	Achievement test along with feedback from learners	Agreed with the same	Feed-back proforma only included

(6) Key features of the new model

The key features of the new model abides the guiding principles formulated during different phases of its development.

1. The new model intend to transact Tridoshasidhanta to a beginner learner who comes to learn Ayurveda as a part of graduation course.
2. New model was broadly aimed at instigating constructivist teaching/ learning practices in the context of learning Ayurvedic concepts as a part of conceiving the idea of transitional curriculum for Ayurvedic beginner learners." It was conceived to build a smooth transition of a fresher learners to the conceptual background of Ayurveda represented by Tridosha-sidhanta and to help learners widen the perspective so that they could accommodate abstract Ayurvedic concepts and to make Tridosha learning participatory and process oriented
3. New model, presented as a written document named as "Innovative Model for Transacting TridoshaSidhanta" consisted of a package of 10 modules, each module with its own learning objectives, note to the instructor, activities, teaching strategies and assessment criteria. The document was conceived as a material which is self-explanatory in all respects, which enables a new instructor to implement the same by following the instructions.
4. The new model was deemed to be "innovative" by way of blending newer techniques with traditional method of sloka learning.

5. Constructivist approach of learning was taken as the central principle of the new model, as an idea derived from literary comparison
6. The new model basically addresses a learner during his/her inception to Ayurveda, as a part of graduation course. It is planned to bring out a smooth transition from his/her previous learning premises to that in Ayurveda. In that way, this model was conceived as a transition curriculum.
7. The model find itself suitable to be implemented within three months of their admission to graduation course, defined as pre-clinical phase. The pre-clinical approach to learn Ayurveda, where learners are not directly exposed to clinics but exposed to their own real life situations and surroundings.
8. Piaget's concepts of cognitive development, related to assimilation and accommodation was found worth consideration while pondering on learners' exposure to new information.
9. The new model did not challenge the timeframe prescribed as per the present curriculum. It followed the present time structure and time table adjusted for the content to be delivered, as far as possible.
10. The total approach of the model is to follow constructivist theory of teaching, where there is total agreement with the fact that learners can proceed with their own capacity to construct new knowledge based on their own experience. It was implemented by adopting strategies of interactive, student centered, activity oriented learning such as

discussions, brainstorming, games, role plays, problem based learning, simulation, constructionism etc. In constructivist model the focus is shifted to the learner to build up their interest, attitude, aptitude and creativity. The role of teacher there is only to let them identify themselves.

11. The package was successfully effective in imparting chances for reflective practices, which is capacity to reflect on one's actions so as to engage in a process of continuous learning.

12. Along with experimenting with new model, the present package ideally kept the merits of traditional methods of sloka learning. This is the way in which the new model becomes innovative.

13. Role of new media was considerably employed in the process of learning in the new model. Judicial usage such gadgets was found to increase effectiveness of the content delivery.

14. In this new model concept of Guna was selected as a background knowledge to advance to the core ideas of TridoshaSidhanta.

15. The new model made an attempt not to follow any of the established models though structurally it wore attire of a model of instruction. As suggested by Joyce et al.

16. The structural integrity of the new model enabled an easy changeover of learners to a wider perspective which insisted them to think "out of the box" . In the next stage, building a logical Guna perspective of the nature was done which then advanced to the biological understanding

of Tridosha, identification of Tridosha in their own personality, functionial states of Tridosha etc.

(7) Summary of experimental part of the study

Experimental part of the study compared the effectiveness of the new model in transacting Tridoshasidhanta and compared it with conventional teaching (whatever method adopted in such institutions). The new model was implemented in a batch of BAMS students in scholar's own institution (case) and formative and summative assessments were taken as pretest and post-test as prescribed in the proposal. Summative assessments from three other colleges (control), with conventional teaching, were also taken through pre-test and post-test with the same questionnaire. The scores were compared to see the difference. Apart from the summative assessment, the effects of the new model was evaluated through formative assessment during the implementation of individual modules in each unit of the model, through spot tests quizzes and assignments. Structured feed-back was collected in each unit and at the end of the whole package, which reflected the learner's perceptions on the content of the new model and its presentation. The observations were presented in tabular and diagrams and appropriate statistical tests were applied to draw conclusions.

1. The study group, which received new model comprised of 45 participants from shcolar's Institution (Govt.aided), and the control group comprised of 166 participants from two self-financing college's one Govt. College from different parts of Kerala.

2. The demographic data reflected almost comparable distribution with respect to age, gender, socio-economic status, prior knowledge in Sanskrit. A considerable difference was noted in average rank numbers in qualifying entrance test between Govt./Govt. aided and self-finance colleges which was presumed to be reflecting the intelligence of the participants which may affect the outcome measure. So, the control group was subdivided into control-1 (Govt. College) and control-2 (Private College) during comparisons.
3. The study groups received new model not as a separate program but, along with their routine class schedule prescribed by University. It took 57 days to complete the package. In control group post-test was done after completion of the prescribed subject content.
4. Within group comparison of the pretest-post-test score in study group showed highly significant difference ($p<0.001$), which indicated effective transaction of the new model. The same in control-1 also showed significant results which showed that the conventional teaching also was effective in transacting the content ($P<0.001$). Comparison of the post-test score between groups (t-test) showed that there is highly significant ($P<0.05$) difference in performance. This indicated that new model was significantly more effective in transacting the content than conventional teaching. The difference was more with in Govt. Ayurveda College (control-1) than private Ayurveda College (control-2). Since there is significant improvement in the study group the hypothesis of experimental part "the newly constructed innovative model is more effective in transacting

Tridoshasidhanta when compared to conventional teaching" was accepted.

5. The summative assessment questionnaire had three parts – part-1 with MCQ for testing memory and logic based, part-2 more reasoning and application based and third part was sloka – recall based. The difference in part-1&2 was between the groups was highly significant where as in sloka-recall there was no significant difference. That means, the new model was more effective in imparting the reasoning, application and logical based knowledge than memory oriented knowledge.
6. During feed-back learners agreed strongly that sloka learning was more easy than conventional classes (of other subjects), but this advantage was not reflected in recalling the slokas. Recalling capacity of slokas remained good in both the groups where as new model imparted more reasoning, application and logic in the content of solka, which helps the learners' to surmount one of the main disabilities – i.e, learning sloka without knowledge on its application.
7. Structured feed-back of the total package showed learners' high agreement with constructivist and activity oriented atmosphere offered by the new model through encouraging learners participation, leaving chances for constructing learners' own ideas, easiness of concept learning, richness of real life examples, enabling critical thinking, apprehension of Ayurvedic concepts in real life situations, easiness in sloka learning, appropriateness of activities and non-imposing attitude of the instructor. Hence, the new model was successful in making a constructivist attire in the transaction.

8. Aggregate feedback on the perception of content delivered participants had strong agreement on the deliverance of out of the box thinking, man-nature homogeneity, conglomeration of Sarira-indriya-Satwa-Atma, real life implications of GurvadiGuna, pivotal role of Tridosha in bringing out physiological activities, environmental and lifestyle influences leading to Dosha variation, logical connectedness of Gunas of with functioning in the body, Prakruti as a learning tool of Tridosha, connectedness of Karma with Guna in the context of Tridosha.

9. Unit wise feed-back gave high agreement with interactive nature, scope for critical thinking, interest sharing, clarity in ideas and slides, participatory nature and interest for further learning. All the units showed almost the same pattern with minor changes. Unit-6, dealing with Prakriti disposition in relation to Tridosha, transacted through highly interactive methods like role play, video lessoning, construction of proforma etc. was rated with highest agreement among the units.

10. The results of the experimental part reinforced the positive effects of adoption of variety of teaching strategies in conveying core principles of Ayurveda like Tridosha. The teaching strategies included games, group discussion, guided discussion, case simulated discussion, case studies, brainstorming, spot quiz, didactic lecture, group activity, analogy, concept mapping, role play, video lesson, storytelling, construction of tools, graded tabulation, proforma filling etc. Didactic lecture was adopted as a method in situations which necessitates such a method essentially.

11. The new model succeeded in putting a different approach to the nature

and the world around as the place for assembling the logic behind basic construct of Tridoshasidhanta. This approach re-inforced the time tested character of Ayurveda as a natural science. This approach defined style of the pre-clinical learning in Ayurveda i.e, pre-clinical learning definitely means learning through observing the nature. The new model started from nature and advanced to human being.

12. Importance of prior knowledge of Sanskrit in learning Ayurveda was subjected to reappraisal and it was found that proper knowledge in mother tongue (Malayalam) could initially bridge the gap between the content and the learner, which could initially enhance confidence to deal with the new subject easily.

13. From the feed-back and results of assessment of different units, it becomes clear that even though subject content of the new model, ie, Tridoshasidhanta is strange to a new comer, through the new model it does not make a big challenge in the form of cognitive dissonance, instead, the content becomes assimilated easily to the existing schema and tend then to widen the schema to accommodate to a higher schema. The performance in the formative assessment show this tendency throughout the whole package. So, this new model could be considered as a prototype of a transition curriculum. Hence, the present study reveals the feasibility of constructing and implementing a transition curriculum in Ayurveda graduate course.

CONCLUSIONS

1. The present study aimed to elicit the comparison between ancient teaching methods and contemporary teaching. Initially an intra-system comparison of ancient system was attempted by comparing systems such as Vedic, Upanishat, Buddhist, Ayurvedic,and found that there were considerable differences among them.
2. Transition from ancient teaching to the modern teaching was considered in seven phases (Gurukula in Vedic/Upanishat, Buddhist, Ayurvedic, Medieval, Modern I and Modern II) and found that there were merits and demerits for each system. Incorporating merits of ancient system and modern system was deemed to be ideal.
3. Extensive comparison of teaching methods in Brihat-trayee and principles of contemporary teaching concluded that they agree with each other in terms of philosophy, learning methods, teaching strategies and other specific approaches. So, the hypothesis stated was found agreeable.
4. Accepting constructivist approach as baseline, a new innovative model suitable for a beginner learner in Ayurveda, was developed blending the styles of traditional and modern approaches, for transacting Tridosha-sidhanta, through a series of structured activities such as brainstorming among students, survey among teachers, Focus Group Discussion and Pilot study. The new model was documented as a

package with ten modules comprising of student centered, activity oriented methods, following the guidelines formulated during the process.

5. The effects of the new model was compared with conventional teaching through an experimental study at four Ayurveda Colleges in Kerala in two groups –Study group (transacted with new model) and Control group – conventional teaching. The new model was found to be more effective in transacting Tridoshasidhanta than conventional teaching, especially in the understanding and application levels of the content.

6. The perception of the participants on the new model suggested that even though the content of transaction was new to their knowledge, it was rendered without offering much dissonance in their scientific temperament, leaving ample scope for critical thinking, interaction, interest creation and smooth assimilation and accommodation. It shows the feasibility of developing a transition curriculum which allows a smooth transition of a beginner learner to the core content of Ayurveda.

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Part - III OBSERVATIONS & RESULTS

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Appendices

BACK GROUND SURVEY FOR PREPARING MODULE FOR TRANSACTING TRIDOSHA SIDHANTA

1. Do you think that method of transaction for Tridosha sidhanta should be Activity Oriented?

2. Do you think that Activity Oriented learning can substitute sloka oriented conventional learning?

3. Do you think that learning and by hearting Sloka should be a separate entity from the Module? or Should it be part of the Module?

4. Which of the following components do you wish to include in the content of Module for introductory learning of Tridosha sidhanta for a BAMS student, as a part of an induction course? (Please tick)

a. Etymology of Tridosha
b. Gunas of Tridosha
c. Understanding tridosha with possible comparison with modern biology
d. Karmas of Tridosha
e. Prakriti
f. Vriddhi-kshayalakshana of Dosha
g. Locations of Dosha
h. Five fold classifications of dosha
i. General treatment of doshas
j. Any others; please specify ……..

5. Please arrange the above topics in an order which they appear in the module

6. If all the above topics are included in the module, please specify suitable teaching strategy for them from the list given below:

1. Lecture discussion
2. Lecture with AV aids
3. Group discussion
4. Demonstration method
5. Clinical Based Learning
6. Case studies
7. Problem Based Learning
8. Role play
9. Home work/assignments
10. Others …….(please specify)

Sl No	Topic	Teaching strategy
1	Etymology of Tridosha	
2	Gunas of Tridosha	
3	Understanding tridosha with possible comparison with modern biology	
4	Karmas of Tridosha	
5	Prakriti	
6	Vriddhi-kshayalakshana of Dosha	
7	Locations of Dosha	
8	Morbid activities (Prakupita karma)	
9	Five-fold classifications of doshas	
10	General treatment of doshas	

7. After implementation which of the following skills you expect from a student as an introductory learner in Ayurveda
   a. Should be able to explain Tridosha sidhanta with possible comparison with modern biological principles
   b. Should be able to express major physiological activities in terms of Tridosha
   c. Should be able to identify Gunas and karmas of doshas in normal human body
   d. Should be able to identify or elicit doshik symptoms in patients
   e. Should by heart corresponding slokas related to specific topics

8. Which of the following mode of module transaction would you prefer?
   a. The whole content at a stretch(two or three days)
   b. Coupled with other subjects

9. Suggest a suitable set induction for introducing Tridosha sidhanta.

10. Which of the following assessments will be suitable after the implementation of the module?

a. Achievement test, descriptive
b. Achievement test, objective
c. Viva-voce
d. Practical test with healthy person and patients
e. Module evaluation proforma

REPORT OF FOCUS GROUP DISCUSSION

Topic: Development of Module for teaching Tridosha Sidhanta

Organized by:
Kottakkal Ayurveda Academy for Professional Excellence
19th September 2016, VPSV Ayurveda College, Kottakkal

Background

Experimental part the PhD research titled *Comparative assessment of models of instruction for transacting Tridosha Sidhanta* proposed by Dr. Vinodkumar M V, under the guidance of Dr. Upendra Dixit aims at comparing conventional teaching with newly developed Teaching Module to transact Tridosha Sidhanta. Tridosha sidhanta is one of the corner stone theories of Ayurveda. Students admitted to Ayurveda (I BAMS) find it very difficult to understand such theories because of their abstractness and lack of convincing methodology adopted in teaching the same. Ancient methodologies adopted to teach Ayurveda, as evidenced from Classical Textbooks of Ayurveda ensured Process oriented and Activity oriented learning. But, later on, as a part of modernization of education in general, during 19th and 20th Centuries the pedagogy changed to class room bound settings. This affected Ayurveda also. Didactic lecture method got predominance in transacting Basic Principles of Ayurveda. On the other part, when standards of Ayurvedic graduate courses got streamlined with other medical systems, students from the back ground of Biology, Chemistry and Physics came to learn Ayurveda. This contributed a lot to the scientific basis of Ayurveda, but, a new problem evolved in Ayurvedic pedagogy. The issue of abrupt transition from PCB based scientific temperament to a totally different conceptual scenario became imperative. The field of general education was continuously under experimentations of pedagogical reforms, through which Process Oriented Learning, Critical Pedagogy, Constructivism etc. came to the forefront of educational philosophy. Ayurvedic class rooms still remained unchanged.

Ayurveda is a science with a different content. Building a proper orientation on the concepts is not an easy discourse. While students need a different order of thinking and a different perspective of viewing human being, such a perspective should be built up through a defined process, as it is done in learners of primary classes. As they are presently keeping a PCB order of understanding this cannot be challenged also. There should be a sensible planning about bridging a student from PCB to Ayurvedic order of thinking. This study

proposes such a bridging through developing an innovative teaching module to be implemented in I BAMS for transacting Tridosha Sidhanta which is the key stone theory in Ayurveda.

While planning for developing such a module, we should know our own limitations. We are not experts in Philosophy of teaching. We are not experts in developing modules. The only capital we have with us is the knowledge in the subject and profuse desire to make a change in present pedagogy. Inputs from multiple sources were required for such an effort. In that back ground, we thought of a Focus Group Discussion where in experts from multiple sectors – Educational Sector, Medical Educational Sector, Ayurvedic Academy, Ayurvedic clinical teaching, Student section etc. sit together to discuss various aspects of developing such a module. In Ayurveda, we have minimum efforts done in this direction, so, there were no abundant models for such work. To begin with, we planned a FGD with representations from the said sectors.

Ten experts were selected from different fields as shown below (table.1). Students' participation was essential in such an exercise because, they know the current ground realities of the problem. All the experts were communicated with the background of the study and the nature of discussion being planned. Also, some prior materials like pilot module were sent to them.

In the communication sent to the experts, the points of discussion were enlisted as below:

1. Concept and structure of Teaching Module
2. How does activity oriented modular teaching enhance process of learning?
3. Feasibility of modular teaching in Ayurveda
4. Concerns on developing module for transacting new and abstract ideas for a beginner (in students' psychology point of view)
5. Feasible study design (if different from that suggested in research proposal)
6. Designing the content of module for transacting Tridosha Sidhanta for a beginner
7. Designing the duration of implementation considering practical implications
8. Designing the teaching strategies suitable for different subtopics of the content
9. Designing strategies for outcome assessment
10. Expected hurdles during module implementation (in terms of biasing, practical stringencies etc.)

Discussion was organized at VPSV Ayurveda College Kottakkal on 19th September 2016.

Table. 1 Discussants

Sl No	Name	Designation	Role in FGD
1	Dr. Upendra Dixit	Professor in Ayurveda Sidhanta, LKR Mahavidyalaya, Kolhapur	Research Guide
2	Dr. Sreejith Sreekumar	Director, Clinfound Clinical Research Foundation, Cochin	Moderator
3	Mrs. Vijayasree K V	Asst. Professor, Govt. Nursing College, Kozhikode	Technical Expert
4	DR. Mohammed Salim T	Asst. Professor, Farook Training College, Kozhikode	Educational Expert
5	Dr. Anjali Sivaram	Asst. Professor in Kriyasareera Govt. Ayurveda College, Kannur	Subject expert
6	Dr. P P Kirathamoorthy	Professor in Ayurveda Sidhanta, VPSV Ayurveda College Kottakkal	Subject expert
7	Dr. Uma Karthik	Asso. Professor & head in Kriyasareera, VPSV Ayurveda College, Kottakkal	Subject expert
8	Dr. Prakash Mangalasseri	Asso. Professor in Kayachikitsa, VPSV Ayurveda College, Kottakkal	Clinical Teacher
9	Dr. Vinod D S	Asst. Professor in Sidhanta, VPSV Ayurveda College, Kottakkal	Subject expert
10	Dr. Thushara Joy	PG Scholar, Dept. of Kayachikitsa, VPSV Ayurveda College Kottakkal	PG Representative
11	Dr. Sherin P	Internee, VPSV Ayurveda College, Kottakkal	UG Representative
12	Dr. Vinodkumar M V	Associate Professor, VPSV Ayurveda College, Kottakkal	Research Scholar

PhD Research Title: Comparative assessment of Models of Instruction for Transacting Tridosha Sidhanta
Guide: Dr. Upendra Dixit Scholar: Dr. Vinod Kumar M V

Focus Group Discussion on
Developing Teaching Module in Tridosha Sidhanta

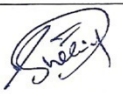
19th Sept. 2016, VPSV Ayurveda College, Kottakkal

Statement of Participation - Experts

Sl No	Name	Designation	Role in FGD	Signature	Mail id & Phone no.
1	Dr. Upendra Dixit	Professor in Ayurveda Sidhanta, LKR Mahavidyalaya, Kolhapur	Research Guide		drdixitud@gmail.com 09850454751
2	Dr. Sreejith Sreekumar	Director, Clinfound Clinical Research Foundation, Cochin	Moderator		drsreejith@clinfound.com 9995342978.
3	Mrs. Vijayasree K V	Asst. Professor, Govt. Nursing College, Kozhikode	Technical Expert		Sreevijaya 123@gmail.com 9447637908.
4	DR. Mohammed Salim T	Asst. Professor, Farook Training College, Kozhikode	Educational Expert		drsalimt@gmail.com 9496363353
5	Dr. Anjali Sivaram	Asst. Professor in Kriyasareera Govt. Ayurveda College, Kannur	Subject expert		sivaram.anjali@gmail.com 9446697795.
6	Dr. P P Kirathamoorthy	Professor in Ayurveda Sidhanta, VPSV Ayurveda College Kottakkal	Subject expert		Dr.kirathamoorthy@gmail.com 9447242341

PhD Research Title: Comparative assessment of Models of Instruction for Transacting Tridosha Sidhanta

Guide: Dr. Upendra Dixit Scholar: Dr. Vinod Kumar M V

7	Dr. Uma Karthik	Asso. Professor & head in Kriyasareera, VPSV Ayurveda College Kottakkal	Subject expert		umakarthik10@gmail.com 9447291404
8	Dr. Prakash Mangalassery	Asso. Professor in Kayachikitsa, VPSV Ayurveda College, Kottakkal	Clinical Teacher		ayurprakash@yahoo.co.in 9447541935
9	Dr. Vinod D S	Asst. Professor in Sidhanta, VPSV Ayurveda College, Kottakkal	Subject expert		Vinurekha73@gmail.com 9446314863
10	Dr. Thushara Joy	PG Scholar, Dept. of Kayachikitsa, VPSV Ayurveda College Kottakkal	PG Representative		thusharajoy26@gmail.com 9744570055.
11	Dr. Sherin P	Internee, VPSV Ayurveda College, Kottakkal	UG Representative		drsherinpayur@gmail.com 9400806067



ignature of Research Guide:

Signature of Scholar: 

Supporting Team:

1. Program Co-ordinator: Dr. Mukesh E, Asst. Professor
2. Observer: Dr. Vivek P, Asst. Professor
3. Session co-ordinator: Dr. Rajesh N, PG Scholar
4. Minuting:
    a. Dr. Binitha A, Asst. Professor (Manual)
    b. Mrs. Najma Mol, Final Year Student (Manual)
    c. Dr. Rahmathulla K, PG Scholar (Video minuting)
    d. Dr. Honey Jones, PG Scholar (Audio minuting)
    e. Dr. Santhosh C, PG Scholar, (Preparation of Sociogram)

Session started at 10.35 AM with a formal welcome speech by **Dr. Mukesh E**, Program coordinator. He introduced the discussants in brief.



Moderator's initial remarks: Dr. Sreejith Sreekumar

- A focus group is a homogenous group of experts. Homogeneity in this group is that all are stakeholders of education. We selected Nursing stream because in medical education, nursing faculty only has Teaching methodology as an essential part of their curriculum, which actually teaches students about how to teach others. We essentially need guidance from an educationist; because Medical education lacks the orientation about the mechanism of teaching. Students come to learn Ayurveda from a modern framework to a very old thought process, a philosophical process, also clinical. How to bridge that gap was always been our primary concer for long time. This FGD is another step in that direction.

