

**A STUDY ON NEED OF INTERACTION DESIGN AND ITS
RELEVANCE IN ANIMATION INDUSTRY**

A Thesis

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BY

BHARAT SHIVAJI JADHAV

(PRN: 25621004416)

UNDER THE GUIDANCE OF

Dr. GEETALI D. TILAK & Dr. SANJAY BHARATI (CO- GUIDE)

DEPARTMENT OF JOURNALISM & MASS COMMUNICATION

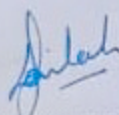
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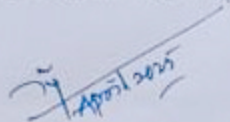
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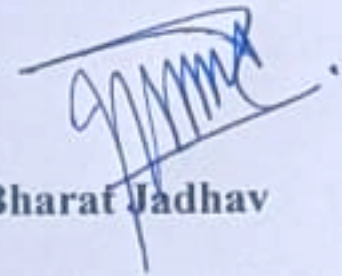
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Signature:

Address: Blueberry Society Dhamalwadi Fursungi, Pune 412308

Ph. No: 7775049125

E-mail: bhjaratjadhav9058@gmail.com

Date: April 2025

Place: Pune

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Mr. Bharat Jadhav

Research Scholar

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Abstract

The way viewers interact with visual content has changed as a result of the animation industry's adoption of interaction design. The necessity of interaction design in animation is examined in this study, along with its increasing significance in improving audience engagement, storytelling, and user experiences.

The study emphasizes how animation has changed from conventional linear formats to immersive, interactive media due to technological breakthroughs and changing viewer expectations. In the creation of animated material, interaction design which aims to create user experiences that are simple, captivating, and seamless has become essential, especially in the fields of gaming, animation and Vfx and interactive movies.

This study outlines important interaction design ideas and techniques that support the success of animated content by examining case studies, industry practices, and audience feedback. Additionally, it explores how animators, interaction designers, and engineers might work together to solve issues like accessibility, usability, and emotional involvement.

The results show that interface design not only makes animation more visually and normatively appealing, but it also creates new opportunities for individualized, interactive experiences. This study emphasizes how crucial it is to give animation professionals interface design abilities in order to satisfy industry demands and promote innovation.

In order to ensure the animation industry's continued relevance and competitiveness in a fast changing digital context, this research ends by offering a framework for incorporating interaction design ideas into animation workflows and educational courses.

Interaction Design (IXD) plays a crucial part in the ever-changing animation industry, where technology and narrative are coming together. In the animation sector, where user involvement and immersion are of the utmost importance, this research explores the crucial requirement for IXD. The collaboration between animation and Interaction Design is becoming more and more important as viewers want more tailored and participatory content. Animators may create stories that go beyond the norm by studying user habits, tastes, and interfaces; this helps them connect with their audience on a deeper level. Delving into the significance of Interaction Design in animation reveals its ability to transform narrative by creating enthralling and engaging virtual environments. This study's findings and analysis are based on data gathered from an online survey that sought to

investigate the importance of interface design in animation studios and the courses offered at universities. In the Indian state of Maharashtra, 528 persons filled out the survey; 47% were from students, 26% were from faculties, and 27% were experts in the field.

It was found that students who were studying interaction design elements as part of the curriculum were quite engaged in the survey. Additionally, more respondents who were either highly or moderately aware of the current need for interface design skills. Some were still unsure, but the majority said that interface design is essential for meeting industry expectations occasionally or frequently.

Most people expressed great satisfaction with the animation curriculum's usefulness, but some claimed it didn't cover all the skills required for the position. Opinions on the use of software and technology resources were mixed; some people felt it was fantastic, while others thought it was awful. Most respondents said that there was adequate coverage of both academic knowledge and real-world experience.

Of the pupils, half said that the curriculum had adequately prepared them for new trends, while a quarter disagreed. The majority of respondents believed that having interface design skills would increase their employability, despite some disagreeing or severely disagreeing. The findings highlight areas in which the curriculum has to be improved in order to satisfy the evolving demands of businesses and generate graduates who are prepared for success in the workforce.

Chapter 1

Introduction

1.1 Evolution of Animation and Emerging Trends

Over the past few decades, the animation business has seen a significant transition, moving from conventional hand-drawn methods to extremely complex computer procedures. Thanks to technological developments and the growing popularity of interactive platforms, animation is no longer limited to delivering stories in a linear fashion. Rather, it has evolved into a dynamic medium for producing immersive and captivating experiences in a variety of fields, such as virtual environments, education, entertainment, and advertising. Because of this change, interface design has gained more attention and is now seen as being crucial in determining how consumers interact with animated information.