Research Guide's introduction: Dr. Upendra Dixit (powerpoint presentation)

- In our classical textbooks, especially Charakasamhita, master Atreya used to travel with his disciples, and his teachings were in response to the questions raised by them. For example, when students see a person with distended abdomen and thin extremities, they asked about their Teacher (Atreya) about the condition and he starts describing *Udara*. Class room teaching was not the method then. Processes like *Sastrapareeksha* (disciples' appraisal on the science), *Acharyapareeksha* (Teacher evaluation by the disciple) *and Sishyapareeksha* (Student evaluation by the teacher) were the primary steps in Education. Learning Ayurveda in class rooms became a practice in a recent past (after independence) only. Some survey results shows that present teaching methodology in Ayurveda is not encouraging students to ask questions or think critically. It is in this back ground we selected this topic for preparing some teaching modules in one of the most basic principles in Ayurveda that is, Tridosha Sidhanta.
- Ayuveda considers man as an epitome of universe. Panchamahabhuta and Brahma in the Universe are represented as Panchamahabhuta and Atma in human body. Panchamaha-bhuta is scientifically studied worldwide, especially in India. In 1990 there was an international symposium on Panchamahabhuta, in which eminent scientists like Raja Ramanna shared their views on Panchamahabhuta.
- In Panchamahabhuta, *Prithvi* represents the principle which gives material form, mass and weight to objects, *Apa (Jala),* the principle which glues particles together; *Agni*- the principle which performs transformations; Vayu, the principle which initiates, controls and guides all the movements and Akasha - the principle which provides space, responsible for arrangements of particles.
- There are three principal processes in the universe – *Visarga (process of construction)*, *Adana (process of utilization)* and *Vikshepa (process of motivation)*. In these three, *Visarga* brings out evolution, new creations, birth, augmentation, conjunction, conglomeration, evolution, collocation, synthesis, impletion, anabolism, growth and development and longevity. On the other side, *Adana* fulfils the opposite processes like destruction, annihilation, death, reduction and disjunction. *Vikshepa* brings out all the movements necessary for Visarga and Adana. These three are represented in the universe in the form of Surya (the Sun), Soma (the Moon) and Anila (the Wind)
- The same process is repeating in human body and is termed as Kapha, Pitta and Vata respectively. They have a harmonious mutuality in human body. They are collectively known as *Tridosha*. The term *Dosha* indicates their

capability to produce diseases. Tridosha affects physical physiological activities, behavior and nature (*Prakriti*) of a person.

- We need to think more about how to teach *Tridosha* more effectively. Welcome all the participants to this session.

Research Scholar's introduction: Dr. Vinod Kumar M V (powerpoint presentation)

- This introduction focuses on what made us to select such a topic; not the content or its theoretical aspect.
- Tridosha theory is such a type of theory which does not explain single event related to human life, but, pertaining to almost all variables related to human life. It explains things related to personality, physiology and pathology at a time. Tridoshas are influenced by almost all exposure variables in human life such as environment, geographical disposition, food, activity, age, heredity etc. It is a frame through which almost all variables affecting human being can be explained. They are principles "behind" physiological and pathological sequences, not physically verifiable, only identifiable through their Qualities and Activities. So, learning Tridosha sidhanta is not memorizing some statements, but, cultivating a paradigm through which one can observe human beings. This is the abstractness of Tridosha sidhanta.
- The main hurdles in transacting Tridosha sidhanta come from the above abstractness. Along with that, as far as I BAMS students are concerned, an abrupt transitions in learning experience (learning Sloka in Sanskrit etc.) and unfamiliarity with technical terminology make them feel to be not in continuity with their learning experience upto +2 classes. Also, the same theory is learnt in different levels on advancing the course.
- Incorporating Process oriented learning is scopeful here because; learning Tridosha sidhanta is typically *formative* in nature. That means, student need to go through learning different aspects of the theory throughout his study period and even after that (during practice). The constructivist approach in modern pedagogy can also be considered here, because, apart from the class room teaching of the theory, they can keep on constructing new ideas based on their experiences around them.
- Another advantage in the case of Tridosha teaching is that the theory is well illustratable in personality assessment, physiology, psychology, environment, climate, diurnal pattern, healthy status of an individual and also in patients. The above aspects leave immense chance to the students to construct ideas regarding Tridosha.
- In the present curriculum, learning Tridosha is mainly class room bound, through didactic lecture leaving no scope for demonstrative,

illustrative and clinical based learning. In the assessment part also, recently CCIM has removed pratcial/viva part from examinations for basic principles of Ayurveda.

- It has already been observed by Dr. Kishor Patwardhan et al in 2009 that the present day Ayurvedic teaching methodology does not keep up the scientific values and scientific spirit of a young student. Again the study finds out the teaching methodology followed in Ayurvedic educational institutions does not encourage questioning among the young students.
- One of the main aims of this study is to develop a module for teaching Tridosha incorporating principles of Process oriented learning. As a part of pilot study, we have developed a 2 hr module and implemented them in + 2 students and BAMS students. Details of the module have been already communicated with the experts gathered here. Also, a pilot survey was conducted among teachers in Ayurveda Colleges with questions regarding content and teaching strategies to be included in the module.
- After instructing Tridosha with pilot teaching module among +2 students and BAMS students, we got the feedback that it enhanced critical thinking, enabled generation of ideas than imposing ideas and it provided smooth entry to the terminology and concepts.
- The advantages of the above instruction were noted as learners' involvement was assured through implementing Prakriti assessment as part of module. Scope of peer group discussions was tested. Importance of widening learner's perspective was reinforced. Also, the module enabled construction of slokas instead of instruction of sloka.
- There are many limitations to that module: It did not ensured demonstrations of real life experience or clinical illustrations, which would have support to build up the concept. Also, module covered only minimum area from the syllabus prescribed for the subject. So, it was too short also. Hence, the module should be modified by incorporating more areas of the syllabus and more sorts of teaching strategies including CBL, CSL, PSL, Role play etc.
- Considering the practical implementation of the project, two modules can be visualized. One basic module – for two or three days, as an orientation module, to be implemented as a part of induction course, mostly class room bound activities and demonstrations. Another advanced module, including more strategies like CBL. It can be by three or four months. Basic module can be easily implemented in more number of colleges, where as the advanced module may be implemented in the Institution where the teacher works. There should be separate assessment protocols for them.
- Focus of discussion of this FGD may be limited to the following issues:

- What is the frame work and considerations of a teaching module when introducing an entirely new subject?
  Issues in Implementation
- Time frame for the module – Class room or Clinical
- How a beginner can be effectively exposed to clinics?
- Whether it is ideal to implement constructivistic methods in clinics?
- Which areas can be selected for CBL – Gunas/Vridhikshaya/Vikritakarma
- How the assignments like peer interactions, social interactions can improve learning?
  Issues in assessment
- Assessment of outcome- Test/Practical vivavoce – Recalling slokas/understanding/application/analysis/synthesis/evaluation
- Conventional teaching – What are the ideal assessment outcomes expected

Moderator:

- We are moving on to the discussion. Ideally we will finish the discussion in 90 minutes.



Dr. Mohammed Salim T

- First of all, there should be clarity in whether the study focuses on the assessment of models of instruction or preparation of such an elaborately comprehensive module for transacting the topic. Whether it's the transactional methods, or, quality and comprehensiveness of what which is transacted. It is understood from the previous presentations that the major

hurdles are related to nature of students, nature of content and nature of methods. In the entire educational scenario transactional methods has changed a lot. So, students are coming from entirely different background. In general education, traditional methodologies have been totally replaced with process oriented earning. Recently, methodologies like Issue based curriculum, critical pedagogy, constructivism etc. get predominance in general education. Students are coming from such a background. Naturally teachers of Ayurveda have to face many challenges. Traditional method of Ayurvedic learning has its own strategies of transaction.

- There are different levels of teaching: Memory level, understanding level, application level, and reflective level. While teaching attributes of Tridosha you are expecting a reflection from the students. In that aspect process oriented methodology has high significance. But, so far, Ayurvedic physicians are trained in traditional method and are highly competent also. That means the present methodologies have their own merits also.
- Models of teaching are an established term in Education. Different models of teaching has already been compiled, all of them has psychological base also.

Smt. K.V. Vijayasree

- The study focuses on comparison of traditional method with modular method. As the setting we can select two colleges, one with traditional method and the other new method. It will be helpful to the students if you prepare an induction module for making things proper. As in the case of Ayurveda, my subject nursing also is new to the students when they are admitted. We teach them 4 months in the class room; the subjects are Medical subjects, Nursing, Sociology, Psychology, Economics etc. While teaching in classroom there are chances for demonstration like that in laboratories. Afterwards, students are divided into small groups and under a teacher they visit clinics and learn basic things like how to communicate or so. They identify how to implement the lessons they learnt in the classrooms in a clinical scenario.
- As in the case of Nursing, Ayurveda also should be clinical oriented. The students can be taken to clinics after three or four months of their admission. In the induction period (the first 4 months) after a short introduction of the subjects, students can try to identify those things among themselves. This will contribute to the understanding or comprehensive levels of teaching. In the case of Triodhsa also spending one or two hours in clinics, ward or even field and interact with patients will enhance their understanding.

- Regarding the hypothesis, we can test whether the new method is better than traditional one. Randomized selection of cases may be applicable there. Regarding selection of colleges, introduction of module in more number of colleges will be difficult. So, it will be more feasible to implement the new module in this college which can be compared to the traditional method in some other colleges.
- For making the module more interactive, demonstration, PBL and CSL can be used.

Moderator:

- Is the thought process employed in preparing nursing module brings out new ideas in the students?

Mrs. Vijayasree:

- Nursing is clinically oriented. Conducting demonstrations, case studies, care analysis, clinical interaction with the patients, writing up of drug file, assessment of the patients etc. are employed there. Apart from medical diagnosis we have our own diagnosis. In that way, here also making an induction module, clinical oriented learning, opportunities to enhance their reflection, doing an evaluation etc. can be incorporated.

Dr. P.P Kirathamoorthy

- Activity oriented learning is not a new methodology as far as Ayurveda is concerned. That tradition is also there in Upanishats. That type of learning is better than conventional teaching. What we have to think is how it can be adopted to tridosha. Conventional method here is reciting sloka, making its prose order (anwaya), meaning (anwayartha) and so on. References of Learning-Teaching methods (Dhyayana-adhyaapana) in Ayurveda explain other modes of teaching also. But, now days the learning typically becomes memory oriented. Regarding Tridosha, entering the terminology through making an experience will be more ideal. Activities like discussion, demonstration, presentations, case studies etc. can be adopted here. Introduction of terminology all on a sudden without a background introduction creates embarrassment in students.
- Two levels can be visualized as described previously. A basic level module and an advanced module. But, in the present module, some more time may be allotted to each sub units because, the time limits prescribed in the module seems to be inadequate to complete the idea.
- A college each from four regions in Kerala can be selected for study.

Dr. Prakash Mangalasseri

- I am trying to brief my ideas in two heads: one is about what should be the focus of this discussion. The other about methodology of introducing a new subject to the students. Regarding the second head, it is very difficult to convey the concept of a new subject in a single sitting of two or three weeks. Understanding Tridosha is a process.
- Implementation of the module, may it be conventional or modular, depends on many variables like quality of the teacher, quality of students, standard of the College, clinical setting etc. Especially in the case of assessment it makes lot of problems. Those variabilities should be overcome by standardizing the module.
- Assessment component of the module should never consider tests, practical's, viva etc. The only thing assessed should be the level of satisfaction of the learners. Receptivity is the main thing, not reproduction. There are many inadequacies in our examination system, which make it fail to measure the quantity or quality of knowledge attained by the learners. Even a good teacher brings out bad results in an examination now days. So, the assessment may be done only in a customer friendly mode, ie, whether the learner is satisfied with the module or not.
- Regarding the settings, when more number of colleges is there, more is the chance for getting good assessment of results. Taking more number of colleges reduces the chance of biasing also. Biasing will be more when the sample size is less. Assessments within a group may also be considered.
- Regarding teaching methodology, we have to think whether vertical teaching or horizontal teaching be ideal in bringing out good comprehension. The same question remains with bed side/community learning, patient/healthy volunteer also.
- Conventional teaching in Ayurveda is not bad. Even when we think "out of the box" there should some lectures about basic things in Ayurveda. In ancient teaching of Ayurveda, students were well oriented on Philosophical thoughts and technical terms like Ruksha Laghu etc. But, now that does not happen. So, initially it needs a didactic lecture about such things, even though it may be sometimes boring, before going to interactive sessions.
- The present module seems to be excellent in an interactive aspect. The imaginative capacity is well nourished here. But, in order to put the spark in students, a lecture is essential before implementing the module. In that introduction, students are directed to see the universe in terms of hot and cold terms (Soma and Surya). This is very convincing explanation of the Universe. It can be explained in atomic levels also. Students with a base of physics and chemistry also can be convinced in this way. So, before introducing Dosha, concept of Guna should be introduced to the students.

Moderator:

- We will go to such details later sir.

Dr. Uma Karthik

- I my ten year's experience as a teacher, students enjoys to learn physiology because the subject has direct continuity to what they learnt till +2. But, students are often shocked when, after two or three months, there is transition to Ayurvedic topics.
- The main problem faced in the case of Tridosha is that they are not quantifiable, but are qualitatively expressed phenomena. The main thing to be kept in mind while preparing module for Tridosha is that it should make students to accept the abstract. Two years' entrance coaching actually shatters whatever creativity they had in them, which they expressed well in school time. They can be very well categorized based on the left-right brain dominance also. In introducing the abstract, abundant usage of literature, dance forms or art forms can be employed.
- Another issue is the subtleness of principles explained in Ayurveda. Making such subtle ideas is difficult. Visualizing subtle principles need experience. Introducing concept of Prakriti is good, but, the term Prakriti should not be used here. In Charakasamhita, Prakriti is explained in terms of Guna only. Instead of explaining chalatwa, functions etc. of doshas, go to the gunas directly.
- There is no standard for conventional teaching now. Sanskritization of modern concepts as seen in Brihat-sareera and Pratyaksha sareera. That style is not advisable here. Better thing is explaining Tridosha in terms of biology what they learnt. We can use different historical persons, kings, and leaders etc. to explain characters of Tridosha.
- Process oriented learning can be of two types: Activity oriented learning and clinical oriented learning. Assessment of their own nature, parent's nature, their own problems etc. can be done as a part of Activity oriented learning. Clinical based learning can be done with the help of teachers, PG's, House surgeons etc.

Dr. Vinod D S

- As a teacher in I BAMS, I have seen that minimum period of six months is taken to change students' attitude towards Ayurveda.
- Another thing they often complaint is difficulty in memorizing sloka. Minimum time to accommodate to the new situation is six months. So, it is ideal to implement activity oriented teaching within that period so that they can construct their own idea regarding tridosha.

- Another important observation is, when the students are promoted to third year, they are exposed to clinics and suddenly their attitude changes. So, it is evident that if we can create a clinical atmosphere in I BAMS itself, attitude change can be brought in at an early stage.
- As Dr. Prakash suggested, starting point can be Gunas.

Dr. Thushara Joy

- I represent the feelings of a UG student when coming to I BAMS. The main change felt in learning Ayureda is students are shifted from a segment based learning (upto +2) to system based learning. The paradigm shift made is to understand every system functions in terms of Vata, Pitta and Kapha. Observation based, analytical learning is substituted by inductions like by hearting of sloka in BAMS. Process of logical thinking is being cut off. Students are felt it as something like an art subject, not a medical subject. That is where activity oriented, clinical based learning to be implemented.
- Macro level and micro levels of human biology should be approached based on Tridosha theory. Module should be prepared in such a way that, students don't feel Ayurveda as a strange subject, but, continuous with what they have learnt in previous classes. Only the perspective is changing; not the content.
- It is always better to avoid difference of opinion among teachers about Tridosha. Never over saturate the students with so many ideas. It is always ideal to transact minimum ideas with maximum clarity to younger one's. There is no need to implement all the clinical aspects at the beginning, but, hinting on the clinical utility alone is necessary.
- The ideas conveyed should be uniform in all colleges.
- The module should be base in bridging compartmentalized information about Theory, Patient, Modern science etc.
- Translations of technical terms (like Vata as wind) are one among many unscientific practices seen during learning of Ayurveda.
- Two or three days' implementation of module is not that much promising. One week orientation program may be conceptualized in which apart from tridohsa, Panchabhuta, Dinacharya etc. also can be included.
- Learning Tridosha from within (observing oneself) can be the method adopted initially. Internalizing the principles yields much more effectiveness in transaction. Visual aids like images of clinical conditions etc. can also be used.
- For proper learning of Ayurveda, observation skill has to be increased, but, initially such observations should start from within. Observing things outside in a materialistic attitude will ruin the real spirit of Ayurveda in an

initial stage. Incorporating self observation along with Yoga and meditation is a better option.

Dr. Anjali Sivaram

- Main concern is how to compare two teaching methodologies ie, the conventional method and modular method. First we should standardize the conventional method. We cannot become prejudiced that modular teaching will be better than conventional. Because, a good teacher can transact much better in conventional way than an average teacher in modular way.
- IQ of students and their interest in the subject are two components which may affect the outcome of teaching. Different groups should be identical in the above aspects if we want to derive an observation based on the results.
- Implementing both the methods in the same college will make problem of inter communication between them about the strategies, which can bias the observations. On the other side, if we go for more number of colleges, it is very difficult to standardize the groups as well.

Dr. Sherin P:

- I consider two groups of students among us: a group who can capture the portions very fast. And the other are slow learners but having high imaginative and creative power. Ayurveda requires more imaginative and creative ability. So, the imaginative capacity of the students should be nourished in the new method of teaching. This is the opinion of the whole student community.
- In many instances the concepts learnt in early years greatly differ when we learn the same thing in final year, in clinics. This gap should be filled. For that activity/clinical oriented learning will help a lot.
- Doshas are *gunasanchaya*. Concept of *guna* is more important than learning terms like *Vata, Pitta* and *Kapha*.



Moderator:

- I request Dr. Upendra Dixit to have an interim comment.

Dr. Upendra Dixit:

- The main issue to be addressed now is how to define conventional teaching and new teaching. The teaching method described in Ayurvedic texts is different from what we follow now in teaching basic principles. Conventional teaching in this study is the method adopted by teachers *now* to transact basic principles, mainly class room lecture method. It need not be as described in classical texts.
- In Ayurveda, there is no training for teachers about how to teach. There should be training during PG course on teaching methodology.
- It is s not declarable at this point that one method is better than the other. But, its only a hypothesis that modular teaching is a better teaching practice. Study aims to test it. Sometimes, in the future, it may be found that a better method is a combination of both the styles.
- As Dr. Anjali suggested, we should consider students with different intellectual levels. In Ayurveda, science is said to be trividha-sishya-buddhihita (palatable to students with different intellectual capacity).

- Initially students should be considered as lay man, not a professional. Method of explaining Tridosha to those having no idea about Ayurveda is important.
- Principles of modern medicine are learnt in School syllabus, but there is no such learning in the case of Ayurveda. It should come. In Goa we started some movements in this direction.
- For every principle it is always better to illustrate with clinical examples. What approach is taken in a clinical condition and what result was obtained? Even though students may not be able to understand the principles, they will remember the outcome. In that way, they will become convinced about effect of such principles.
- One instance I remember. In my class sometimes I use jokes while explaining complex principles. After the course one student told me that she remembers all the principles and even the jokes told by me at that time.
- As agreed by other experts, while introducing Ayurveda to new students, we should start from some modern terminologies and then explain Ayurvedic perspective of such things. Only the perspective is different, not the content. They should never feel that what they learned is wrong, but we have to make them identify that there is another way to view human body.
- In Ayurveda, there is a method called tantrayukti, which is a tool to make out proper meaning of verses in textbooks. Somebody asked me why Tantrayukti is given at the end of textbook? I replied, learning Ayurveda is circular, once you enter in, it keeps on revolving. Once you complete a preliminary study of a textbook, learn Tantrayukti and again read the textbook, you can see things in a better way.
- Order of chapters in Charakasamhita itself gives the methodology of teaching. After introducing the basic principles in the first chapter of this textbook,the very second chapter is related to clinical observations.
- Students should be encouraged to observe things (especially in clinics) and to ask questions. Terminology is never a barrier in learning Ayurveda. Even those who knows English when starts to learn Moden Medicine they also will have problems in learning Terminology. We should use the terminology is Sanskrit and explain it in a language which they find easy to understand (generally English). Gradually they will become in the right way.

Moderator:

- We are moving onto the second segment of FGD. There need not be a sequence in discussing; anybody can attack on issues of their own. Would the external experts like to add something after the primary round?

Dr. Mohammed Salim

- From this discussion I feel, we cannot challenge the prevailing system of transacting the particular topic. This study should focus on an *innovative intervention* in the prevailing system. As Dr. Anjali suggested, lecture of an excellent teacher will be far better than modular teaching of an average teacher. So, the investigation need not challenge the traditional system of transaction. I think, beyond all terminologies like method of teaching, strategies, modular approach etc, the innovative method should a blended mode of teaching which incorporates both traditional method and modular method.
- Technology enabled transaction also can be considered in teaching and learning.
- There are two types of modules: Teaching module and learning module. We have to fix which type is done in this research. It is better to mix the concepts of learning module and teaching module. Whatever the method of teacher be, we should focus on better learning experience to the students. On that basis, the investigator can prepare an innovative module; I would call it as a model of instruction.
- It is better to concentrate in a single institution, not going wider. Because, research will become fruitful when concentrating on small things and to elaborate it to a wider realm.

Moderator:

- If study is done in a single institution, is not there an issue of blinding students? Because, there is a chance of mingling of students, especially if the program is a long term one, will it not influence the final assessment? One group learning from the other group will make some problems, I think. Wont it bias the study

Dr. Mohammed Salim

- There can be many such problems in this type of study. After all, I think the better way is studying a single Institution.

Vijayasree:

- My opinion is to conduct the study in two institutions. It's better to avoid cross over. But, both the methods should be adopted by the scholar himself. Content should be well prepared in both the methods.
- There is hard and fast rules regarding number of samples. Minimum number is 30.

Dr. Vinodkumar M V:

- Whether any IQ test or so is needed to equate the students in both the groups

Mrs. Vijayasree:

- No need of IQ test, but the content should be prepared in such a way that it is palatable to the students with moderate IQ. It should meet the need of all the students. The method should be starting from simple to complex.
- The final assessment can be based on a checklist, a questionnaire or a scale. Just by asking the satisfaction rating we cannot assess how much volume of the content is learnt by the student. As an educational package, we have to assure that students get adequate knowledge. We are not grading the students. We are trying to adopt a new methodology, and assess in which way it enhance the outcome of the total group.
- While preparing the questionnaire we should include multi level questions in it. Assessment of Knowledge, Attitude and Skill should be enabled in the questionnaire. Application analysis also can be included. In that way, there should be some methods of assessing the knowledge they attained, apart from satisfaction rating. For assessment of satisfaction, rating scales can be used.
- A pretest post test study can be done. Post test can be done at different intervals. Immediately after the study, after the gap of one month. This is to assess whether they can retain the memory or not.
- By hearting the sloka is not an ideal thing. They have to make it on their own. They should be capable to rewrite it.
- When we state the objective, it should be measurable. Otherwise it will become difficult to identify whether they have attained the level of expectation.

Dr. Mohammed Salim

- In the evaluation part there should be application oriented questions also.
- If you follow process oriented methodology, there should be formative and summative assessment.

Dr. Vinodkumar M V:

- Is it significant to conduct pretest in a group totally ignorant about the subject?

Mrs. Vijayasree:

- Pretest can be there regarding the attitude.

Dr. Prakash:

- For comparing two groups, pretest is not necessary.

Mrs. Vijayasree:

- Pretest is advisable for an evaluation within the group.

Dr. Prakash:

- The conventional teaching enables a student to by heart, recollect and reproduce the slokas. Imagination, application level of questions is a must in achievement tests. Unfortunately, this is lacking in present examination pattern.
- Ayurveda typically requires by hearting. Because, unlike other sciences, Ayurvedic texts contains verses which are abridged form of many ideas. In the name Sootrasthana sootra means a verse in which large amount of knowledge is encoded. That means, large area of knowledge is learnt by a student through by hearting slokas. Important thing is how to bridge between by hearting and its application. Without by hearting the slokas, student can not apply them when and where required.

Mrs. Vijayasree:

- But in the present scenario, the word by hearting seems to be a little bit mis-fitting. Better to use rewriting of ideas.

Dr. Anjali:

- It is just like multiplication table in mathematics. It is not a compulsory technique but always desirable.

Dr. Kirathamoorthy

- If you ask the students to write the features of health, they will write them. That idea if you convert to Sanskrit becomes a sloka. There is nothing more than that.
- Good lecture make things naturally by hearted.

Moderator:

- Let us now move on to the discussion on how to implement clinical based learning in Tridosha. Dr. Prakash may start the discussion.

Dr. Prakash

- I think it is better to start from Properties (Guna) of Doshas instead of Prakriti. Dr.Sherin pointed out that, when she heard the term Guru she felt it to be something related to weight of a substance. This is the impression imparted in first year.
- Actually we know that there is nothing called dosha. A group of Gunas are known as Dosha. Basically there are two properties existing: either Hot or Cold (Ushna & Seeta). Again it is expanded to eight (veerya) and twenty (gurvadi guna).
- Gunas are having multiple understandings. Physical, Physiological, Pharmacological and therapeutic. Guru is "heavy" in its physical understanding. But, there is a contradiction in explaining Gunas in Ashtangahridaya. That is, without explaining what Guna really means, gunas of doshas are explained.
- Pharmacological understanding of Guna like brimhane guru, langhane laghu are also explained in textbooks (commentaries). Physiologically Gunas can be understood based on Prakriti. The description of Prakriti in Charakasamhita is based on Guna. That means, there Guru is identified if a persons gait is stable (gurutwat adhishtita avasthita gatayah). Whenever Guru is increased gait changes. Increased laghutwa cause instability (chapalatwa) in walking. Chala guna also can be explained by increased mobility of body movements. Assessing Prakriti by Charaka method gives insight to the Guna concept related to Dosha.
- Such features can be demonstrated in the class by calling upon students having particular body language (eg: hyperactivity, sow movements etc.). We can classify students into three groups based on such features. Identifying features in themselves (about prakriti) can bring background awareness on Doshas. After identifying Properties, we can explain that these properties are interdependent and not mutually contradictory. For example, when Ushna is considered it has something to do with cahalaguna also. Ruksha do something with Guru.
- All the doshas can be understood in terms of four qualities – Ruksha, Snigdha, Seeta and Ushna. Arranging these properties in different ways, we can make Doshas.
- Next task is about making students understanding Gunas. For example, Snigdha can be explained as churnadi pindeebhava hetu and even can demonstrate in the class room by taking wheat powder and water. Water, when added to the maida powder, latter becomes consolidated and formed. When particles are adherent it is snigdha.
- Another instance is Ushna property – Ushan mukha, prabhutapiplava etc… Intolerance to heat, lot of pimples and moles on the body can be seen related to Ushna especially in teenagers.

- So, to conclude, study of Dosha should be based on Gunas.

Upendra Dixit:

- Focusing on Guna is good, but when to focus on Guna is to be fixed. Whether in the beginning or afterwards.
- Another thing is, above Guna, there is concept of Panchamahabhuta. Gunas also are Panchabahutik. Not only Doshas, Dhatus and malas also have these gunas. They are Dravya and Gunas don't exist independently. Pitta and Kapha are Moorta, ie, they can be shown to some extent.
- So, focusing on Guna will take the study to Panchamahabhuta. Here the topic is Dosha. So, study of Guna should be in such a way that it enables understanding Tridosha.

Anjali Sivaram

- Concept of Panchabhuta is not easy to conceive as far as I BAMS students are concerned. But, Gunas are easily appreciable. Introduction of Guna is more practical. Prakriti is good, because it gives scope for some scope for activities. Then also, the best thing that can be introduced is Guna. So, rather than Prakriti, Guna will be more important in introducing Tridosha.

Dr. Vinodkumar

- If we select Gunas are the prime means to introduce Dosha, how can we implement in clinics? Whether all Gunas need to be explained in clinics? Whether all the cases should be explained? Because, sometimes teachers themselves find it difficult to identify Gunas in diseases. Then is it advisable to introduce Guna to students? Will it be ideal to select some standard cases to demonstrate Gunas?

Dr. Prakash

- It is not ideal to introduce fresh BAMS students to the ward or OPD. Introducing students to the ward has its own principles. A clinical exposure can be given by Nidana people only. We have to have some specimen patients, (eg: specimen for rooksha etc.) to teach I BAMS students. Department of Basic Principles should have constant contact with Kayachikitsa to get specimen patients in the ward. Also, Kayachikitsa teachers have the responsibility to mark patients who deserve to be shown to I BAMS students. A patient with Twagrookshata, swararookshata, swararookshata, kesa rookshata can be shown to students to understand Vata in terms of Rukshata.

- Applying such a module in different institution may not be feasible. Because, other Institutes will not have sufficient patients as well. Showing all the students in the ward is not feasible, not ideal also. It will be better to call the patients to the class room and explain the features.
- Also, we have a lot of multimedia scopes. We can have audio-visual clippings of specimen cases. Visual clippings can be used to explain rooksha of different grades, khara, sphutita, visada, parusha etc. very well.
- The aim of such demonstrations is that, students should feel that Ayurveda is not some slokas only; they are practically implemented things.

Dr. Upendra Dixit

- As a part of this study we can prepare some clippings or photos for explaining Gunas.

Dr. Kirathamoorthy

- For introducing Dosha, starting with Guna will be difficult in my opinion. Because, it can make many confusions in students. Better to start with simple things. For that Prakriti will be better. As explained in the present module, we reach in Gunas through Prakriti only. I feel it is better for freshers.
- Another thing is we are not applying all the Gunas in the clinic. Some of the Gunas are explainable in disease condition only. So, better explain Gunas in physiological parlance, to be precise, Prakriti.
- Exhibiting video clippings or calling patients t the class can be done easily.

Anjali Sivaram

- Prakriti is interesting, but, through that we are trying to group students into three groups. Then naturally students can ask a question, why am I in that particular group or why such characters are attributed to a particlaur group? In the case of introducing Guna there is no such question of complexity.
- We are not giving any classification and also leave space for thinking while introducing Guna. At the end only they should be able to categorize Gunas into three groups. So, it is very easy to implement. They themselves come to the point, we are not suggesting anything.

Dr. Vinodkumar

- While introducing Tridosha through Prakriti, there is an added advantage. Students start learning Tridosha through themselves. It has an affective advantage also. That means, they become convinced that Ayurveda is something which speaks about myself.

- Another thing, we are taking Prakriti as a tool for personality assessment. Students are familiar with many such tools in their school days. We are not using the term Prakriti also. In such a manner, I think there is no harm in introducing Prakriti in them.

Dr. Uma Karthik

- Now I feel that, as a part of induction course, Prakriti can be used as a tool, for basic understanding of Tridosha.
- Through Prakriti, the very basic concepts of Guna can be easily conveyed. In an advanced course only we can move onto the clinical implications of Gunas.

Dr. Thushara

- Explaining gunas with Prakriti is always hypothetical. But, students can learn Gunas in themselves through Prakriti.

Dr. Prakash

- If so, we have to modify the present proforma for Prakriti assessment. It should be more Guna oriented. For that Charaka's description can be taken more ideally.
- Certain things like BMI, reluctant in making…. (in Kapha), analytical power (in pitta) are wrong in case of Prakriti assessment. They should be deleted from the proforma.
- Mixing Ayurveda concepts with modern attributes, this problem comes, like in BMI.
- There are lot of examples of Prakriti, the features which are easily identifiable. Explaining with famous persons like Sachin Tendulkar, Vinod Kambli etc. is very interesting and concept building. Behavior of cricketers in the pitch can be taken as a reference for illustrating Prakriti. It will be very interesting also.

Uma Karthik

- Updating the examples also is very important.

Anjali Sivaram

- I agree with Prakash sir.

Moderator

- Up till now we were discussing about Guna. Anybody has something to comment on Vridhi-kshaya or Vikrutakarma of Doshas? Does Karma have

paramount importance in understanding Dosha? Or, shall we limit the extent to Guna only? Understanding Guna only satisfies preliminary understanding of Dosha, is it so?

Prakash

- As a part of preliminary module, slokas explaining Gunas, relation to agni, relation with kostha, diurnal variation, variation with age, general sites only are essential. No need to go to the further details of Karma and all.

Vinodkumar

- In a discussion two days back, Salim sir was referring about Cognitive apprenticeship. Can you explain it sir?

Dr. Salim

- When you go to this module, actually it used an inductive way. That means experiencing different types of examples and finally reaching in a conclusion. I think we can centralize in sloka in this inductive method. From different attributes, finally reaching in sloka is inductive method.
- Among different strategies, one can be cognitive apprenticeship. It is a type of apprenticeship with an expert to experience his/her expertise. While going through different activities in the module, let the students get opportunity for that also. One or two days' residential experience is an example of it.
- In inductive method, we cannot by pass slokas. On the other side, meaningfully by hearting sloka may be the proper way.
- What about the prevailing pattern of question paper? While introducing a module, it is important that students have to face the examination. Finally, if at all we are using these activity oriented module, the students have to write sloka in the examination. Is it not? So, sloka cannot be replaced in any way.

Dr. Prakash

- Now days, question paper pattern of KUHS does not test understanding level of the subject. Its only a memory test. Simple by heart will help in examination.

Dr. Upendra

- We have to introduce viva again to this subject for assessing understanding and application.

Dr. Salim

- In process oriented learning, there is a scope for self examination. They themselves can create a presentation based on the information gathered.
- Concept mapping is a method useful in by hearting slokas. There are much software through which concept mapping can be done.
- Brain mapping also is another concept.

Moderator

- As an assessment, a test only is not going to assess all the aspects, We have to include a viva-voce? Whether the students were able to make the sloka of his/her own is another part of it.
- What would be the ideal assessment expected?

Vijayasree

- We have to assess all the three domains – Knowledge, Attitude and Skill. It depends on which tool you use to assess.
- Rating scales, Questionnaire (having different domains). There are other tools also to assess the outcome.
- Same tools should be used to assess both the groups.

Prakash

- A written test which assesses all the domains can be used. It can include all the levels – memnory, understanding, analysis etc.

Mohammed Salim

- There can be two sorts of assessments. One is to assess the level of understanding of students and the other, effectiveness of teaching.

Anjali Sivaram

- When we conducted the study we used MCQs and descriptive questions. Descriptive questions were better answered by students in conventional group.

Moderator

- Thus we come to an end to the discussion. Invite Dr. Vinodkumar for formal conclusion.

Dr. Vinodkumar

- This exercise has two outcomes. One is, we had a good practice on how to conduct FGD. The other, it put some light to darker areas of the subject.
- Thanks to all those participated and contributed.

The discussion was concluded at 1.45 pm.

Summary of ideas being raised in FGD

Characters of ancient teaching
• Class room teaching was not a method in ancient medical education – Dr. Upendra Dixit • Activity oriented learning is not a new methodology as far as Ayurveda is concerned, It was prevailed right from Upanishat tradition – Kirathamoorthy • Science is said to be trividha-sishya-buddhihita – Upendra • Order of chapters in Charakasamhita itself gives the methodology of teaching - Upendra
Nature of learning/Teaching Tridosha
• Learning Tridosha sidhanta is typically formative in nature – Vinodkumar M V • Understanding Tridosha is a long process – Prakash • While teaching attributes of Tridosha you are expecting a reflection from the students – Dr. Mohammed Salim • The main problem faced in the case of Tridosha is that they are not quantifiable, but are qualitatively expressed phenomena. Another issue is the subtleness of principles explained in Ayurveda. – Uma Karthik • Macro level and micro levels of human biology should be approached based on Tridosha theory. – Thushara
Comments on present teaching/conventional teaching
• We have to define conventional teaching in this study is the method adopted by teachers *now* to transact basic principles, not the ancient methodology. Learning Ayurveda is circular. Terminology should not become a barrier in learning Ayurveda – Upendra • Conventional method here is reciting sloka, making its prose order (anwaya), meaning (anwayartha) and so on – Dr. Vinodkumar • Conventional teaching is not a bad experience – Prakash • Conventional teaching has its own merits. We cannot challenge the prevailing system of transacting the particular topic. In the present curriculum methodologies of general education like Issue based curriculum,

critical pedagogy, constructivism etc. get predominance in general education. – Salim • There is no standard for conventional teaching now. – Uma Karthik • First we should standardize the conventional method. – Anjali • Minimum period of six months is taken to change students' attitude towards Ayurveda. – Vinod D S • The main change felt in learning Ayureda is students are shifted from a segment based learning (upto +2) to system based learning. – Thushara • By hearting sloka is not an ideal thing – Vijayasree • Ayurveda typically requires by hearting. Important thing is how to bridge between by hearting and its application. – Prakash • Good lecture make things naturally by hearted. - Kirathamoorthy • It is always better to avoid difference of opinion among teachers about Tridosha. – Thushara
Settings of the study
• As the setting of study we can select two colleges, one with traditional method and the other new method – Vijayasree • It will be more feasible to implement the new module in this college which can be compared to the traditional method in some other colleges. - Vijayasree • Implementing both the methods in the same college will make problem of inter communication between them about the strategies – Dr Anjali Sivaram • One group learning from the other group will make some problems – Moderator • Regarding the settings, when more number of colleges is there, more is the chance for getting good assessment of results. – Prakash • It is better to concentrate in a single institution, not going wider – Salim • Applying a module, which is clinically oriented, in different institution may not be feasible. - Prakash
Clinical Learning of Tridosha
• it is evident that if we can create a clinical atmosphere in I BAMS itself, attitude change can be brought in at an early stage. – Vinod D S • If exposed to clinics, Even though students may not be able to understand the principles, they will remember the outcome. – Upendra • Prakriti can be used as a tool, for basic understanding of Tridosha. But for advanced learning, clinical exposure is a must. – Uma Karthik • The students can be taken to clinics after three or four months of their admission - Vijayasree • It is not ideal to introduce fresh BAMS students to the ward or OPD -

Prakash • We have to have some specimen patients, (eg: specimen for rooksha etc.) to teach I BAMS students. - Prakash
Methodology
• Students can be very well categorized based on the left-right brain dominance also. – Uma Karthik • Students can try to identify those things among themselves. – Vinodkumar • Assessment of their own nature, parent's nature, their own problems etc. can be done as a part of Activity oriented learning. Clinical based learning can be done with the help of teachers, PG's, House surgeons etc. – Uma Karthik • Learning Tridosha from within (observing oneself) can be the method adopted initially. - Thushara
Nature of module
• Implementation of the module, may it be conventional or modular, depends on many variables like quality of the teacher, quality of students, standard of the College, clinical setting etc. - Prakash • Initially it needs a didactic lecture about such things, even though it may be sometimes boring, before going to interactive sessions. – Prakash • A better method is a combination of both the styles. (conventional and new) – Salim • We can develop an innovative method which is a blended mode of teaching which incorporates both traditional method and modular method. – Salim • Initially students should be considered as lay man, not as a professional. – Upendra • We should start from some modern terminologies and then explain Ayurvedic perspective of such things – Upendra • They should never feel that what they learned is wrong, but we have to make them identify that there is another way to view human body. • Technology enabled transaction also can be considered in teaching and learning. – Salim • It is better to mix the concepts of learning module and teaching module. – Salim • The content and strategy of module should meet the need of all the students. The method should be starting from simple to complex. - Vijayasree • Also, we have a lot of multimedia scopes (video clippings/photos) – Prakash • Among different strategies, one can be cognitive apprenticeship – Salim • Concept mapping can be used in by hearting slokas - Salim

• Ayurveda requires more imaginative and creative ability – Sherin
Comments on present pilot module
• Two or three days' implementation of module is not that much promising. – Thushara • The time limits prescribed in the module seems to be inadequate to complete the idea. – Kirathamoorthy • The prepared module is an inductive module. - Salim • We have to modify the present proforma for Prakriti assessment, to Charaka's model – Prakash • We can centralize in sloka in this inductive method. In inductive method, we cannot by pass slokas. – Salim • The present module seems to be excellent in an interactive aspect. The imaginative capacity is well nourished here. – Prakash
Probable Content of new Module
• Before introducing Dosha, concept of Guna should be introduced to the students. Better use Charaka's model of Prakarir\ti assessment, which gives a better Guna orientation – Prakash • Concept of *guna* is more important than learning terms like *Vata, Pitta* and *Kapha*. – Sherin • Rather than Prakriti, Guna will be more important in introducing Tridosha. - Anjali • We can use different historical persons, kings, and leaders etc. to explain characters of Tridosha. - Uma • There are lot of examples of Prakriti, the features which are easily identifiable – Prakash • Updating the examples also is important - Uma • As a part of preliminary module, slokas explaining Gunas, relation to agni, relation with kostha, diurnal variation, variation with age, general sites only are essential. No need to go to the further details of Karma and all. - Prakash • Focusing on Guna is good, but when to focus on Guna is to be fixed. Whether in the beginning or afterwards. – Upendra • For introducing Dosha, starting with Guna will be difficult in my opinion. Because, it can make many confusions in students. Another thing is we are not applying all the Gunas in the clinic – Kirathamoorthy
Outcome Assessment
• Just by asking the satisfaction rating we cannot assess how much volume of the content is learnt by the student. As an educational package, we have to assure that students get adequate knowledge. – Vijayasree • Imagination, application level of questions is a must in achievement tests -

Prakash

- There should be formative and summative assessment. – Salim

- Assessment of Knowledge, Attitude and Skill should be enabled in the questionnaire – Vijayasree
- There can be two sorts of assessments. One is to assess the level of understanding of students and the other, effectiveness of teaching. – Salim
- IQ of students and their interest in the subject are two components which may affect the outcome of teaching. - Anjali
- A pretest post test study can be done. Post test can be done at different intervals. Pretest can be there regarding the attitude. - Vijayasree
- Assessment component of the module should never consider tests, practical's, viva etc. Satisfaction scoring only is needed - Prakash

Report prepared by: Dr. Vinodkumar M V

PILOT MODULE: UNDERSTANDING TRIDOSHA SIDHANTA

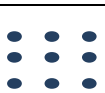
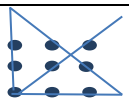
Total teaching hours: 2 hrs

Aims of module

1. To familiarize the way in which Ayurveda approaches human being.
2. To understandtridosha as the basic physio-psychological principles which govern basic mechanisms of any living organism, especially human beings.
3. To formulate a statement for Tridosha sidhanta
4. To identify Gunas of Tridosha
5. To easily by heart slokas corresponding to Tridosha sidhanta and Gunas of Dosha

1. Subtopic – 1: "Thinking out of frame"

Mode of transaction	Lecture
Aim	1. To explain the aim of the class and to direct the students about their participation in the class 2. To impart the sense of thinking "out of the box" to the participants
Content	Welcome the participants to the class. Instruct them to perform deep breathing thrice. Brief interaction with two or three students to identify their level of understanding by asking "what do you know about Ayurveda? Have you ever heard about Tridosha?" Have a brief discussion on the importance of seeing things "out of frame". For that, "nine dotted game" can be introduced. Put nine dots on the black board, three dots in each line. Ask the students to join the dots with four continuous lines. Usually they think in the frame of dotted area. But, then with four lines it is impossible to connect all the dots. Then the Instructor completes it with four lines (as shown in the figure). It ensures the importance of "thinking out of the frame".

	   Frame limited to dotted area Thinking out of the frame Note: Some of the students may be familiar with the game. If so, entertain other students to complete the game by themselves. Request maximum participation in the interaction/discussion/activity etc.
Activities	Nine dotted game
Materials	Nil
Time allotted	10 minutes
Skills attained	Prepare themselves to receive new ideas
Critical remarks	Lecture may emphasis on bridging the class atmosphere to a new/strange science. Also it may enable them to get ready for interactive learning.

2. Subtopic – 2: Assessment of Nature

Mode of transaction	Students activity
Aim	1. To introduce the method in which Ayurveda approaches a person 2. To build up back ground for familiarizing Tridosha
Content	Students are allowed to make groups of two each. Let them assess prakriti mutually. The Questionnaire (Table – 1) is supplied and directed them to put tick marks in corresponding items which they find suitable to explain the other's character. Brief explanation can be given on the terms used in the table. Better encourage them to furnish the questionnaire themselves.
Activities	Assessment or Prakriti
Materials	Prakriti assessment chart (Appendix-1)
Time allotted	20 minutes
Skill attained	Identify several terms/ideas through which Ayurveda explains human being. Reach in an orientation about three groups of features.

Critical remarks	Don't introduce the names of tridosha in this stage. Instead let the students be familiar with the characteristic features of Doshas (in prakriti) and learn to categorize into three groups. The activity enables them to be familiar with the way in which Ayurveda speaks about the activities of human beings.

3. Subtopic – 3: Characteristics of Tridosha – Primary ideas

Mode of transaction	Students Activity
Aim	1. To identify some terms related to Tridosha in the background of prakriti assessment 2. To become familiar with core characteristics of Tridosha (without their names) 3. To introduce names of tridosha with their etymology
Content	Students are allowed to make groups of five or six (better to group for each bench). They are instructed to read the Chart-1 once again to identify terms given in Table-2 (appendix-2). In table-2, 20 terms are enlisted. Students can identify those terms in Chart-1 very well. They are instructed to identify the domains in which the questions come. The discussion will end up in classifying the domains as: Physical, Physiological, Psychological and Social. They are instructed to roughly classify the features into the above domains. (this is rather a discussion than an activity) They will make discussions to make the selection. Though the terms are not directly available in the chart they can comprehend them from it. The discussion enables them to have more concrete ideas about the characteristic features of dosha (without entitling them as dosha). In Table-3 they categorize the terms into three groups. The students are encouraged to pick out the most prominent biological characteristics. The discussion will conclude by selecting three basic characteristics of Tridosha Chalana (Movement), Pachana (Metabolism) and Upachaya (accumulation). Teacher will intervene in the discussion so as to make a desired outcome from the discussion. By the end of this session teacher will coin three terms Vata, Pitta, Kapha with etymology. Teacher establishes that the three core features (Chalana, Pachana and

	Upachaya) are illustrated in the etymology.
Activities	Discussion
Materials	Tables-2& 3 (Appendix-2)
Time allotted	20 minutes
Skills attained	Come closer to the terminologies/features used in Ayurveda to explain its theories. Classify them into three
Critical remarks	The teacher can bring to their attention that the terms listed in the table are mutually opposite (Eg: Seeta, Ushna etc.). Through this the idea of "mutually opposing" characteristics of human body can be introduced. By this stage students will become familiar with characteristics of three factors and how their name suggests their major activity

4. Subtopic – 3: Tridosha sidhanta

Mode of transaction	Interactive lecture
Aim	1. To establish that all the activities in the biological system involve three basic principles viz Tridosha 2. To make out the statement for Tridosha sidhanta
Content	Teacher asks students to list out identifying features of Living organism those differentiate it from non-living. Have a discussion about the above features to highlight how the three major functions (Chalana, Pachana, Upachaya) play major role in all the features. The teacher establishes that three major functions are reflected in all life sustaining mechanisms enlisted in varying proportions. After establishing the three as the primary mechanisms of life, take digestion, respiration, excretion etc. as examples to derive the idea that in all these physiological processes three main principles work in various proportions. Then explain the idea of homoeostasis in terms of tridosha. Harmonious activity of Tridosha leads to health (homoeostasis) and loss of harmony leads to disease. As a conclusion class reaches to the sloka explained in AH (*Vayupittamkaphascheti… vikritaavikritaadehamghnanti….)*. Printed sloka is supplied to students and its meaning is explained by the

	teacher.
Activities	Listing out differences between living and non-living organisms
Materials	Printed Sloka (AH Soo 1/….)
Time allotted	30 minutes
Skills attained	Students are able to identify dosha as the basic principles those govern all the physiological activities in human body. Able to describe homoeostasis (health) and disease in termsof Tridosha
Critical remarks	This subtopic is the most important one. So, assure maximum participation of the students as a part of discussion. Get frequently assured that the ideas are conforming to their scientific temperament.

5. Subtopic – 5: Introduction to technical terminology

Mode of transaction	Lecture
Aim	1. To familiarize basic technical terminology needed for understanding tridoshasiddanta
Content	In this session, teacher familiarizes terms like dosha, guna, karma and some of individual gunas with their meanings in English/Malayalam. Students understand these technical terms with the help of study material, prepared for this purpose. Some of the terms like sheetha, Ushna etc. are familiar to the students in their conventional meanings and some others like Rooksha, Khara etc. are to be familiarized freshly. It's better to start with familiar terms by ensuring students' participation and then to proceed to new terms.
Activities	NIL
Materials	Glossary of technical terms
Time allotted	10 minutes
Skills attained	Students are able to identify some conventional terms as technical terms
Critical remarks	There is no need to describe the terms deeply. Only rough sense of the terms is to be conveyed

6. Subtopic – 6: Gunas of Tridosha

Mode of transaction	Lecture discussion

Aim	1. To enlist gunas of tridosha as described in AH sutrasthana 1 2. To minimize resistance in by-hearting sloka
Content	Students are directed to classify the gunas enlisted in glossary as those of tridosha in the light of the above knowledge base. Eg., take each guna enlisted in the glossary and ask the students to correlate them to particular dosha. In this manner, ushna is connected to pitta, chala is connected to vata and so on. Teacher ensures students' participation in identifying gunas. Thus finally reaches to a list of gunas under the heading of each dosha. The gunas are enlisted in an order which composes a sloka in that order. They reach in slokas (tatrarooksholaghuseeta etc.). Missing gunas like sookshma (in vata), visra (in pitta) and mritsna (in kapha) are explained by the teacher. Finally students are instructed to recite the slokas and to by heart them.
Activities	Discussion
Materials	Sloka portion in AH
Time allotted	10 minutes
Skills attained	1. To enlist Gunas of doshas 2. To by heart slokas with their meanings
Critical remarks	By hearting sloka directly put difficulty in most of the students. But, when sloka is derived from their common logic and learning it becomes more easy to by heart. Some core concepts can be taught in this style. Once students learn how to deal with slokas, it will become more easy to by heart slokas. Initially by hearting simple pieces of sloka s like the above will minimize their resistance in learning sloka.

PILOT STUDY

Āryavaidyan, Vol XXX, No. 2, November 2016 - January 2017, Pages 15 - 20

Framing innovative teaching model for āyurvedic concepts a pilot trial on transacting Tridoṣasiddhānta

Vinod Kumar M. V. and Upendra Dixit

ABSTRACT: Reforms in teaching methodology of āyurvedic concepts are gaining augmented concern over last few years in the curricular reconstruction efforts initiated in India. Beginners in āyurveda find it difficult to imbibe the real scientific spirit of āyurvedic concepts due to lack of convincing teaching methods. Here is a pilot trial on developing a miniature teaching module for transacting the "Tridoṣasiddhānta"; one of the prime concepts in āyurveda. For developing an innovative teaching module for tridoṣasiddhānta, principles of Process Oriented Learning (POL) can be taken as a platform. A two hour module was developed and implemented among two groups of learners; I BAMS students and pre-āyurvedic students (+2 students). The module included strategies of active learning like activities, brainstorming, group discussion, guided discussion, etc. At the end of implementation of the module, learner feedback assessment was done to see whether the module satisfies principles of POL. Results showed that, the module satisfactorily transacted pre-designed content with increased student participation leaving a scope for critical thinking, interest generation and aptitude building. The pilot module can be considered as a background move in further development of extensive modules to transact āyurvedic concepts.

Key words: Tridoṣasiddhānta, Innovative teaching model, Process oriented learning

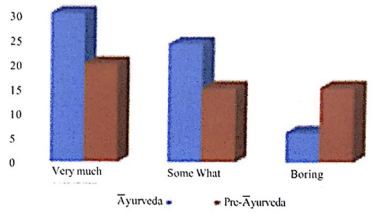
Introduction

Prevailing methods of teaching/learning āyurvedic basic concepts have been reported not to ensure participatory learning, critical thinking and conformity with the scientific temperament of new comers. A learner admitted to BAMS finds it hard to attain smooth transition from his previous learning experience to the new.[1] Main reasons may be abstractness of the concepts and learners' unfamiliarity with the technical language. Introducing a new āyurvedic concept, that too without challenging their present scientific temperament, needs a well planned strategy. Āyurveda is a science with a different content. Building a proper orientation on the concepts is not an easy discourse. While students need a different order of thinking and a different perspective of viewing human being, such a perspective should be built up through a defined process, as it is done in learners of primary classes. Āyurvedic textbooks like Carakasamhita explicitly dealt with teaching-learning methods suitable for medical learning.[2] The process of learning was equipoised with its product in such descriptions. Learning tridoṣasiddhānta is typically formative, because, gathering ideas on tridoṣa continues throughout the course and even after. Proper learning of the concept of tridoṣa needs reframing of learners' approach towards human body. The concept does not make strangeness in beginners when their thought process is put in a new framework. In the exercise of putting things in a new framework, process orientation is more important than product orientation. POL enables active, student centered learning through activities, discussions, demonstrations, brainstorming, clinical based learning (CBL) etc. where learners' participation is pivotal. Passivity of didactic lecture method is replaced with activity in such strategies.

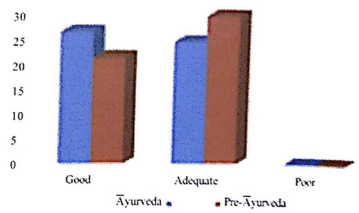
Diagram 2

Perceptions regarding topic

Interest to know more (Perceptions regarding topic)



Explanations (explanation of topic)



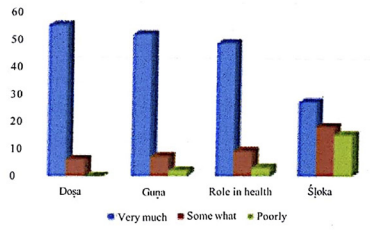
2. Perception on subject content

Subject content: 90% of learners in Group-1 earned very much clarity of the concept of tridoṣa, 10% got somewhat clear idea, nobody reported to have poor idea. In Group- 2 it was 45%, 50% and 5% respectively. In case of the concept of guṇa in relation with tridoṣa it was 80%, 20%, 0% and 35%, 55% and 10% respectively. (See diagram 3)

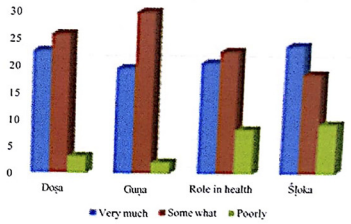
Diagram 3

Perception on subject content

Group-1 (Āyurveda)



Group-2 (Pre-āyurveda)



The role of tridoṣasiddhānta in concept of health was very much clear for 75% learners in Group-1, somewhat clear for 20% and poorly clears for 5% learners; where as in Group-2 it was 38%, 46% and 16% respectively.

Learning śloka through its construction was found very much easy by 45% learners, somewhat easy by 35% and not at all easy by 20% in Group-1 and Group-2 equally.

3. Perception on teaching methodology

In Group-1, 55% learners strongly agreed that the total module was interesting. 45% has moderate agreement. In Group-2, the percentage of strong agreement was 12% and moderate agreement 24%. 28% of them had neither agreed nor disagreed. 10% & 26% had general disagreement and strong disagreement in this respect.

Majority of Group-1 (64%) strongly agreed that the module encouraged critical thinking. 24% agreed moderately and 12% disagreed. In Group-2, majority agreed (strongly 20%, moderately 33%), but there was considerable disagreement (total 27%) with that idea. 20% of them had a neutral status.

Majority of Group-1 (65%) strongly agreed that the module ensured learner's participation. 35% had general agreement and 5% strongly disagreed. In Group-2, majority agreed with the idea (strongly 40%, general 45%). Neutral status was shared by 10% and 5% disagreed.

In Group-1, 40% shared strong desire to know more about the subject, 45% agreed. 15% was neutral in this appraisal. In Group-2, minority (16%) showed intense desire, whereas a desirable number (36%) agreed to have a further learning in the topic. 20% had a neutral appraisal, 20% disagreed and 8% strongly disagreed to imbibe further knowledge on the subject.

Results

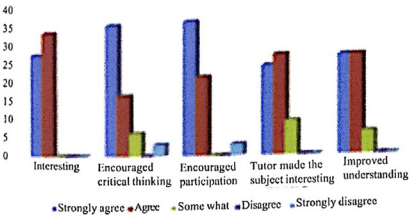
The results obtained from the above observations can be summarised as below:

- Majority of learners agrees with clarity of ideas, participatory nature and chance for critical thinking. I BAMS students marked higher intensity.
- Majority of learners feel themselves well communicated with the content offered through the module. Group-1 marks higher percentage.
- Grand majority shared their interest to know more about āyurveda. I BAMS students' marked higher percentage.
- In almost all parameters Group-1 showed shift to positive aspect, where as Group-2 marks more or less an equal distribution.
- Majority in Group-2 do not want to become āyurvedic physician.
- Majority in Group-2 does not feel that the learning of tridoṣasiddhānta is easy.
- Majority of learners agree with the scientific nature of āyurveda. Group-2 agrees with more intensity. (See diagram 4)

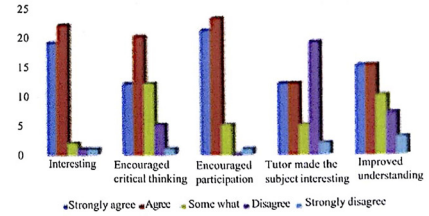
Diagram 4

Evaluation of the teaching methods

Group-1 (Āyurveda)



Group- 2 (Pre-āyurveda)



Discussion

A pilot module was designed to make a radical change in the class room behavior of a learner who comes to learn āyurveda, when compared to conventional āyurveda teaching. A learner who comes to BAMS class room is substantially different from a learner who by chance comes to learn it. Selection of a group from +2 stream was necessitated by an urge to compare the outcome in the above two settings. In other words, it was to assess the change in approach when he/she purposively becomes a learner in āyurveda. In almost all assessments, Group-1 showed positive inclination towards the items. Group-2 (+2 students), being impartial and non-preconceived about the outcome expected, the results can be considered with an additional validity about their strength.

Preparation of the module was completed in such an intension that teacher centered learning may be substituted by student centered. The prime concern was to assure student participation in the process of learning. Second thought was to incorporate the idea of constructivism in its minimum applied extent. Showering the pre-conceived ideas of a teacher directly over the brains of a learner was challenged by providing ample opportunities for them to participate in constructing new concepts.

By introducing prakṛti assessment chart as an opening tool, it was expected that learners can feel āyurveda as a discourse in which they are personally taking part, never a zone from where they are alienated. This helps to address their affective domain at the outset itself.

Generally, there is a notion about teaching reforms in āyurveda that all such efforts aim at challenging śḷoka oriented learning. Conventional āyurvedic teaching stick on to the classical śḷoka oriented didactic methods. Here in this method, there is an innovative attempt to learn āyurveda in an activity oriented way, preserving the importance of śḷoka tradition. Śḷoka learning itself is made process oriented in this approach. Both the methods have their own merits.

The components of the module *viz.* activities, brainstorming, group discussion, lecture discussion, construction of śḷoka were intended to make the whole discourse more student centered, active, interesting and assuring student participation. From the results it is evident that these goals are safely attained.

The biological understanding of tridoṣasiddhānta (step-4, in the module) was the hall mark of the module, which made the module not compromising the present scientific temperament of the learners. This aspect attains high significance by pointing on the way in which āyurvedic concepts need to be presented before new generation learners. It never tried for a blind correlation to modern concepts, but, tried to make a frame where tridoṣa and biology meet together. Formulation of such a frame resulted in feeling tridoṣa as a scientific principle.

Conclusion

The pilot trial of an innovative teaching model was implemented among fresh students of āyurveda as well as previously unexposed group of school children to gauge the acceptability of the module. The findings suggest that the module was an effective communicative and learning model for introducing āyurvedic principles to novice students. The module proved to meet its outcomes in the scientific understanding as well as improved participation in class. A significant number of participants from both groups showed interest to learn more at the end of the module. Thus, this pilot trial puts light on feasibility and nature of teaching module as a part of developing innovative teaching models to transact basic concepts of āyurveda. However, the assessment of the module will be completed only after comparing it to current practice in colleges as well as a slightly expanded subject matter.

Limitations

The pilot module could not complete comparison of the new model with presently available teaching models (conventional teaching) to have a comprehensive assessment of merits and demerits of the new method. Learning of basic principles as a part of present curricular structure needs real time implementation of the module with necessarily advanced content and more effective strategies like CBL, demonstration, etc.

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Authors

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Appendix – V

Kottakkal
19.01.2017

From
Dr. Vinodkumar M V; MD (Ay)
PhD Scholar
TilakMaharahstraVidyapeeth, Pune
email: ayurvin@gmail.com
Mob: +91 94472 70848

To
……

Respected Sir/Madam,

As a part of my PhD work (Title: *Comparative assessment of models of instruction for transacting Tridosha Sidhanta*) under Dept. of Ayurveda, Tilak Maharashtra Vidyapeeth, Pune, I am planning to develop a draft module for transacting Tridosha sidhanta at I BAMS classes. Tridosha sidhanta is corner stone of Ayurvedic fundamental principles which explains different states of biological functioning in normal and abnormal states of health. As of now, Tridosha sidhanta is taught mainly through didactic lecture based on verses from Samhitas. As a beginner in learning Ayurveda, students feel alienated from the classes due to abstractness and non-familiarity of the subject as well as strangeness of technical language. Even though the core idea of Tridosha sidhanta is easily comprehensible for a beginner, the method in which it is usually transacted makes problems. In this back ground, the above study aims to develop and implement Teaching Modules incorporating principles of activity oriented, student centered, process oriented learning.

The experimental part of the study comprises of comparing conventional teaching with modular approach. As a part of the assessment of outcomes in the above groups we need to conduct an achievement test (Summative Assessment) through a structured questionnaire. Hereby I attach the questionnaire for your expert opinion. I humbly request you to furnish an expert opinion in the prescribed format attached herewith.

Expecting your kind co-operation,

Thanking you

Dr. Vinodkumar M V

Topics covered in the module:

- Brief assessment of Prakriti(As per AH Soo1 and simple descriptions based on AH Sareera3 without sloka)
- Man-nature mutuality –Soma-surya-anila concept (As per Susrutasamhita)
- Biological make up of Tridosha Sidhanta – major physiological activities explained in the back ground of Tridosha
- Understanding the Statement of Tridosha sidhanta (Vayu: pittamkapahascheti etc…)
- Qualities of Tridosha (As per AH Soo 1)
- Normal fluctuations of Tridosha – fluctuations according to diurnal variation, geographical variation, age and food etc. (As per AH Soo1)
- Gross locations of Dosha (adho-madhya-urdhwa concept) (As per AH Soo1)
- Normal activities of Tridosha (As per AH SooDoshadivijanneeya)
- Symptoms of increase (Vriddhilakshana of Doshas)
- Locations of doshas (Doshasthanas)
- Types of Vata (As per AH SootraDoshabhedeeya)

EXPERT REVIEW PROFORMA

Name of the expert:
Institution:
Subject taught:
Educational Qualification with specialty:
Years of service:

Sl No	**Item**	**Agreement**				
		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	Portions mentioned come under the topic Tridosha as per I BAMS syllabus					
2	The questions cover the whole topics mentioned					
3	The questions are adequate to test the proficiency of learners in the subject					
4	The questions assess the knowledge, understanding and application levels in the topics mentioned					
5	The questions test the slokaorientation of the learners					
6	The questions sufficiently use technical terms (in Sanskrit) meant for the learners in the topics mentioned					
7	Questions are clear by the language(both English and Malayalam) to the standard of I BAMS students					
8	Time allotted for the test is adequate					
9	The options given in MCQ is well demarcated					
10	In an overall assessment, the questionnaire is well drafted					

Signature of the expert:

Place:
Date:

INSTITUTIONAL ETHICS COMMITTEE (IEC)

[INSTITUTIONAL REVIEW BOARD (IRB)]

VAIDYARATNAM P.S.VARIER AYURVEDA COLLEGE
Kottakkal, Edarikode 676 501

Proceedings No: IEC/CI/02/13 dated 26/07/2013

Ref: IEC/Doc/02/13 dated 20/07/2013

The Institutional Ethics Committee of Vaidyaratnam PS Varier Ayurveda College, Kottakkal unanimously approved the PhD research proposal submitted by **Vinodkumar** M V, under the Department of Ayurveda, Tilak Maharashtra Vidyapeeth, Pune.

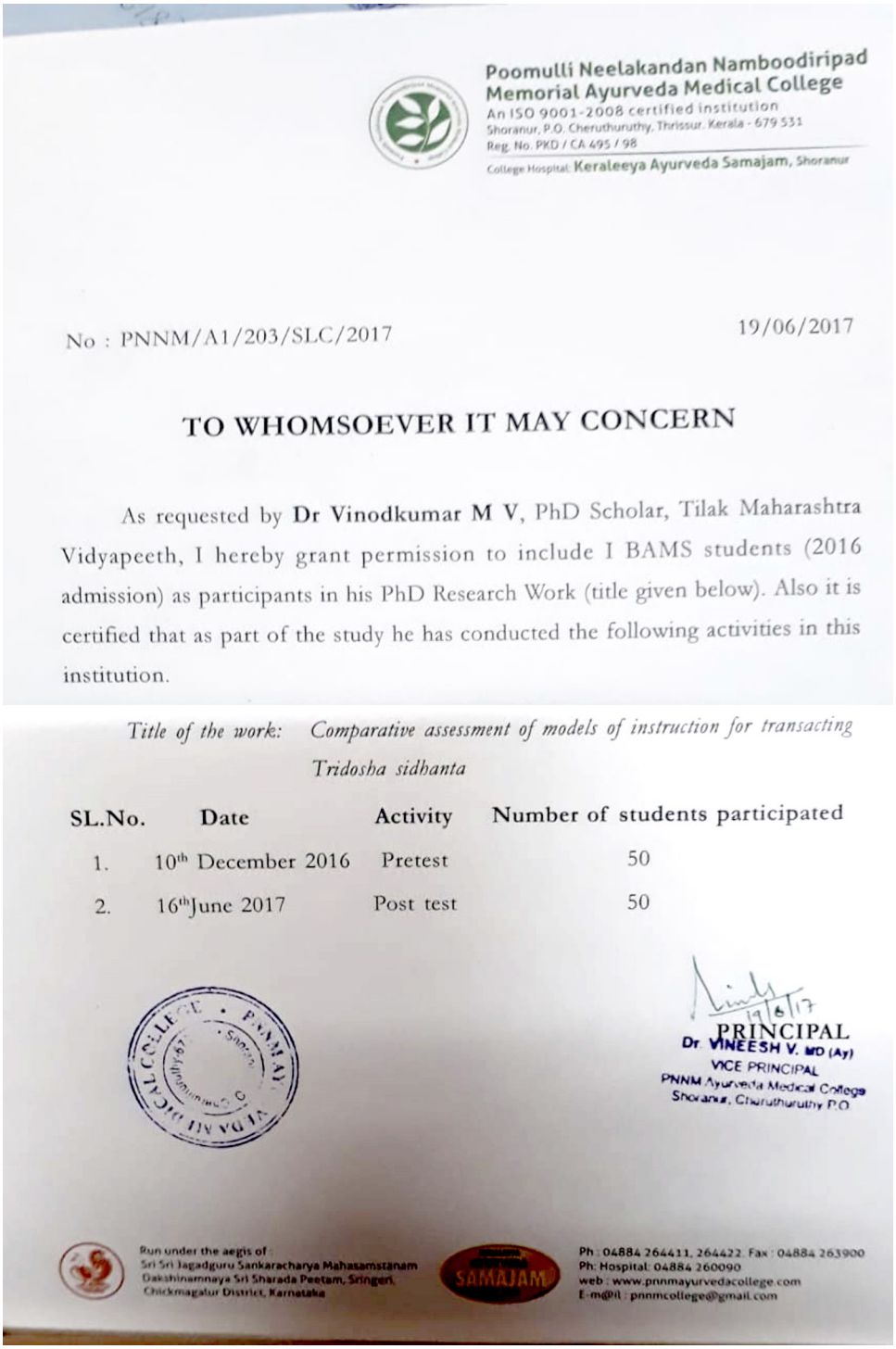
Title:

Comparative assessment of models of instruction for transacting Tridosha Sidhanta

Dr.P P Kirathamoorthy

Member Secretary

1



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An ISO 9001-2008 certified institution
Shoranur, P.O. Cheruthuruthy, Thrissur. Kerala - 679 531
Reg. No. PKD / CA 495 / 98
College Hospital: Keraleeya Ayurveda Samajam, Shoranur

No : PNNM/A1/203/SLC/2017

19/06/2017

TO WHOMSOEVER IT MAY CONCERN

As requested by **Dr Vinodkumar M V**, PhD Scholar, Tilak Maharashtra Vidyapeeth, I hereby grant permission to include I BAMS students (2016 admission) as participants in his PhD Research Work (title given below). Also it is certified that as part of the study he has conducted the following activities in this institution.

Title of the work: Comparative assessment of models of instruction for transacting Tridosha sidhanta

SL.No.	Date	Activity	Number of students participated
1.	10th December 2016	Pretest	50
2.	16thJune 2017	Post test	50

19/6/17
PRINCIPAL
Dr. VINEESH V. MD (Ay)
VICE PRINCIPAL
PNNM Ayurveda Medical College
Shoranur, Cheruthuruthy P.O

Run under the aegis of
Sri Sri Jagadguru Sankaracharya Mahasamstanam
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PANKAJAKASTHURI

AYURVEDA MEDICAL COLLEGE & POST GRADUATE CENTRE

(CCIM Approved Regional Centre for Training to Teachers)

PKAMC/A-1/127/17

4/7/2017

TO WHOMSOEVER IT MAY CONCERN

As requested by Dr. Vinodkumar M V, Associate Professor, VPSV Ayurveda College Kottakkal, for granting permission, I hereby grant permission to include I BAMS students (2016 admission) as participants in his PhD Research work (details given below). Also, it is certified that as a part of the study he has conducted the following activities in this Institution.

Title of work: Comparative assessment of Models of Instruction for TransactingTridosha Sidhanta

Sl No	Date	Activity	No. of students participated
1	16/12/2016	Pretest	61
2	04.07.2017	Post test	57

PANKAJAKASTHURI AYURVEDA MEDICAL COLLEGE & POST GRADUATE CENTRE Thiruvananthapuram

Executive Vice President

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DEPT. OF SAMHITHA, SAMSKRITHA & SIDDHANTHA
GOVERNMENT AYURVEDA COLLEGE
Thiruvananthapuram, Kerala

To whomsoever it may concern

This is to certified that **Dr. Vinodkumar M.V.**, PhD Scholar, Tilak Maharashtra Vidyapeeth, has conducted the following activities in this department as part of his PhD Research Work (title given below) among 1st BAMS students (2016 Batch).

Title of the work:

Comparative assessment of models of instruction for transacting Tridosha sidhanta

Sl. No.	Date	Activity	Number of students participated
1	19th December 2016	Pretest	59
2	6th July 2017	Post test	59

Rani Sayed

Dr. Rani Sayed MD(Ay)
Professor & Head

GOVERNMENT AYURVEDA COLLEGE

Dr. RANI SAYED M.D (Ay)
Professor & HOD Reg. No.4786
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To whomsoever it may concern

This is to certify that as requested by Dr. Vinodkumar M V, Associate Professor in this institution, and as approved by Institutional Ethics Committee vide ref. IEC/Cl/02/13 dated 26.07.2013, the following activities were undertaken by him as a part of PhD research under Tilak Maharashtra Vidyapeeth, (Title: "Comparative assessment of models of instruction for transacting Tridosha sidhanta"), for the students of 2016 admission batch of BAMS.

Activity	Date	Number of students participated
Pretest	13.01.2017	45
Class - 1	17.01.2017	48
Class - 2	20.01.2017	46
Class - 3	21.01.2017	47
Class - 4	24.01.2017	44
Class - 5	31.01.2017	45
Class - 6	02.02.2017	45
Class - 7	03.02.2017	46
Class - 8	04.02.2017	45
Class - 9	05.02.2017	46
Class - 10	06.02.2017	48
Class - 11	09.02.2017	45
Class - 12	10.02.2017	46
Class - 13	13.02.2017 & 16.02.2017	45
Class - 14	18.02.2017 & 23.02.2017	45
Class - 15	02.03.2017	46
Post test	11.03.2017	45

PRINCIPAL 6/5/2018

PhD Title: Comparative Assessment of Models of Instruction to Transact Tridosha Sidhanta
Name of Scholar: Dr. Vinodkumar M V, Name of Guide: Dr. Upendra Dixit
Institution: Tilak Maharashtra Vidyapeeth, Pune

SUMMATIVE ASSESSMENT
Topic: Tridosha Sidhanta

Participant Code No:
Age: Gender:
Entrance Rank No.: Month & Year of admission:
Name of Institution:
Prior knowledge in Sanskrit: Yes/No
Parents Education: Professional/Postgraduate/Graduate/High school/Diploma/Middle school/Primary school/Illiterate
Parents occupation: Profession/Semi-profession/Clerical/shop owner/Skilled worker/Unskilled worker/unemployed
Parents Income per month (Rs) : ≥ 32000, 16000-32000, 12000-16000, 8000-12000, 5000-8000, 2000-5000

- **Use black/blue ink ball pen**
- **Max. Marks: 50**
- **Time allotted: 1 hour**
- **Question Numbers 1-40 carries 1 mark each**
- **Question 41 carries 10 marks**

PART - I
Questions 1-15, please encircle the correct option
1 മുതൽ 15 വരെയുള്ള ചോദ്യങ്ങൾക്ക് ശരിയായ ഉത്തരത്തിൽ വട്ടം വരയ്ക്കുക

1. Among the following, which natural object represents Kapha
താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏത് പ്രകൃതിവസ്തുവാണ് കഫത്തെ പ്രതിനിധീകരിക്കുന്നത്
   a. Soma (Moon) ചന്ദ്രൻ
   b. Surya (Sun) സൂര്യൻ
   c. Anila (Wind) കാറ്റ്
   d. Prithwee (Bhumi) ഭൂമി
2. Among Tridosha, which brings out nourishment and growth of the body
ത്രിദോഷങ്ങളിൽ വെച്ച് ശരീരത്തിന പോഷണവും വളർച്ചയുമുണ്ടാക്കുന്നതേത് ?
   a. Vaata വാതം
   b. Pitta പിത്തം
   c. Kapha കഫം
   d. b & c
3. Which dosha is aggravated in mid-day
മദ്ധ്യാഹനത്തിൽ വർദ്ധിക്കുന്ന ദോഷമേത്?
   a. Vaata വാതം
   b. Pitta പിത്തം
   c. Kapha കഫം
   d. b & c

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4. Which of the following Guna is common for Vata & Pitta
താഴെ കൊടുത്തിരിക്കുന്നതിൽ വാതത്തിനും പിത്തത്തിനും പൊതുവായുള്ള ഗുണമേത്?
   a. Seeta ശീതം
   b. Ushna ഉഷ്ണം
   c. Chala ചലം
   d. Laghu ലഘു
5. Guna of Pitta responsible for its bad smell is
പിത്തത്തിനു ദുർഗന്ധമുണ്ടാക്കുന്ന ഗുണമേത്?
   a. Snigdha സ്നിഗധം
   b. Ushna ഉഷ്ണം
   c. Visra വിസ്രം
   d. Teekshna തീക്ഷ്ണം
6. Which Dosha is aggravated during the final stage of digestion
ആഹാരപചനത്തിന്റെ അവസാനഘട്ടത്തിൽ വർദ്ധിക്കുന്ന ദോഷമേത്?
   a. Vata വാതം
   b. Pitta പിത്തം
   c. Kapha കഫം
   d. All എല്ലാം
7. Which of the following characteristics are NOT shown by a person with Vataprakriti
താഴെ കൊടുത്തിരിക്കുന്നവയിൽ വാതപ്രകൃതിയുള്ള ഒരാൾ കാണിക്കാത്ത സ്വഭാവമേത്
   a. Unstable memory
   സ്ഥിരതയില്ലാത്ത ഓർമ്മ
   b. Excessive sweating
   അമിതമായ വിയർപ്പ്
   c. Dry skin
   വരണ്ട തൊലി
   d. Broken speech
   തടസ്സപ്പെട്ടുള്ള സംസാരം
8. The word Slehsma is derived from the root 'slish'. Which of the following is the meaning of the root 'Slish'
'ശ്ലിഷ്'എന്ന മൂലപദത്തിൽ നിന്നാണ് 'ശ്ലേഷ്മാ' (കഫം) എന്ന പദമുണ്ടായിരിക്കുന്നത്. താഴെ കൊടുത്തിരിക്കുന്നവയിൽനിന്ന് 'ശ്ലിഷ്' എന്ന വാക്കിന്റെ അർത്ഥം തിരഞ്ഞെടുക്കുക.
   a. Binding together (Alingana) ചേർത്തു നിർത്തുക (ആലിംഗനം)
   b. Heating (Santaapa) ചൂടു നൽകുക (സന്താപം)
   c. Movement (gati) ചലനം (ഗതി)
   d. Nourishment (Brimhana) പോഷണം (ബൃംഹണം)
9. Chief location of Vyana, one among five types of Vaata
വാതത്തിന്റെ അഞ്ചുവകഭേദങ്ങളിൽ ഒന്നായ വ്യാനന്റെ പ്രധാനസ്ഥാനം ഏത്?
   a. Mastishka (brain)
   മസ്തിഷ്കം (തലച്ചോറ്)
   b. Hridaya (heart) ഹൃദയം
   c. Amasaya (gut) ആമാശയം
   d. Sroni (pelvis)
   ശ്രോണി (അരക്കെട്ട്)
10. Samyag-gati of Dhatu (proper circulation of tissue nutrients) is the function of
ധാതുക്കളുടെ ശരിയായ ചംക്രമണം ഏതിന്റെ ധർമ്മമാണ്?
   a. Vata വാതം
   b. Pitta പിത്തം
   c. Kapha കഫം
   d. All എല്ലാം

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11. Jangaladesa means
ജാംഗലദേശം എന്നാൽ അർത്ഥമാക്കുന്നത്
    a. Dry land
    ഉണങ്ങിയ പ്രദേശം
    b. Wet land
    ഈർപ്പമുള്ള പ്രദേശം
    c. Moderate land
    ഇടത്തരം പ്രദേശം
    d. Marshy land
    ചതുപ്പു നിലം
12. Which dosha shows predominance in Aanoopadesa
ആനൂപദേശത്ത് ഏതു ദോഷം വർദ്ധിച്ചിരിക്കുന്നു?
    a. Vata വാതം
    b. Pitta പിത്തം
    c. Kapha കഫം
    d. a & c
13. Presence of Pitta is marked in the middle portion of human body, which is in between chest and umbilicus. The reason may be
മനുഷ്യശരീരത്തിന്റെ മദ്ധ്യഭാഗത്ത്, അതായത് നെഞ്ഞിനും നാഭിക്കുമിടയിൽ, പിത്തം കൂടുതലായി കാണപ്പെടുന്നു, കാരണമെന്തായിരിക്കും?
    a. That portion is the hottest in human body
    ശരീരത്തിലെ ഏറ്റവും ചൂടുള്ള ഭാഗമാണത്
    b. Intensive digestive processes are carried out in that segment of human body
    പ്രധാനപ്പെട്ട പചനപ്രക്രിയകൾ നടക്കുന്നത് ശരീരത്തിന്റെ മദ്ധ്യഭാഗത്താണ്
    c. Pitta always is seen in between Vata and Kapha
    എല്ലായ്പ്പോഴും പിത്തം വാതത്തിന്റെയും കഫത്തിനന്റെയും നടുവിൽ സ്ഥിതിചെയ്യുന്നു
    d. Pitta is produced in liver
    പിത്തം നിർമ്മിക്കപ്പെടുന്നത് കരളിലാണ്
14. Which dosha is responsible for lustre of the body?
ശരീരത്തിന്റെ തിളക്കത്തിനു കാരണമായ ദോഷമേത്?
    a. Vata വാതം
    b. Pitta പിത്തം
    c. Kapha കഫം
    d. None of the doshas
    ഒരു ദോഷവുമല്ല
15. Mr. John naturally is very slow in his activities. He has an oily skin and well built body structure. Which of the following feature/s can be naturally expected from him if he is assumed to have typical single dosha predominant Prakriti.
ശ്രീ. ജോൺ പൊതുവേ മെല്ലെ മാത്രം കാര്യങ്ങൾ ചെയ്യുന്നയാളാണ്. അയാൾക്ക് എണ്ണമയമുള്ള തൊലിയും നല്ല ശരീരഘടനയുമുണ്ട്. അയാളുടെ പ്രകൃതി ഒരു പ്രത്യേകദോഷത്തിന്റെ പ്രമുഖസ്വഭാവങ്ങൾ കാണിക്കുന്നുവെങ്കിൽ താഴെ പറയുന്നവയിൽ ഏതു സ്വഭാവത്തെ അയാളിൽ പ്രതീക്ഷിക്കാം?
    a. Aggressive nature പെട്ടെന്നു തീക്ഷ്ണമായി പ്രതികരിക്കുന്ന ശീലം

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b. Excessive thirst അമിതമായ വെള്ളംദാഹം
c. Talkativeness വായാടിത്തം
d. Deep sleep ആഴമുള്ള ഉറക്കം

State True or False (please encircle the option)
ശരിയോ തെറ്റോ എന്ന് രേഖപ്പെടുത്തുക

16. All the doshas have psychological functions (True/False)
എല്ലാ ദോഷങ്ങൾക്കും മാനസികധർമ്മങ്ങളുണ്ട് (ശരി/തെറ്റ്)
17. Chalaguna of Vata does not operate at the level of heart because cardiac movements are involuntary (True/False)
വാതത്തിന്റെ ചലഗുണം ഹൃദയത്തിൽ പ്രവർത്തിക്കുന്നില്ല; കാരണം, ഹൃദയത്തിലെ പേശികൾ അനിച്ഛാപ്രവർത്തകമാണ് (involuntary) (ശരി/തെറ്റ്)
18. Agni becomes Manda when influenced by Vata (True/False)
വാതം കൊണ്ട് ബാധിക്കപ്പെടുമ്പോൾ അഗ്നി മന്ദമാകുന്നു (ശരി/തെറ്റ്)

Fill in the blanks
വിട്ടഭാഗം പൂരിപ്പിക്കുക

19. ..... dosha is related to Visargakarma of Visarga-Adana-vikshepa triad.
വിസർഗ-ആദാന-വിക്ഷേപങ്ങൾക്കിടയിൽ വിസർഗകർമ്മത്തിന കാരണമായ ദോഷം ..... ആണ്
20. Among the functional states of Kosht'ha, Mridukosht'ha is brought about by ..... Dosha
കോഷ്ഠത്തിന്റെ വിവിധ പ്രവർത്തനാവസ്ഥകളിൽ മൃദുകോഷ്ഠത്തെ ഉണ്ടാക്കുന്ന ദോഷം ..... ആണ്.

Specify the type of Vata involved in the following activities
താഴെ കൊടുത്തിരിക്കുന്ന പ്രവൃത്തികളിൽ ഏർപ്പെട്ടിരിക്കുന്നത് വാതത്തിന്റെ ഏതു വകഭേദമാണ്:

21. Proper functioning of sense organs
ഇന്ദ്രിയങ്ങളുടെ ശരിയായ പ്രവർത്തനം Ans:.....
22. Articulation (voice production)
വാക്കുകളുടെ ഉച്ചാരണം Ans:.....
23. Defecation
മലത്തെ പുറംതള്ളൽ Ans:.....

Read the following descriptions carefully and answer the questions followed:
താഴെ കൊടുത്തിരിക്കുന്ന വിവരണങ്ങൾ സശ്രദ്ധം വായിച്ച ശേഷം ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതുക.

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(29) Name two Gunas of that particular Dosha which can cause such changes ....., ...

വാർദ്ധക്യകാലത്ത് ആളുകൾ പൊതുവേ ധാതുക്ഷയരോഗങ്ങൾ (degenerative diseases) അനുഭവിക്കുന്നു. അതായത്, അവരുടെ ധാതുക്കൾ ആ പ്രായത്തിൽ അളവും കഴിവും കുറഞ്ഞവയാകുന്നു. അസ്ഥികൾക്കു തേയ്മാനം വരുന്നതുകൊണ്ടുണ്ടാകുന്ന സന്ധിവേദന അതിനൊരു നല്ല ഉദാഹരണമാണ്.

(28) ഏതു ദോഷമാണ് അത്തരം അവസ്ഥകൾക്കു കാരണം? .....

(29) ആ ദോഷത്തിന്റെ ഏതു ഗുണങ്ങളാണ് അത്തരമൊരവസ്ഥ സംജാതമാക്കുന്നത്? .....

Read the following passages and identify the dosha responsible for the events underlined.

താഴെ കൊടുത്തിരിക്കുന്ന ഖണ്ഡികകൾ വായിച്ച് അടിവരയിട്ടിരിക്കുന്ന കാര്യങ്ങൾ ഏതു ദോഷം കൊണ്ടുണ്ടായിത്തീരുന്നുവെന്ന് നിർണ്ണയിക്കുക.

- Respiration involves movement of the thoracic cage, diaphragm and lungs[30] in response to nervous signals from the respiratory centre in the medulla. Lungs are covered by two layered membrane called pleura. Pleural fluid is present in between the two layers. Pleural fluid acts as a lubricant[31] to prevent friction between the two layers of pleura. During expiration water evaporates through the expired air and along with water heat is also lost from the body. Thus regulation of body temperature[32] also is a function of lungs.

  തലച്ചോറിലെ മെഡുല്ലയിൽ സ്ഥിതിചെയ്യുന്ന ശ്വസനകേന്ദ്രത്തിന്റെ (respiratory center) നിർദ്ദേശാനുസരണം നെഞ്ചിലെ പേശികൾ, ഡയഫ്രം, ശ്വാസകോശങ്ങൾ എന്നിവകൾക്കുണ്ടാകുന്ന ചലനം[30] മൂലമാണ് ശ്വാസോച്ഛ്വാസം നടക്കുന്നത്. ശ്വാസകോശങ്ങൾ രണ്ടു പാളികളോടുകൂടിയ പ്ലൂറ (pleura) എന്ന സ്തരം കൊണ്ട് സംരക്ഷിക്കപ്പെട്ടിരിക്കുന്നു. രണ്ടു പാളികൾക്കിടയിൽ കാണുന്ന ഒരു തരം ദ്രാവകം (pleural fluid) അവയ്ക്കിടയിൽ ഘർഷണം കുറയ്ക്കുന്നു (lubricant)[31] ശ്വാസം പുറത്തേക്കുവിടുമ്പോൾ വെള്ളം ആവിയായി പുറത്തേക്കുപോകുന്നതിന്റെ ഭാഗമായി ശരീരത്തിനകത്തെ ചൂടു നഷ്ടപ്പെടുകയും ചെയ്യുന്നു. അതിനാൽ, ശരീരത്തിന്റെ താപനില നിയന്ത്രിക്കുക[32] എന്നതും ശ്വാസകോശങ്ങളുടെ ഒരു ധർമ്മമാണ്.

  30 ..... 32.....

  31.....

- People differ in their intellectual level due to different reasons. Intellect is usually measured based on fastness in grasping ideas, analyzing the ideas gathered, capacity to retain memory of the idea etc. Some people learn things slowly, but, once they learn things, they can memorize it for longer duration[33]. Some others have greater capacity to grasp things fastly; but, they forget them immediately[34]. Yet another group have sharpness of mind which help them to discriminate[35] things from one another. People

- A patient comes to you with head ache. He explains a specific pattern of symptoms. The head ache starts in the morning, slowly aggravates to reach maximum severity at noon and slowly comes down by evening.

  (24) Which Dosha is responsible for this pattern? Ans.....

  (25) Select a symptom from the following which can associate with the above pattern

  (i) Pain aggravates during hunger

  (ii) Pain subsides by application of heat

  Ans:.....

  തലവേദനയുമായി ഒരു രോഗി നിങ്ങളെ സമീപിക്കുന്നു. ഒരു പ്രത്യേകക്രമത്തിലുള്ള വേദന യാണ് അയാൾ വിവരിക്കുന്നത്. രാവിലെ ചെറുതായി തുടങ്ങി പ്രമേണ ഉച്ചനേരത്ത് തീവ്രത ഏറ്റവും കൂടുകയും വൈകുന്നേരമാകുമ്പോൾ കുറയുകയും ചെയ്യുന്നു.

  (24) ഏതു ദോഷമാണ് ഇങ്ങനെയുള്ള അവസ്ഥ ഉണ്ടാക്കുന്നത്?

  ഉത്തരം: .....

  (25) താഴെ കൊടുത്തിരിക്കുന്നവയിൽ ഏതു ലക്ഷണമാണ് അത്തരക്കാരിൽ കാണാൻ സാദ്ധ്യ ത കൂടുതൽ

  (i) വിശന്നിരിക്കുമ്പോൾ വേദനയുടെ തീവ്രത കൂടുന്നു

  (ii) ചൂടുപിടിപ്പിക്കുമ്പോൾ വേദന കുറയുന്നു

  ഉത്തരം: .....

- Pain in abdomen is a common symptom for different types of ulcers in GI tract. In some patients pain aggravates immediately after intake of food. In some others, pain starts after 1-2 hrs of intake. Some others develop pain after complete digestion of food. If a patient starts developing pain immediately after intake of food,

  (26) Which Dosha is to be considered while treating the patient? .....

  (27) Guess the part of GI tract where such an ulcer can be located

  Upper part/Middle part/Lower part

  വയറിലെ പുണ്ണിന്റെ (Ulcers) ലക്ഷണങ്ങളിൽ പ്രധാനം വയറുവേദനയാണ്. ചില രോഗിക ളിൽ, ആഹാരം കഴിച്ചയുടനെ വേദന വർദ്ധിക്കുന്നു. മറ്റു ചിലരിൽ, 1-2 മണിക്കൂറുകൾക്കു ശേഷമാണ് വേദന ആരംഭിക്കുന്നത്. പിന്നെയും ചിലരിൽ ആഹാരം ദഹിച്ചതിനു ശേഷമാണ വേദന അനുഭവപ്പെടുന്നത്. ഒരു രോഗിയിൽ ആഹാരം കഴിച്ചയുടനെ വേദനയുണ്ടാകുന്നു വെന്നിരിക്കട്ടെ.

  (26) ചികിത്സയിൽ ഏതു ദോഷത്തെ പരിഗണിക്കണം? ഉത്തരം.....

  (27) ഉദരത്തിലെ ഏതു ഭാഗത്താണ് അത്തരം ഒരു അൾസർ വരാൻ സാദ്ധ്യത കൂടു തൽ? ആദ്യഭാഗം/മദ്ധ്യഭാഗം/അവസാനഭാഗം.....

- People generally suffer from degenerative disease in their old age. That means, during that age their tissues are generally get weakened by quality and quantity. Best example is degeneration of bones in the joints to cause joint pain.

  (28) Which Dosha is responsible for such diseases? .....

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who have high grasping capacity, good sharpness and good memory power are said to have good intellect.

പല കാരണങ്ങൾ കൊണ്ട് ആളുകൾ തമ്മിൽ ബുദ്ധിപരമായ വ്യത്യാസങ്ങൾ കാണാറുണ്ട്. പൊതുവേ, വസ്തുതകളെ ഗ്രഹിക്കുന്നതിലുള്ള വേഗത, അവയെ അപഗ്രഥനം ചെയ്യാനുള്ള കഴിവ്, അറിഞ്ഞ വസ്തുതകളെ ഓർമ്മിച്ചുവെക്കാനുള്ള കഴിവ് എന്നിവയാണ് ഒരാളുടെ ബുദ്ധിയെ നിർണ്ണയിക്കുന്നത്. ചില വ്യക്തികൾ കാര്യങ്ങൾ മെല്ലെ ഗ്രഹിക്കുകയും പഠിച്ച കാര്യങ്ങൾ ദീർഘകാലം ഓർത്തുവെക്കുകയും ചെയ്യുന്നു.[33] മറ്റു ചിലർ, വളരെ പെട്ടെന്നു കാര്യങ്ങൾ ഗ്രഹിക്കുന്നു, പക്ഷേ, അത്രയും പെട്ടെന്നു മറക്കുകയും ചെയ്യുന്നു.[34] ചിലരെ കുശാഗ്രബുദ്ധിയെന്നു വിളിക്കാറുണ്ട്; കാരണം, അവർ കാര്യങ്ങളെ കീറിമുറിച്ച് പരിശോധിക്കുവാനും വേർതിരിച്ച് മനസ്സിലാക്കുവാനും കഴിവുള്ളവരായിരിക്കും.[35] ഇത്തരം കഴിവുകളെല്ലാം തികഞ്ഞിരിക്കുമ്പോഴാണ് ഒരു വ്യക്തി ബുദ്ധിപരമായി ഏറ്റവും മികച്ചുനിൽക്കുന്നത്.

33 ..... 35.....

34.....

- Digestion starts from mouth. There is a group of muscles called “muscles of mastication” which helps in chewing the food[36]. Along with chewing, there is production of Saliva from salivary gland. Saliva helps the process in two ways: one is to lubricate and moisturize[37] the food particles and the other is to start enzymatic activity[38] for proper digestion. By chewing and salivation, the food becomes a bolus which moves down through esophagus. That act is called deglutition[39]. The movement of bolus through esophagus is made easy through wave like movement of esophagus called peristalsis[40]. Wall of esophagus produce mucous which helps in lubricating the movement and also to protect the walls. These well co-ordinated activities lead the bolus to stomach.

  ആഹാരത്തിന്റെ പചനം ആരംഭിക്കുന്നത് വായയിൽവെച്ചാണ്. ആഹാരം ചവച്ചരയ്ക്കാൻ[36] സഹായിക്കുന്നത് മാസ്റ്റിക്കേഷൻ പേശികൾ (muscles of mastication) എന്നറിയപ്പെടുന്ന പേശീസമൂഹമാണ്. ചവച്ചരക്കുന്നതിന്റെ കൂടെത്തന്നെ, ഉമിനീർ ഗ്രന്ഥികളിൽ നിന്നു ഉമിനീർ (Saliva) സ്രവിക്കുകയും ചെയ്യുന്നു. ഉമിനീർ രണ്ടുതരത്തിലാണ് ഈ പ്രക്രിയയെ സഹായിക്കുന്നത്. ഒന്ന്, ആഹാരത്തെ നനയ്ക്കുകയും വഴുവഴുപ്പുള്ളതാക്കി[37] മാറ്റുകയും ചെയ്യുന്നു. രണ്ട്, ഉമിനീരിലെ എൻസൈമുകൾ ആഹാരപചനത്തെ[38] ത്വരിതപ്പെടുത്തുന്നു. ചവച്ചരയ്ക്കൽ, ഉമിനീർ സ്രാവം എന്നിവയുടെ സഹായത്തോടെ ആഹാരം ഉരുളകളായി മാറുകയും വിഴുങ്ങൽ പ്രക്രിയ (deglutition)[39] വഴി അന്നനാളത്തിലേയ്ക്ക് (esophagus) പ്രവേശിക്കുകയും ചെയ്യുന്നു. അന്നനാളത്തിന്റെ തരംഗചലനം (peristalsis)[40] ആഹാരത്തെ ശരിയായ രീതിയിൽ ഇറങ്ങിപ്പോകാൻ സഹായിക്കുന്നു. അന്നനാളത്തിന്റെ ഭിത്തികളിൽ നിന്നു സ്രവിക്കപ്പെടുന്ന ശ്ലേഷ്മദ്രവം (mucous) വഴുവഴുപ്പുണ്ടാക്കുകവഴി (lubrication) ആഹാരത്തിന്റെ ചലനത്തെ സഹായിക്കുന്നു; കൂടാതെ, അന്നനാളഭിത്തിയെ സംരക്ഷിക്കുകയും ചെയ്യുന്നു. ഇത്തരം ആസൂത്രിതപ്രവർത്തനങ്ങൾ വഴി ആഹാരം ശരിയായ രീതിയിൽ ആമാശയത്തിലെത്തുന്നു.

36 ..... 37.....

38.....

39.....

40.....

- **Write the slokas in Sanskrit, which explains the following ideas:**
  താഴെ കൊടുത്തിരിക്കുന്ന ആശയങ്ങൾ വിവരിക്കുന്ന അഷ്ടാംഗഹൃദയത്തിലെ ശ്ലോകങ്ങൾ എഴുതുക:
  a. Statement of Tridosha Sidhanta
     ത്രിദോഷസിദ്ധാന്തം പ്രസ്താവന

  b. Gunas of Tridoshas
     ത്രിദോഷങ്ങളുടെ ഗുണങ്ങൾ

  c. Normal Karmas of Vata
     വാതത്തിന്റെ കർമ്മങ്ങൾ

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PART – II

1. In the Visarga-Adana-Vikshepa trio, Vikshepa is related to
    a. Vaata
    b. Pitta
    c. Kapha
    d. Pitta & Kapha
2. Mechanism of sweating comprise of two steps: Dilatation of peripheral blood vessels and filtration of water through small pores of vessel walls. Gunas which act in the above mechanisms are …… and …….
    a. Ushna, Teekshna
    b. Ushna, Sukshma
    c. Seeta, Sukshma
    d. Laghu, Seeta
3. Fat molecules adhere to blood vessel which later on develop block to the vessel. The Guna responsible for this adherence is ……..
    a. Snigdha
    b. Kathina
    c. Pichila
    d. Laghu
4. Gunas present in milk are Seeta, Snigdha, Guru and Manda. The same Gunas are present in Ghrita (Ghee) also. Select a Guna from the following which is present in Ghee and not in Milk
    a. Sthira
    b. Sookshma
    c. Ushna
    d. Teekshna
5. Vaata is derived from the root Gati and Gandhana. The word meaning of Gandhana is
    a. Movement
    b. Sensation
    c. Instability
    d. Dryness
6. Which among the following statements is WRONG regarding Tridoshas
    a. Tridoshas are in dynamic equilibrium in normal conditions
    b. Presence of Doshas are inferred through their Gunas and Karmas
    c. Doshas are present only in the locations specified to them
    d. Doshas cannot help each other in bringing out their activities

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7. Classify the following functions as Vata, Pitta and Kapha
   Fertility, Repair, Pumping, Immunity, Appetite, Lubrication, Digestion, Catabolic changes, Sensory activity

Vata	Pitta	Kapha

8. Statement: Tridoshas are in a state of dynamic equilibrium in their healthy status
   Reason: There are opposite Gunas in Doshas so that they can have a balancing in between them
   Select the right option from among the following regarding the above statements:
   a. Statement and Reason are correct; Reason justifies the statement
   b. Statement and Reason are correct; Reason does not justify the statement
   c. Statement is right and Reason is wrong
   d. Both Statement and Reason are wrong
9. Statement: Morning hours and evening hours represents Kapha and Vata respectively.
   Reason: Morning hour is comparatively Seeta-snigdha and evening hours is Seeta-Rooksha
   Select a right option among the following regarding the above description
   a. Both Statement and reason are correct; reason justifies the statement
   b. Statement and reason are correct, but reason does not justify the statement
   c. Statement is correct and reason is wrong
   d. Statement and reason are wrong
10. Here are some Vridhilakshanas of Doshas on one side and some of the Gunas on the other side. Arrange them in the table given as shown in the first row.

Kampa	Chala
Ushnakamitwa	Ruksha
Agisadana	Ushna
Sakritgraha	Guru
Alpanidrata	Seeta
Gaurava	Sthira
	Sookshma

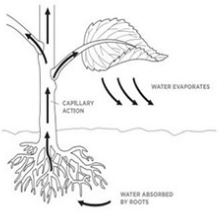
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Name of Dosha	Vridhilakshana	Probable Guna behind Vridhilakshana
Vata	Kampa	Chala

11. **Identify probable Gunas responsible for the phenomena shown in the pictures below:**









12. Process of digestion is similar to cooking. Imagine cooking rice in the kitchen. We generally cook rice by adding water to it. Directly heating the rice will burn it to ashes. Which Guna of Pitta is referred in the description underlined?
    a. Sasneha
    b. Ushna
    c. Teekshna
    d. Sara
13. Heaviness usually increases dullness/slowness in activity. Slowness always goes along with firmness/steadiness. Which Dosha is referred from the above descriptions?
    a. Vata
    b. Pitta
    c. Kapha
    d. All the Doshas

14. In the story of Rabbit & Turtle, Turtle typically represents
    a. Vata prakriti
    b. Pittaprakriti
    c. Kapharakriti
    d. Vata-Kapha prakriti
15. There are some Gunas common for more than one Doshas. Which of the following statements are RIGHT regarding common Gunas.
    a. All the Doshas have one Guna in common
    b. Vata & Kapha have one Guna in common
    c. Pitta & Kapha does not have any Guna in common
    d. Vata & Pitta have three Gunas in common
16. Write features of Prakriti in the balnk boxes. Fill the last two rows by your own.

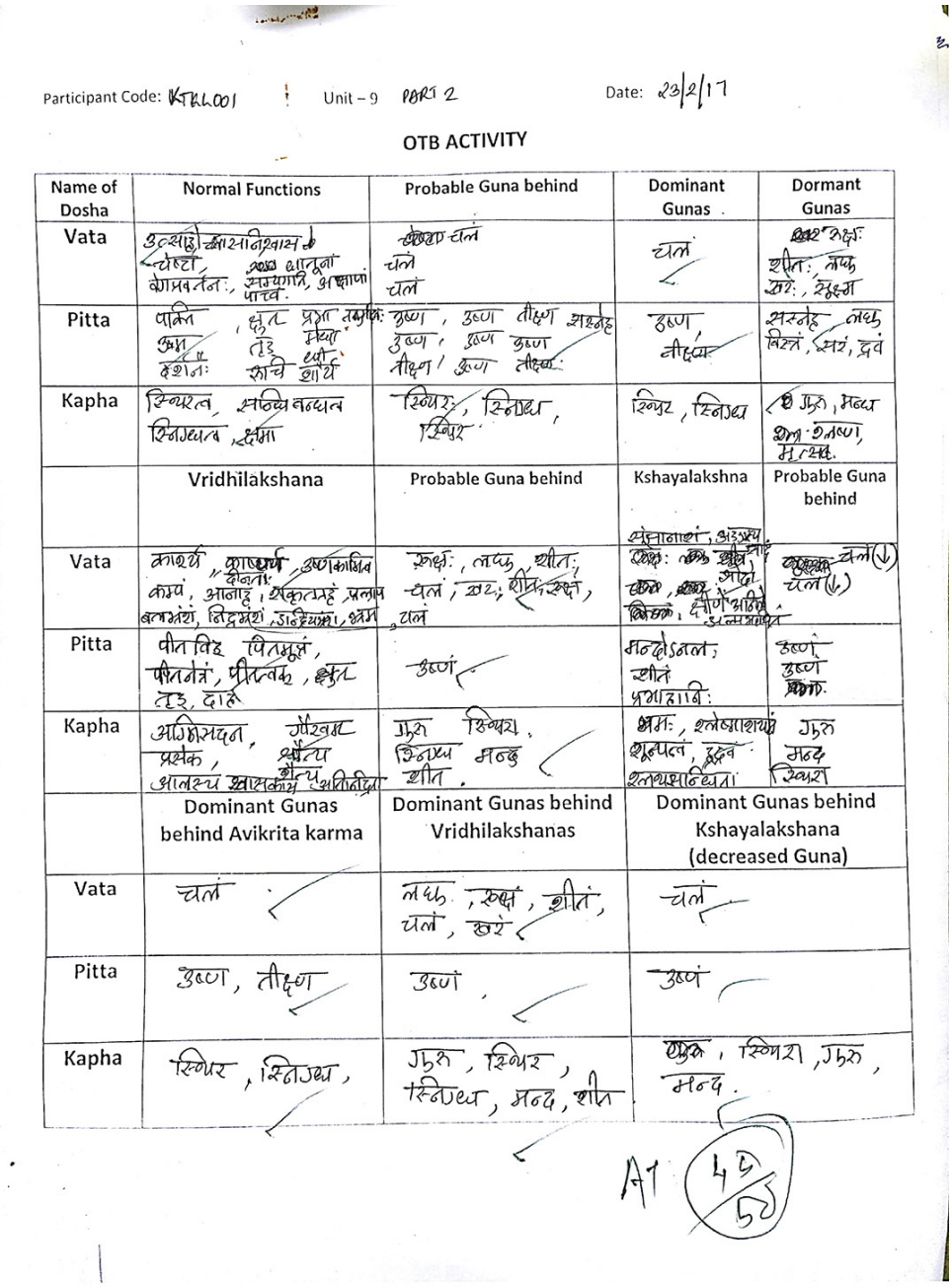
	Vata	Pitta	Kapha
Appetite	(1)	(2)	Less
Sleep	Disturbed	(3)	(4)
Skin	(5)	(6)	Oily
Body movements	(7)	Fast and precise	(8)
Body structure	(9)	Moderate built	(10)
(11)	(12)	(13)	(14)
(15)	(16)	(17)	(18)

17. Draw lines to connect matching terms in the following columns

Deglutition (Annapravesana)	Vyana
Phonation (Vakpravritti)	Apana
Digestion (Annapachanam)	Prana
Ejaculation (Suklanishkramanam)	Udana
Physical movements (Gati)	Samana

PhD Project Material

Sample sheets of Activities



Participant Code: KTKL001 Unit – 9 PART 2 Date: 23/2/17

OTB ACTIVITY

Name of Dosha	Normal Functions	Probable Guna behind	Dominant Gunas	Dormant Gunas
Vata	उत्साह, उच्छ्वास, निश्वास, चेष्टा, धातूनां सम्यग्गति, अङ्गानां कोचप्रसारणं,	चलं, चलं, चलं	चलं	शीतः, लघु, खरः, रूक्षम्
Pitta	पक्ति, क्षुत्, प्रभा, तनूष्मा, दृष्टेः, तिक्त, मेधा, रुचि, धी, शौर्य	उष्ण, तीक्ष्ण, स्नेहः, उष्ण, उष्ण, उष्ण, तीक्ष्ण, उष्ण, तीक्ष्ण	उष्ण, तीक्ष्ण	सस्नेह, लघु, विस्रं, खरं, द्रवं
Kapha	स्थिरत्व, सन्धि बन्धन, स्निग्धत्व, क्षमा	स्थिरः, स्निग्ध, स्थिर	स्थिर, स्निग्ध	गुरु, मन्द, शीत, उष्ण, मृदुत्व.
	Vridhilakshana	Probable Guna behind	Kshayalakshna	Probable Guna behind
Vata	कार्श्यं, कार्ष्ण्यं, उषाकालिव दीनता, कृशं, आलस्यं, एकाग्रतायां प्रलाप, बलभ्रंशः, निद्रायां, उद्विग्नता, श्रमः	रूक्षः, लघु, शीतः, चलं, खरः, शीतं, रूक्षं, चलं	रूक्षः, लघु, शीतं, चलं, दीर्णप्रकृतिः, अल्पशरीरं	चलं(↓)
Pitta	पीतविड्, पित्तमूत्रं, पीतनेत्रं, पीतत्वक्, क्षुत्, तृड्, दाहे	उष्णं	मन्दोऽनलः, शीतं, प्रसादीवि:	उष्णं, उष्ण
Kapha	अङ्गसादन, गौरवत्व, प्रसेक, श्वैत्य, आलस्य, शैत्य, अधीनिद्रता	गुरु, स्निग्ध, स्निग्ध, मन्दु, शीत.	श्रमः, श्लेष्मलाशयां, शुक्लपत्व, दृढत्व, श्लथसन्धिता.	गुरु, मन्द, स्निग्ध
	Dominant Gunas behind Avikrita karma	Dominant Gunas behind Vridhilakshanas	Dominant Gunas behind Kshayalakshana (decreased Guna)	
Vata	चलं	लघु, रूक्षं, शीतं, चलं, खरं	चलं	
Pitta	उष्ण, तीक्ष्ण	उष्ण	उष्णं	
Kapha	स्थिर, स्निग्ध,	गुरु, स्थिर, स्निग्ध, मन्द, शीत	गुरु, स्थिर, गुरु, मन्द.	

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Prakriti Assessment

	Fetaure	Vata	Pitta	Kapha
	Physical appearance	• Slim ✓	• Average ✓	• Fatty ✓
	Physical strength	—	—	—
P	Body language/body movements	• More ✓	• Purposefull movements ✓	• Less ✓
H	Sleep	• Interupted ✓	• Less & deep ✓	• More & deep ✓
Y	Appetite	• High ✗ Intolerable	—	• High ✗ tolerable
S	Speech	• Highly ✓ talkative	• Purposeful talks ✓	• less ✓
I	Skin	• dry ✓	• oily ✗	• oily ✓
C	Hair	• long ✗	• copperish hair ✓	• short ✗
A	Eyes	—	—	—
L	Tolerance to heat	Tolerable ✓	Intolerable ✓	—
	Tolerance to physical exertion	—	—	—
P	Grasping & Memory	Sucklen grasp ✓ but Short memory	Long memory ✗	Long memory ✓
S	Planning	No planing ✓	Proper planning ✓	No planing ✗
Y	Concentration	less ✓	more ✗	High ✓
C	Making friendship	many ✓	few but deep ✓	Need laege time ✓
H	Completion of task	No ✓	Proper ✓	Slow ✓
O	Sensitivity	Not ✓	highly ✓	less ✓
	Excitation	high ✓	~~An~~ Proper ✓	less ✓

35/35

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Participant code: KTKL024 Unit.7 Date: 9/2/17

Prior knowledge in Sanskrit: Yes/No

NORMAL FUNCTIONS OF DOSHAS

Terms	Mere Sanskrit terms			Sanskrit terms with meaning			Sanskrit terms with explanation		
	Vata	Pitta	Kapha	Vata	Pitta	Kapha	Vata	Pitta	Kapha
उत्साहं	✓			✓			✓		
प्रभा		✓			✓			✓	
पक्ति		✓			✓			✓	
उच्छ्वासनिश्वासं	✓			✓			✓		
तृट्		✓			✓			✓	
दर्शनं			✓			✓		✓	
तनुमार्दवं			✓			✓		✓	
चेष्टा	✓			✓			✓		
स्निगधत्वं			✓			✓			✓
क्षमा			✓			✓			✓
धी					✓			✓	
वेगप्रवर्तनं	✓					✗	✓		
क्षुत्	✓			✓				✓	
ऊष्मा		✓			✓			✓	
मेधा					✓			✓	
धातूनां सम्यग्गति			✓	✓			✓		
रुचि		✓			✓			✓	
शौर्यं		✓			✓			✓	
अक्षाणां पाटवं						✓	✓		
स्थिरत्वं			✓			✓			✓
सन्धिबन्धं			✓			✓			✓
	14/21				16/21			21/21	

GRADED TABLE METHOD

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Participant Code: KTK1031

Date: 22/3/2017

Prakriti Assessment

	Fetaure	Vata	Pitta	Kapha
PHYSICAL	Physical appearance	Lean, long	Moderate ✓	Stout, well built
	Physical strength	Weak	Moderate, Easily exhaustible ✓	Strong
	Body language/body movements	Hypermobile, unnecessary facial expressions	Precise, planned movements ✓	Restricted, slow movements
	Sleep	Interrupted	Less, but deep	Deep, adequate sleep ✓
	Appetite	Irregular	More ✓	Adequate
	Speech	Feable, interrupted, flight of ideas	Clear, planned speech ✓	Clear, slow, affirmative
	Skin	Dry	Pale, hot, with lot of pimples	Oily, smooth ✓
	Hair	Brittle, unequal length	Coppery, thin, early graying	Thick, long ✓
	Eyes	Dead looking, mobile	Redness due to sunlight, dust etc.	Clear white, well structured ✓
	Tolerance to heat	Tolerate	No tolerance ✓	Tolerate
PSYCHO	Grasping & Memory	Easy grasping, easily forgets	Sharp, moderate memory ✓	Slow grasping, deep memory
	Planning	Poor	Moderate ✓	Well
	Concentration	Poor	Well, in interested areas ✓	Well, in any area
	Making friendship	Shifting friendship	Selective friendship, possessive, sensitive ✓	Restricted friendship, deep
	Completion of task	Poor	Complete with exhaustion ✓	Complete without exhaustion
	Sensitivity	Poor	More ✓	Moderate
	Interests	Easily shifting	Shifting after attaining target ✓	Almost permanent
	Excitability	Easy excitation, fast recovery	Easy excitation, slow recovery ✓	Delayed excitation, slow recovery

14 4

Prakriti assessed as: .....Pitta/Kapha.

Age.- 23.

Female.

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Participant Code: KTKL004 Unit – 9, Disturbance in Dosha Equilibrium Date:

ASSIGNMENT

वातवृद्धिलक्षणाः	*पित्तवृद्धिलक्षणाः*	*कफवृद्धिलक्षणाः*
कार्श्यं, काष्ण्यं, उष्णकामित्वं कम्पं, आनाहं, शकृत्ग्रहं बलभ्रंशं, निद्राभ्रंशं, इन्द्रियभ्रंशं, प्रलापं, भ्रमं, दीनता	पीतविट्, पीतमूत्रं, पीतनेत्रं पीतत्वक्, (अति)क्षुत्, (अति) तृट्, दाहं, अल्पनिद्रता	प्रसेकं, आलस्यं, गौरवं शैत्यं, श्वैत्यं, श्लथाङ्गत्वं श्वासं, कासं, अतिनिद्रता

Probable causes of Dosha Vitiation	Dosha vitiated	Probable Guna behind vitiation	Probable Lakshana	Whether personally experienced by the participant or not
Night alertness	Vata	Ruksha	*कार्श्यं, शकृत्ग्रहं, बलभ्रंशं, इन्द्रियभ्रंशं, प्रलापं, भ्रमं, दीनता*	Yes
Excessive exposure to sunlight	Pitta, Vata	Ruksha, Usna Teekshna	बलभ्रंशं कार्श्यं, काष्ण्यं, क्षुत् इन्द्रियभ्रंशं, भ्रमं, तृट्, दाहं	Yes
Excessive day sleep	Kapha	Manda, गुरु	दीनत, गौरवं, अग्निसदन, आलस्य	No
Excessive physical exercise	Vata, Pitta	Chala, Laksha	क्षुत्, तृट्, दाहं, बलभ्रंशं, दीनता	Yes
Starvation	Vata, Pitta	Laghu, Ruksha	क्षुत्, तृट्, बलभ्रंशं, कम्पं, निद्राभ्रंशं, इन्द्रि	Yes
Use of excessive spicy food	Pitta, Kapha	Theekshna Ushna.	तृट्, दाहं.	No.
Excessive mental tension	Vata(Pitta)	Ruksha.	कार्श्यं, काष्ण्यं, कम्पं, निद्राभ्रंशं, बल भ्रंशं, इन्द्रिय भ्रंशं, अग्निसदनं	Yes
Excessive anger	Pitta, Vata	Theeksha, Ushna	दाहं, अल्पनिद्रा, कम्पं	Yes
Excessive sexual intercourse	Vata	Ruksha	बल भ्रंशं, धातुक्षयं	No.
Sedentary lifestyle	Kapha	Manda	गौरव, अतिनिद्रता, आलस्य	No
Suppression of natural urges	Vata.	Chala	आनाहं, शकृद्ग्रहं	Yes.
Excessive, loud, long speech				
Excessive intake of cold and heavy food	Kapha	Guru	गौरव, आलस्य, अतिनिद्रा	No.

12 12 11 12 12

38

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PRE-TEST

SPOT ASSESSMENT (10 marks)

Unit: 2: Man as an epitome of universe

Participant's Code No: KTKL014 Date: 21-01-2017

1. Number of Qualities enlisted as Gurvadi Guna:
2. Categorise the following into Constructive and Destructive
   Guru, Ruksha, Ushna, Chala, Teekshna, Drava, Manda, Sandra, Snigdha, Sthira

   Constructive: Guru, Mandra, Snigdha, Sthira

   Destructive: Ruksha, Chala, Teekshna, Drava

3. Make four groups from the following ten Qualities
   Seeta, Laghu, Manda, Ushna, Teekshna, Guru, Sandra, Drava

   ① Seeta Ushna ② Manda Teekshna

   ③ Guru Laghu ④ Sandra Drava

POST TEST

SPOT ASSESSMENT (10 marks)

Unit: ~~3: Man as an epitome of universe~~

Participant's Code No: KTKL001 Date: 21/1/17

1. Number of Qualities enlisted as Gurvadi Guna: 20
2. Categorise the following into Constructive and Destructive
   Guru, Ruksha, Ushna, Chala, Teekshna, Drava, Manda, Sandra, Snigdha, Sthira

   Constructive: Manda, Snigha, Chala, Sandra, Drava

   Destructive: Teekshna, Ruksha, Ushna, Sthira, Guru, Laghu

3. Make four groups from the following ten Qualities
   Seeta, Laghu, Manda, Ushna, Teekshna, Guru, Sandra, Drava

   Seeta x Ushna, Laghu x Guru, Manda x Teekshna, Sandra x Drava.

PhD Title: Comparative Assessment of Models of Instruction to transact Tridosha Sidhanta

Scholar: Dr. Vinodkumar M V Guide: Dr. Upendra Dixit

Participant Code: KTKL008

Name of Institution: Vpss V Ayur college

Date: 18/2/2017 Hr.: 9-10/12-1 Unit No.: 10 Class No:

Main ideas conveyed in the class: Classification of ~~some~~ groups into Vridhidakshnas of Vata, Pitta, Kapha

1- Strongly agree 2-Agree 3. No comment
4. Disagree 5. Strongly disagree

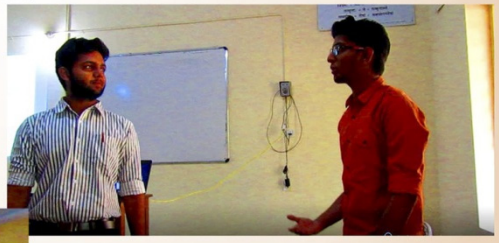
Remark	Agreement		Agreement
Class was interesting	2	Class ensured interest for further learning	2
Class ensured participation	2	The ideas conveyed were clear	2
Class was interactive	2	Class ensured critical thinking	1
Slides were clear and communicating	1		

Any other comments on the class:


Light
Slow
Wet/Oily
Fast


Activate Windows
Go to Settings to activate Windows.









INTERNATIONAL AYURVEDIC MEDICAL JOURNAL

IAMJ

Research Article **ISSN: 2320 5091** **Impact Factor: 4.018**

SCOPE OF CONSTRUCTIVIST APPROACH IN CONCEPT LEARNING – AN EXPERIMENTAL EVALUATION OF A NEW TEACHING MODEL FOR TRANSACTING VIMSATIGUNA

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ABSTRACT

Background: Reforms in pedagogy of Ayurveda hopefully anticipate its shift from teacher centredness to student centredness, from directive teaching to inductive learning, from passive learning to active learning and from memory orientation to application orientation. All these shifts naturally transpire when instructive model of teaching changes to constructivist model. *Constructivism* says that people construct their own understanding, through experiencing things and reflecting on those experiences. Ayurvedic classics leave ample evidences to let us convinced that Ayurveda is adaptive to constructivist model in transacting its content. Concept of *Vimsatiguna*, ten pairs of mutually opposite *Gunas*, is considered as the keystone for building up different theories related to physiology, pathology, drug action, environmental influences and treatment. Constructivist learning of *Vimsatiguna* aims to cultivate a *Guna* perspective among the learners through which they view human body and different variables affecting it. **Objective** of the present study is to assess the effectiveness of constructivist model for transacting *Vimsatiguna*. **Methods:** As a part of preparing a transitional curriculum for I BAMS students, a constructivist teaching module of 2 hours duration for transacting *Vimsatiguna* was prepared and tested in a batch of BAMS students, previously unexposed to the concept of *Guna*, within a month of their admission to the course and the effects were evaluated through pre-test-post-test assessment and feedback proforma. **Results** show 78% comprehension of idea in post test analysis (<0.01) in summative evaluation and 80.9% marks in formative evaluation. The feedback from participants confirmed the role of the module in creating interest, putting clarity in ideas, ensuring participation, bringing out critical thinking and retaining interactive nature. **Conclusion:** Transaction of Ayurvedic concepts like *Vimsatiguna* is adaptive to constructivist model.

Keywords: Ayurveda, *Constructivism, Guna, Vimsatiguna*

INTRODUCTION

Among many problems affecting quality of graduate education in Ayurveda, absence of convincing methodology for teaching is identified as vital. It was reported that Ayurveda learning is more memory oriented than understanding and application oriented, along with being teacher centred.[1,2,3] A nationwide survey study conducted by Dr. Kishor Patwardhan et al (2009) regarding the need of Teaching Methodology in BAMS course revealed that contemporary Ayurvedic teaching methodology does not keep up the scientific values and scientific spirit of a young student.[4] This problem pertains more seriously with learning of Ayurvedic concepts. The challenge offered by Ayurvedic concepts to the scientific temperament of a beginner learner has been repeatedly reported seriously in many discussion platforms by learners as well as teachers. During the induction phase of an Ayurvedic graduate scholar, an abrupt transition from previous learning experience to the new frame of ideas seems to challenge their cognitive integrity. Abstractness of concepts, unfamiliarity with technical terminology, absence of a transitional curriculum and absence of convincing teaching strategies are considered to hold responsibility of the above circumstance.[5] It was recommended that newer methods of active learning should be introduced in Ayurveda.[6] R H Singh (2015) envisaged the teaching reforms in Ayurveda as to enable shift from traditional teacher-centred teaching to student-centred teaching where the leader of educational teamship is the student himself, not merely the teacher. In a new model, it is expected that the teacher does not merely transfer a set of information to the students instead, but try to inculcate learning ability and skill in students to construct ideas by themselves.[7]

The case of concept learning in Ayurvedic pedagogy has to be examined separately. In the induction phase of a beginner learner, concept learning is more complicated due to many reasons including strangeness of the concepts, referring an 'unreal' notion to the concepts, abstractness of ideas, unfamiliarity with technical terminology, learners' non-participation in building up new paradigm, 'forcefully instructed' feel among students and undue stress on blind by hearting and memorization. A new model may ideally be envisaged by assuring learner's participation, respecting learners' capacity to construct ideas through reasoning and logic of his own experiences, not challenging current scientific temperament to a larger extent and imparting due consideration to learners' present level of understanding. Most significantly, it is not necessary to speak in a scientific language of modern science, which they learnt in the previous years, but in a language which they can make sense through logical connections of their own life experiences and common sense. For that, definitely the learner should participate in the process of making sense of the concepts. In a pilot trial reported by Vinodkumar M V et al, the feasibility of introducing activity oriented, interactive module for transacting *Tridoshasidhanta* has been proved.[8] This study proposes a more structured methodology in concept of *Guna.*

Constructivism as a Teaching Model

Constructivism, in relation to Philosophy of Education, is a theory of learning which says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. Social constructivism, one among many streams of Constructivism, view that learning is an active process where learners should learn to discover principles, concepts or facts for themselves, hence there is importance to intuitive thinking (Brown et al, 1989, Ackerman 1996). Many terms like Active Learning, Learning by doing, Discovery Learning, Inquiry Model etc. come under the umbrella concept of Constructivism in an educational set up. Role of teacher in such settings will be that of a facilitator, where students construct appropriate knowledge guided by the Instructor. Lev Vygotsky (1896 – 1934), a Russian Psychologist, formulated Social

Development Theory in 1962, which became the corner stone of Constructivism later on. On contrary to Instructivism (where teacher instructs something), otherwise known as Transmissionist model, Constructivist model is more student centred and process oriented. This philosophy believes that people actively construct or create their own subjective representations of objective reality; new information are linked with prior information. (Table.1)

Table 1: Instructive v/s Constructive models

Instructivist model	**Constructivist model**
Passive learning	Active learning
Teacher is the authority	Teacher takes the role of a facilitator
Teacher centred	Student centred
Achievement/result oriented	Process/Quality oriented
Mainly didactic lecture method is adopted	Active learning strategies like guided discovery, problem based learning, simulation based learning, case simulation, incidental learning etc. can be adopted
Concepts are taught	Concepts are learnt
Less chance for peer interaction	Ample opportunity for peer interaction
Motivation is not an essential component	Motivation essentially associate with process of learning

Constructivist model as corroborated from Ayurvedic classics

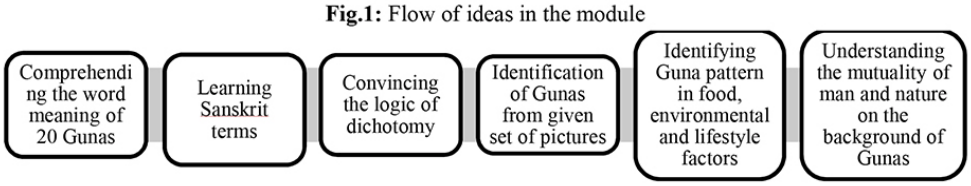
From the descriptions on teaching/learning methods (*Adhyayana-adhyapana vidhi*) in classical Ayurvedic textbooks, it is evident that learning in classical age supported inquiry model (posing questions and getting motivated for finding out its answers) of learning. *Charakasamhita*, in its make itself reflects the queries raised by a brilliant learner (*Agnivesa*) to his teacher (*Atreya*). Often the teacher brings out case discussions, demonstrations, simulations etc. to facilitate learning process. In the case of prime theories like Tridosha sidhanta, the concept is typically formative. That means, learners gather different aspects of the theory at different levels of the curriculum, and finality of the concept is not taught in the class room, but gets constructed by learners by their own experiences even outside the class room. The construction lasts even after completion of the formal studies. This fashion perfectly fits with constructivist approach. Interaction initiated by learners which motivates masters seems to form an important learning method as explained in classical literature. Among four types of Sutras enlisted in *Charakasamhita, Ekeeyasutra* and *Sishyasutra* refer to discussions initiated by learners and scholars.[9] Teacher (Guru) often gets motivated by disciple's question as evidenced from *Charakasamhita,* Sidhisthana.[10] The entire world is considered as master for a wise learner, thereby leaving ample scope for discovery learning.[11] In Ayurveda man is explained as an epitome of Universe (*Loka purusha samya sidhanta*). This basic understanding, in an epistemological parlance spread many hopes for simulation based learning. Tridosha sidhanta, one of the prime concepts in Ayurveda, is primarily established through such a simulation model by Susruta.[12]

Preparation of Constructivist model for transacting *Vimsatiguna*

Vimsatiguna, concept of ten pairs of mutually opposite qualities[13] is considered as the keystone for building up different theories related to physiology, pathology, drug action, environmental influences and treatment. The paradigm shift from physical and chemical understanding of substances (based on modern science) to that of *Guna* spectrum is vital in learning concepts applied in Ayurveda. The present module, prepared as a constructivist model, was aimed to build up a perspective change in learners so that they can identify *Guna* spectrum in the

environmental factors, food and lifestyle factors. In the present module, the concept of *Vimsatiguna* is transacted through a sequence as given in Fig.1.

Fig.1: Flow of ideas in the module



The instructional strategies adopted are brainstorming, game, discovery learning, guided discovery, interactive lecture and spot quiz. Abstract of the content of the module is given in Table – 2.

Table.2: Abstract of the module

Stages	Activity/Strategy adopted	Competency expected
Class - 1		
Comprehending the connotation of *Vimsati Gunas*	*Card game* Step – 1: 20 cards with terms like dry, wet, hot, cold, rough, smooth etc. put on the table. 20 Learners can randomly select one card each from the table. They are instructed to form 10 pairs on a common basis which they make out through mutual interaction. Step – 2: Cards with English terms and Sanskrit terms are supplied; each participant reads the Sanskrit names corresponding to the English term.	Acquaintance with English terms indicating *Gunas* Identifying mutually opposite *Gunas* Connoting Sanskrit terms for *Gunas*
Convincing the logic of dichotomy	*Discovery learning* Two participants were instructed to stand in front of the class with display sheets read as "Constructive change" and "Destructive change". Other participants suggested each *Guna* (card holder) to line up in respective group, applying their own logic	Classify the Gunas to Constructive and Destructive headings, there by apprehending the dichotomy
Identifying *Gunas* in given set of objects	*Guided discovery* For each pair of *Gunas*, some pictures were displayed (ppt), participants were instructed to identify *Gunas* in them	Identify *Gunas* in the given set and ideas
Class - 2		
Identifying *Gunas* in, food environmental and lifestyle factors	*Spot quiz* *Discovery learning* Displaying different environmental/lifestyle factors and identifying the prominent *Gunas* behind them	Can apprehend *Gunas* as real life principles Can view *Gunas* to be the principles behind common variables related to human being

Testing of the new model

Aim

To probe the feasibility of constructivist model in teaching Ayurvedic concepts

Objectives

1. To transact concept of *Vimsatiguna* through constructivist teaching model based on a module prepared for I BAMS class, previously unexposed to the concept, of VPSV Ayurveda College Kottakkal

2. To evaluate the effects of the module transacted through the new model

Methodology

A module for transacting *Vimsatiguna*, based on constructivist approach, was prepared through due discussion with subject experts and educational experts. The module was tested in I BAMS class (2016-17 admission) of VPSV Ayurveda College Kottakkal, with 45 participants. Ethics clearance was obtained from IEC, VPSV Ayurveda College Kottakkal (Ref: No IEC/Cl/02/13 dated 26.07.2013). Instruction of the module was completed in two classes with duration of one hour each, within a month of their admission to the course, corresponding to the existing timetable provided by Kerala University of Health Sciences. Sessions were handled by the researcher himself. The outcome of the class was assessed on the basis of summative pre- test and post test questions which evaluated the knowledge of the students before and after class-1. A spot quiz was used to assess the enhanced understanding on application of the concept developed during the class-1. The questions of the spot quiz were set with an aim of assessing the higher and applied logic building capacity in them. This was assessed at the beginning of class-2. A structured feedback form was used at the end of each class to assess the students feedback regarding role of the module in creating interest, putting clarity in ideas, ensuring participation, bringing out critical thinking and retaining interactive nature, using 1-5 scale, where 1 denoted strong agreement and 5 denoted strong disagreement. Statistical analysis was done using paired t-test for pre-post-test analysis and using Fischer exact test for spot quiz. Student feedback was analysed in percentage of 5 pointed responses in the domains mentioned above.

Results and analysis

45 students participated in the study. Male female ration was 8:37.

As per Table.3, the session showed 78% improvement in comprehension of the idea in post-test analysis which was highly significant ($p<0.001$)

Fig.2 - Summative assessment Class - 1

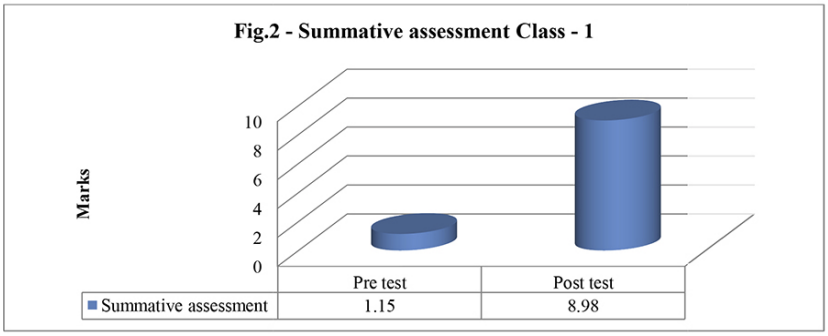


Table.3: Pre-Post analysis Class - 1

Variable	Pre test (n=46)	Post test (n=46)	t-test score	p value	%change
Summative assessment	1.15±1.18	8.98±1.42	25.12	0.001*	78.3%

Spot Quiz was used as a formative assessment tool as well as a teaching strategy. The Spot Quiz assessment showed average 81% marks at the beginning of Class 2 (Table.4). This shows the

68% in both the classes strongly agreed to remark the module as interesting, almost equal response was marked (12%) as to have moderate agreement with the same. No disagreement was noted in both the groups.

Great majority of students agreed that the module ensured participation. Both the groups strongly agreed (79%, 71%) to say that the module ensured students' participation, moderate agreement was noted by 18%, 22% respectively. 3% participants in class-1 and 2% in class 2 disagreed with it.

79% in class-1 and 57% in class 2 strongly agreed to comment that the class was interactive. Moderate agreement was shown by 15% and 42% respectively. 2% made no comments, 2% each in both the classes disagreed strongly to say the class was interactive.

Regarding quality of slides displayed, 70% and 64% participants strongly agreed with good quality, in class-1 & 2 respectively, 22% & 33% moderately agreed and 6% & 2% respectively put no comments. Disagreement was not at all raised in both the classes.

52% and 48% learners strongly agreed that the module ensured interest for further learning. Moderate agreement was noted by 43% and 46% learners respectively. 4% each had no comments. No disagreement was noted in this evaluation.

52% and 55% in class-1 & 2 respectively strongly agreed on the clarity in ideas transacted in the module. Moderate agreement was noted by 43% in each class, whereas no disagreement was noted here in both the groups.

Majority agreed on the chance of critical thinking, strongly by 31%&42% in class-1&2 respectively and moderately by 63% & 46% respectively. 2% & 5% respectively had no comments. No disagreement was shown in both the classes.

DISCUSSION

The present model is a constructivist one in the sense it allows the learners to construct the concept through minimum instruction from the teacher. The teaching strategies adopted in the present model typically generate constructivist ambience in the classroom. Also, the model is activity oriented, student centred and process oriented, as idealized in constructivist model.

Vimsatiguna was selected as the content of the module considering the vitality of the concept. *Guna* is a common base of explaining almost all aspects of human body and drug action and even interaction with surroundings. Bringing out a *Guna* perspective on human experiences makes easy entry to almost all fundamental considerations of Ayurvedic principles. Three basic rules those make the theoretical platform of Ayurveda viz. *Samanya-visesha-sidhanta* (law of similar and dissimilar), *Karya-karana-sidhanta* (Law of causality) and *Loka-purusha samya sidhanta* (Man as an epitome if universe) can be illustrated through taking *Guna* concept as a model. That is really the primacy of concept of *Guna* among Ayurvedic concepts. Being applicable to almost all variables to which human body is exposed, *Gunas* are ideal and amenable for constructivist strategies like discovery learning, interactive learning etc.

The sequencing of ideas contained in the module was done so as to make sensible expansion of ideas starting from mere word meaning. The terminology related to the *Guna* spectrum is often familiar to the learners, with their rough and non-technical meanings. So, direct introduction of such terms will not make them muddled. Starting from such rough notions, through the game given in the module they reach in more precise meanings of the terms. Game ensures learner's participation also. The module never tries to 'define' the terms precisely, but to explain the findings in terms of the *Gunas*, as exemplars and non-exemplars (exemplar is an entity which suits to the definition given and non-exemplar which stands outside) with the help of pictures of common things exhibiting prominent *Gunas*. Classifying things into exemplars and non-exemplars, as it is used in introducing a concept to beginner learner, is a conventional model in concept learning.

The classification was done on two categories: Constructive and Destructive, the two main domains of changes anywhere in the universe. The primary idea of these two categories was given prior to the classification. Classification of things is said to be the primary stage of reflective practices in any discipline.

Spot quiz displays some questions which makes elaboration of ideas suggesting *Guna* behind some situations. Answering such a question assesses the level of understanding on one side, and on the other, bring out further clarity on the terms they learnt. Thus, that method was taken as a formative assessment tool also.

Identifying *Guna* pattern in the environmental factors, common food items, diurnal pattern, geographical distribution etc. was done with the help of pictures showing such variables. The participants were instructed to identify some *Gunas* related to the situation in the picture, guided by the instructor. This was done with two intentions. One is to make sure that learners attained higher levels of reflective practices, and the other, to convince them on the real life effects of *Guna*.

The teaching strategies were selected with an intention to make a modest starting through a simple game, which ensure learners participation and putting a simple entry to otherwise unfamiliar principle like *Guna.* Inculcating a sense of ordinariness is very important in introducing new theories, that too, pertaining to a discipline which the learners have no prior exposure. Advancing to higher strategies ensured reflective practices like comparison, classification, real life association and naturalization of concepts.

Even though Constructivism appeared as an independent teaching model in education in the recent past only, the prime idea of the model is adopted in ancient teaching methods of Ayurveda as evidenced from Ayurveda classics. Hence, adopting such a model in transacting any concept in Ayurveda will not conflict to the spirit of classical Ayurvedic teaching.

The results show effective transaction of the core subject. Difference in scores in pre-test post test assessment, being statistically highly significant there is a real change in the knowledge about the subject matter. In the formative assessment, spot quiz assessed the change in understanding and application levels of the learners, found to be highly significant. The feedback from learners showed significant impression of the module to be interactive, interesting, ensuring critical thinking, creating interest for further learning etc. These aspects reflect the constructivist nature of the module. The model simply overcomes the usual accusations about present transaction of concepts viz- memory orientation, passivity of learners, teacher centredness, learners' notion of getting forcefully instructed etc.

CONCLUSION

In principle, constructivist model is nothing new to Ayurvedic teaching, but its adoption to the current teaching scenario is not attempted much. The review on constructivist method as well as the results of experimental evaluation shows that concepts like *Guna* are practically amenable for constructivist model. This can be extended to other concepts like *Tridosha* etc. which are typically founded upon concept of *Guna*. Through the new model some of the typical hardships in contemporary concept learning can be overcome to a greater extent. This method can also be extended to Ayurveda pedagogy in the form of transitional curriculum implemented during the induction phase of Ayurveda graduation course. This needs due consideration while planning educational reforms in Ayurveda. Curriculum reforms without considering teaching reforms will not yield expected results.

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Source of Support: Nil
Conflict Of Interest: None Declared

How to cite this URL: Vinodkumar M V & Upendra Dixit: Scope Of Constructivist Approach In Concept Learning – An Experimental Evaluation Of A New Teaching Model For Transacting Vimsatiguna. International Ayurvedic Medical Journal {online} 2018 {cited September, 2018} Available from: http://www.iamj.in/posts/images/upload/1967_1975.pdf

Class No	Unit No	Title	Duration	Date	N	Teaching strategies	Main ideas conveyed	Assessments
		Pretest	1 hr	13.01.2017	45			Pretest Questionnaire
1	1	Change your perspective	1 hr	17.01.2017	48	Ice breaking – Game	Learning Ayurveda Needs "out of box" thinking	1. Participants' Feed Back proforma
						Picture puzzles		
						Lecture discussion		
						Group Discussion		
						Case Simulated Learning		
						Sloka learning		
2	2	Man as the epitome of universe	1 hr	20.01.2017	46	Lecture discussion	Man is an epitome of universe	1. Spot assessment (10 marks)
						Brainstorming	Concept of Visarga-Adan-Vikshepa in cosmic and physiological parlance	2. Participants' Feed Back proforma
						Sloka learning		
						Powerpoint presentation		
3	3	Guna spectrum part – 1	1 hr 30 minutes	21.01.2017	47	Game	Introducing 20 Gunas through lecture discussion	1. Pretest-post test
						Lecture discussion with PPt		2. Participants' Feed Back proforma
						Sloka learning		

4	3	Guna spectrum part – 2	1 hr	24.01.2017	44	Activity (Guided Quiz) Lecture discussion	Identifying Guna in various lifestyle factors	1. Spot assessment 2. Participants' Feed Back proforma
5	4	Building Tridosha Approach to human life – Part – 1		31.01.2017	43	Brainstorming Lecture Discussion Activity (Classification of items)	Introducing Tridosha as basic physiological principles with etymological derivation	1. Spot assessment (Pretest-Post test) 2. Participants' Feed Back proforma
6	4	Building Tridosha Approach to human life – Part – 2		02.02.2017	45	Activity (Guided Quiz) Lecture discussion Role play (dynamic equilibrium) Video display Sloka learning	Identifying Tridoshas behind any activity in human body Identifying the dynamic equilibrium among Doshas	1. Spot Quiz 2. Participants' Feed Back proforma

7	5	From Gunas to Doshas		03.02.2017	46	Group Discussion	The Guna pattern of Tridosha sidhanta	1. Pretest – post test
						Constructing ideas	Mutuality of Doshas in terms of Gunas	2. Participants' Feed Back proforma
						Picture display		
						Game (identifying Gunas opposite & similar)		
8	6	The Dosha Basis of personality Part – 1		04.02.2017	42	Video displays of famous stories and personalities (to illustrate prakriti)	Introducing concept of Doshaprakriti	1. Participants' Feed Back proforma
						Role pay (skit)		
						Mutual demonstration of Prakriti		
						Assignment		
9	6	The Dosha Basis of personality Part – 2		06.02.2017	48	Constructing Questionnaire	More ideas about Prakriti	1. Questionnaire score 2. Assignment score - Prakriti assessment
10	7	Normal Fluctuations and Functions of Doshas Part – 1		09.02.2017	45	Guided Quiz (to identify normal fluctuations of Tridosha)	Normal fluctuations and normal functions of Tridosha	1. Spot Quiz
						Proforma filling (three stages)		2. Scoring from tabulation

						Sloka learning		3. Participants' Feed Back proforma
11	7	Normal fluctuations and Functions of Dosha Part - 2		10.02.2017	46	Sloka learning	Learning sloka related to Normal functions of Tridosha	1. Sloka- fill in the blanks
							Identifying dominant and dormant qualities using prescribed proforma	2. Participants' Feed Back proforma
12	8	Structural basis of Tridosha – Part – 1	1 hr	13.02.2017 & 16.02.2017	44	Lecture discussion with Ppt.	How doshas are related to different structural components of human body	1. Spot assessment - Pretest
								2. Post test
								3. Participants' Feed Back proforma
13	9	Disturbance of Dosha equilibrium – Part 1	2 hrs	18.02.2017 & 23.02.2017	45	Case study, Lecture discussion, Open Text Book Activity (OTB),	Syptoms of increase, decrease of Doshas	1. Scoring Pretest-Post test
								2. Score from Assignment for Dosha increase
								3. Participants' Feed Back proforma
14	9	Disturbance of Dosha equilibrium – Part 2		02.03.2017	46	Proforma filling,	Symptoms of decrease	1. Pretest-Post test
						Sloka learning		2. Scoring from OTB activity

								3. Participants' Feed Back proforma
15	10	Functional Divisions of Vata	1 hr	03.03.2017	47	Concept mapping, Lecture discussion with Ppt.	Five functional divisions of Vata with location and functions	1. Spot assessment (pretest & post test)
								2. Participants' Feed Back proforma
		Post test	1.30 hrs	11.03.2017	45			Post test proforma

Comparative Assessment of Models of Instruction for Transacting Tridoshasidhanta

Submitted by

Dr.Vinod Kumar M V, PhD Scholar

Supervisor

Dr.Upendra Dixit

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Year 2012-13

To

The Controller of Examinations

Tilak Maharashtra Vidyapeeth

Pune – 37

Sub: Submission of Protocol for Ph.D. (Ayurveda)

Respected Sir,

I, the undersigned have been enrolled under Faculty of Ayurveda, TMV, Pune for Ph.D. in Maulikasidhanta. I am submitting my protocol titled ***Comparative Assessment of Models of Instruction for Transacting Tridoshasidhanta*** Draft No..... Version No..... for your approval and further instructions.

Thanking you

Yours truly

Dr.Vinod Kumar M V

Forwarded by

Guide HOD Dean

CERTIFICATE

This is to certify that Dr.Vinod Kumar M V whose PRN for Ph.D. (Ayurveda) is ..... has prepared his protocol for Ph.D (Ayurveda), titled ***Comparative Assessment of Models of Instruction for Transacting Tridoshasidhanta*** under my supervision after satisfactory discussions for the selection of the topic.

I recommend that the protocol can be submitted to the Faculty of Ayurveda, as the topic selected by the research scholar is original and not repetition or duplication of any other previous or ongoing work.

The proposed work shall commence after approval by the Ph.D. Committee & Ethics Committee of TMV, Pune.

Date: Sign of the Guide with Seal

1. Title

Comparative Assessment of Models of Instruction for Transacting Tridoshasidhanta

2. Research Guide:

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4. Introduction

Education in its general sense is a form of learning in which knowledge, skills, and attitude of a group of people are transferred from one generation to the next through teaching, training and research.[1]Instructional Models are different kinds of methods which enables the best possibletransaction of knowledge as a part of education.Ancient Ayurvedic seers prescribed the Instructional Methods (adhyayana-adhyapanavidhi) as a part of the very scientific content of the textbooks.[2]FamousAyurvedic textbook Charakasamhitaitself can be considered as a product of disciples' queries regarding different topics.From the descriptions available in Classical Ayurvedic Textbooks it is obvious that disciples were exposed to ProcessOriented Learning through practical demonstrations, group discussions, seminars, question raising, memorizing etc. During the transition of educational pedagogy to Institutionalised pattern, classroom learning came to the centreof the platform and didactic lecture methodssubdued other modes of instruction. It was significantly teacher-centred and memory oriented.Ayurvedicinstructional pattern invariably adopted these changes in their class rooms. It was during the last two decades, primary and secondary education sector subjected to tremendousrevolution in the form of pedagogical shift from Teacher Centred education to student centred education. In other words, these reforms made a shift from

product orientation to process orientation. Process Oriented Learning aroused inquisitiveness, motivation, problem solving capacity and skill developmentof the learners. Process oriented learning stands in contrast to "standard" modes of instruction in which teachers do most of the talking and students are passive.[5]In General Education, remarkable contributions from the field of Educational Research brings out expeditious restructuring of Instructional methods. In Higher Education, Kerala Curricular Framework introduced revolutionary changes in pedagogical approach. In professional education sector, including Technical Education and Modern Medicine the above changes grabbed the instructional patterns in a big deal of volume. Ayurvedic education, as it is dealing with a practical science, should be adaptive to such reforms.

The students admitted to BAMS, before their admission are attuned themselves to Process Oriented Learning adopted at their +2 classes, and even before. In First Professional classes, they are learning Basic Principles of Ayureda, which they experience to be odd due to non-familiarity with the content. Conventional Teaching of Basic Principles in I Professional BAMS comprise of memory oriented teaching.[7]That makes an abrupt shift of the students from familiarised class room behaviour. In the above situation, when students are admitted to BAMS, most often they feel themselves alienated from the mainstream learning methods due to non-familiarity with class room behaviours adopted in Ayurveda Colleges.

As a matter of fact, Basic principles of Ayurveda like Theory of Tridosha, Theory of Panchabhuta, and Concept of Padartha were formulated based on the prime agreement that in all the possible ways human body structurally simulates the nature around him.[8]One who observes human body as a part of nature will succeed in handling Ayurveda. In that sense, Basic Principles of Ayurveda is suitable for Active Learning procedures where natural observations of the learner make the learning simple and effective. The present Ayurvedic pedagogy did not expect the I Professional BAMS students to be introduced to living human body to learn the Basic Principles of Ayurveda.

5. Need and significance of the study

5.1. A survey study conducted by Dr.KishorPatwardhan et al (2009) regarding the need of Teaching Methodology in BAMS course, reveals that the present day Ayurvedic teaching methodology does not keep up the scientific values and scientific spirit of a young student.[3]Again the study finds out theteaching methodology

followed in Ayurvedic educational institutions does not encourage questioning among the young students.[3]

5.2. Though several experiments have been conducted on Instructional Methods across the globe to enhance the quality of learning experience among medical students, no significant efforts of such experiments are recorded as far as Ayurveda education is concerned.

5.3. As a matter of fact, the specialty of Educational Research in Medical Education (modern medicine) began just over three decades ago with a small group of clinicians and educational researchers at the medical school in Buffalo, New York.[14] As far as Ayurveda is concerned, the initiation should come from India, as it is indigenous to India.

5.4. Tridosha sidhanta is one of the most important theory of Ayurveda, which is introduced in I Professional BAMS, as of now the teaching is generally based on didactic lecture method. Process of understanding the concept of any theory (including Tridosha) should involve active participation of the learner. This inevitably invites necessity of developing new instructional methods suitable for building the concept.

5.5. Critical analysis of Instructional methods (adhyayana-adhyaapanavidhi) explained in Brihattrayee (the major textbook triad in Ayurveda) will bring new insights in developing instructional methods suitable for transacting Tridoshasidhanta. Such an attempt has not been done yet seriously.

5.6. Development of Models of Instruction thus becomes ultimate need of the hour. Our approach to pedagogy must shift from being TeacherCentredto being Learner-Centred.[4]

6. List of related previous studies

6.1. Narayan J. *Teaching reforms required for Ayurveda.* Journal of Ayurveda and Integrative Medicine. 2010;1:150-157

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6.7. Mrozowski S. *Effective Multimedia Uses in Medical Education: Connections between Generative Learning Theory and Human-Centered Computing.* LLC Review. 2006;6:42-68.

7. Review of literature

7.1. Learning (Adhyayana), Teaching (Adhyapana) and Colloquia (tadvidyasambhasha) are the three major modalities to impart knowledge to the next generation as per Charakasamhita.[9]

7.2. Major Textbooks of Ayurveda (Brihat-trayee – Charakasamhita, Susrutasamhita&Ashtangasangraha) have explicitly demonstrated the methods of Teaching and Learning Ayurveda. Such methods support effective learning through problem based learning, practical demonstrations, question raising, discussions etc.

7.3. Traditional classroom teaching is old fashioned; too detailed, producing doctors with poor interpersonal skills. Teaching should thus be hospital-oriented, and clinically oriented; then students remember well. Didactic teaching, lectures and tutorials, is outdated spoon-feeding, stifling creative thinking, keeping students inferior.

7.4. The Medical Council of India, as a part of its recommendations for renovation of Medical Education stresses on the importance of Modular Training, being merited by addressing the cognitive, affective, and psychomotor skills better than the usual teaching methods.[11]

7.5. In a study done by Srikanth et al, it is concluded that, modular training methods would be superior to usual lecture classes as the students' involvement would be maximized in this method. It would enhance their retaining capacity.[12]

8. Definition of Key Terms

8.1. *Models of Instruction*: Is defined as the model through which a particular topic is transacted to the learners. In the present study two models of instruction are considered for comparison. They are:

8.1.1. *Process Oriented Learning*: This is anactivity oriented learning experience in which learners involve themselves in various activities. Activity Oriented Learning is an approach to instruction in which students engage the material they study through reading, writing, talking, listening, and reflecting. Active Learning programme is an innovative, interesting and corroborated classroom transaction programme. This approach provides a way to integrate learning within students' knowledge, and, by exposing them to a variety of activities for harnessing their skills.[6]Teaching strategies adopted in active Learning are: Case studies, Small group discussions, demonstrations, Presentations and debates, Journaling, Role playing, Learning Games, Field Experiences, Class Discussions, Simulations etc.

8.1.2. *ConventionalInstruction*: Is the teaching prevalent in the present classrooms of BAMS for teaching Tridoshasidhanta. It mostly contains didactic lecturesfor teaching slokas and their meanings.

8.2. *Instructional Modules*: Module is a unit of work in a course of instruction that is virtually self-containedand a method of teaching that is based on the building up skills and knowledgein discrete units.

8.2.1. A Process Oriented Learning Module has the following components:

8.2.1.1. Rationale

8.2.1.2. Objectives

8.2.1.3. Entry Test

8.2.1.4. Multi Media Materials

8.2.1.5. Learning Activities

8.2.1.6. Assignments

8.2.1.7. Post Test

8.2.2. A module for Conventional Teaching of Ayurveda contains the following components:

8.2.2.1. Reciting sloka

8.2.2.2. Construction of prose order (anvaya)

8.2.2.3. Meaning of the prose order (anvayartha)

8.2.2.4. Other implication of the sloka (bhaavartha)

8.2.2.5. Knowledge of relevant commentaries on the sloka (vyakhyana)

8.2.2.6. By-hearting the sloka

8.3. *Tridosha Sidhanta*: Tridosha sidhanta (sidhanta = theory) is the basic theory in Ayurveda to explain the physiological and pathological status of a person, transacted as a part of I Professional BAMS study in Ayurveda Colleges. It states that the harmonious functioning of Tridoshas (three *doshas)* brings out health and their disharmony, disease. Exclusive knowledge of the theory will explore different aspects of tridosha including their Qualities, Locations, Physiological Significance, Relationship with other components of body, Subdivisions, Pathological Significance etc.

8.4. Brihattrayee: The three Classical Textbooks which laid the theoretical and practical foundation of Ayurveda. They are:

8.4.1. Charakasamhita written by Agnives'a and redacted by Charaka (BC 200)

8.4.2. Susrutasamhita written by Susruta (400 BC)

8.4.3. Ashtangasangraha written by Vagbhata (400 AD)

9. Variables of the study

9.1. Independent Variables

9.1.1. Activity Oriented instructional Module

9.1.2. Conventional Instructional Module

9.2. Dependent variable – Effectiveness of the modules

10. Aims &Objectives of the study

1. To make a critical analysis on Ancient Indian Methods of Instruction explained in Vedic sources, Buddhism and Ayurveda
2. To compare the instructional methods mentioned in Brihat-trayee with those in contemporary teaching and learning

3. To develop innovative model of Instruction for transacting Tridoshasidhanta suitable for beginner learner in Ayurveda graduation course within three months of their admission to the course.
4. To compare the effectiveness of the innovative model with conventional teaching for transacting Tridosha-sidhanta
5. To probe on the feasibility of developing a transition curriculum for beginner learner in Ayurveda graduation course.

Hypotheses

1. Basic elements of ancient teaching is similar to the principles and practices of contemporary teaching
2. The newly constructed innovative model is more effective in transacting Tridoshasidhanta when compared to conventional teaching.
3. It is feasible to develop a transition curriculum for beginner learner in Ayurveda graduation course

11. Research Methodology

11.1. **Development of modules**: After discussion with Guide the Research Scholar will prepare draft modules for both the models fulfilling components mentioned earlier. The draft will be open for discussion among experts from the field of Ayurveda and Educational Research regarding the content and construct of the modules. By incorporating expert comments the modules will be implemented in a pilot study group. Modules will be finalized after necessary corrections.

11.2. **Experimental study**

11.2.1. Study design: Experimental study with two groups – Study Group and Control Group. Study Group will be instructed with Process Oriented Learning Model and Control Group with Conventional Model.

11.2.2. Study Population and Selection of Sample:Population proposed for the study is the students admitted to I Professional BAMS in various Ayurveda Colleges in Kerala. There is a total of 17 Ayurveda Colleges in Kerala with a total admission capacity 750 seats. From among those who are willing to give consent;one Institution each from three zones of Kerala (South, Middle and North Zones) will be selected for the study. Two consecutive batches

admitted to the Institutions for I Professional BAMS will be taken for study. Proportionate Stratified Random Sampling will be done for selecting the samples from each College. Proportions of gender andsocio-economic status of the population will be considered in selecting samples. In each Institution, one batch will constitute Study group and the other batch, Control group. The groups will be equated through a pre-test.

12. **Research Tools**

12.1. Prepared Modules of Instruction

12.2. Achievement test – to evaluate the outcome of Instruction

12.3. Problem Solving Ability Test

13. **Assessment Criteria**

13.1. Assessment of each participant in both the groups will be done after the instruction by scoring the participants through Achievement test.

13.2. The scores of achievement test of each unit acquired in both the groups will be statistically analysed.

13.3. The mean of the individual scores achieved (in the form of test scores) will be compared between the two groups to assess the total effectiveness of the Models of instruction.

14. **Statistical Analysis**

14.1. The analysis of data will be done using statistical software SPSS version 16.0.

14.2. To test significance of the mean difference between the scores of two groups unpaired t test will be applied.

14.3. To test the significance of difference in proportions Z test will be applied.

15. **Time frame**

15.1. Literary study & development of modules – 1 year

15.2. Completion of Experimental study – 1 ½ years

15.3. Analysis, conclusion thesis preparation – 6 months

15.4. Total period – 3 years

16. **Scopes and Limitations**

16.1. Scopes

16.1.1. There is further scope of such studies in other subjects of BAMS syllabus.

16.1.2. The study will explore the scope and feasibility of Educational Research in Ayurveda

16.2. Limitations

16.2.1. Different variables like ration of high, moderate, low achievers etc. are not controlled.

16.2.2. Different outputs like inquisitiveness, skill development, motivation etc. are not considered in the study due to unavailability of suitable assessment tools.

16.2.3. The population is restricted to Kerala for practical convenience even though the proposed study is relevant all over India.

Appendix – 1

Structure of a sample module

Name of Unit: Qualities of Tridosha

Number of hours : 3 hrs

1. Rationale: Doshas are the functional units of human body. They are identified in the body with the help of Qualities and Activities exhibited by them in human body. Knowing the qualities of Doshasis essential in understanding the activities of Dosha in human body.
2. Objectives:
    a. To know to enlist the qualities of Three doshas as per AshtangahridayaSootratshana chapter – 1, Sloka No 10-12
    b. To know how to give a logical explanation to the Qualities of doshas in comparison with their major activities.
    c. To know to identify presence of the qualities in anyone of the major physiological activities in human body
    d. To draw comparison in between doshas regarding the Qualities of Dosha.
3. Entry Test: The student should know the Gurvadiguna (20 qualities) mentioned in AshtangahridayaSootrsthana – 1, Sloka No: 18. Also, they should be aware of the Major activities shown by Doshasie, Vata – movement, Pitta – metabolism, Kapha – accumulation.
4. Multi Media Materials: Animated presentations, PowerPoint presentationsetc.
5. Learning Activities:
    a. *Group Discussion*: Students are made into three groups. Vata, Pitta &Kapha. They are instructed to identify some qualities mentioned in Gurvadiguna which complies with the major activities (as mentioned above) of the corresponding dosha. Finally the discussion is concluded by the teacher.
    b. Based on the above conclusions Teacher *enlists* the qualities of doshas as per the said reference.
    c. The role of qualities of the in major physiological activities is explained with the help of *animated presentations*.
    d. Learning the sloka of the above reference.

6. Assignment: Compare the qualities of doshas and identify the common features among them.
7. Post Test: On the basis of a questionnaire prepared regarding the topic.

Appendix – 3

CONSENT FORM AND CONFIDENTIALITY AGREEMENT

I,_____, am hereby giving my wilful consent to participate in the study titled **"----------"** . I have been completely explained the nature of study and about the extent of my involvement. I have been assured complete confidentiality and have been informed that my identity will not be disclosed in any of the reports or publications or thesis that may result from this study. I don't have any objection in incorporation of data derived out of my participation in the study to be presented as a scientific document/paper/thesis without disclosing my identity.

Signature of the participant

Signature of the investigator

Appendix – 3

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