The primary objective of interaction design is to create smooth and meaningful user experiences while considering usability, accessibility, and emotional resonance. By combining aspects of psychology, technology, and user behavior, it goes beyond simple aesthetics to produce interfaces and stories that react dynamically to user input. This interaction between storyline and interactivity has opened up new avenues for audience participation in animation, allowing producers to create individualized and interactive experiences.

In order to investigate the expanding necessity of incorporating interaction design ideas into animation workflows, this study will examine the relationship between interface design and animation. In applications like gaming, augmented reality, virtual reality and interactive movies, the study explores how interaction design promotes creativity, improves user engagement, and makes communication easier. It also looks at the difficulties professionals have adjusting to this paradigm shift and the methods needed to get past them.

The growing need for immersive and interactive content, which is being fueled by the spread of digital platforms and devices, makes this study pertinent. Through tackling the disparity between conventional animation techniques and contemporary interaction design specifications, this study aids in the creation of a framework that unites these fields. Professionals in the field gain from such a framework, which also helps educational institutions & collages, prepare aspiring animators and designers to satisfy the changing demands of the market.

Each of the several chapters that make up this thesis focuses on a different facet of the investigation. The theoretical underpinnings are established first, and then case studies, business procedures, and audience input are analyzed. In order to keep the animation business competitive and relevant in an increasingly interactive digital environment, the study ends with practical suggestions for incorporating interaction design into animation operations.

The term "interaction design," for short, refers to "the practice of designing interactive digital products, environments, systems, and services." While interaction designers are also concerned with aesthetics (as they are in other design disciplines), they put far more emphasis on how things function. Interaction design is a creative process that envisions potential futures rather than analyzing the present. This aspect of IxD is what sets it apart as a design area, as opposed to a scientific or engineering one.

Interaction designers draw from many disciplines, including psychology, HCI, IA, and UX research to craft products that are optimal for their intended audience. This entails knowing where and how the product will be used, what the users' goals & habits are, and coming up with creative ways to meet those demands. Interaction design, in contrast to fields like software engineering, prioritizes the needs of users and enhancing their experience within any applicable technical or business restrictions.

Designing for user interaction encompasses more than just the final product or service itself; it's called "Interaction Design." While the phrase "Interaction Design" is most commonly associated with the design of human interaction with digital items, it is also relevant when considering how people interact with physical objects, (J. Electrical Systems 20-3s 2024).

User experience (UX) design

User experience (UX) design is the process design teams use to create products that provide meaningful and relevant experiences to users. UX design involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function. Designing an experience includes not only making the software easy to use but also designing the other experiences related to the product, for example, the marketing campaign, the packaging and after-sales support. Most importantly, UX design is concerned with delivering solutions that address pain points and needs. After all, no one will use a product that serves no purpose. "User Experience Design" is often used interchangeably with terms such as "User Interface Design" and "Usability." However, while usability and user interface (UI) design are important aspects of UX design, they are subsets of it.

A UX designer is concerned with the *entire* process of acquiring and integrating a product, including aspects of branding, design, usability and function. It's a story that begins before the device is even in the user's hands. Products that provide a great user experience (e.g., the iPhone) are thus designed with the product's consumption or use in mind and the entire process of acquiring, owning and even troubleshooting it. Similarly, UX designers don't just focus on creating usable products; they concentrate on other aspects of the user experience, such as pleasure, efficiency and fun. Consequently, there is no single definition of a good user experience. Instead, a good user experience meets a particular user's needs in the specific context where they use the product, (Setiyani, L., & Tjandra, E. 2022).

UX Design A Formal Definition.

The International Organization for Standardization (ISO) defines user experience as:

We can break this definition into two parts:

1. A person's perceptions and responses.
2. The use of a product, system or service.

In user experience, designers do not have much control over a person's perceptions and responses—the first part of the definition. For example, they cannot control how someone feels, moves their fingers or controls their eyes as they use a product. However, designers can control how the product, system or service behaves and looks—the second part of the definition.

The simplest way to think about user experience design is as a verb and a noun. A UX designer design (verb) ideates, plans, changes the things that affect the user experience (noun) perceptions and responses to a system or service.

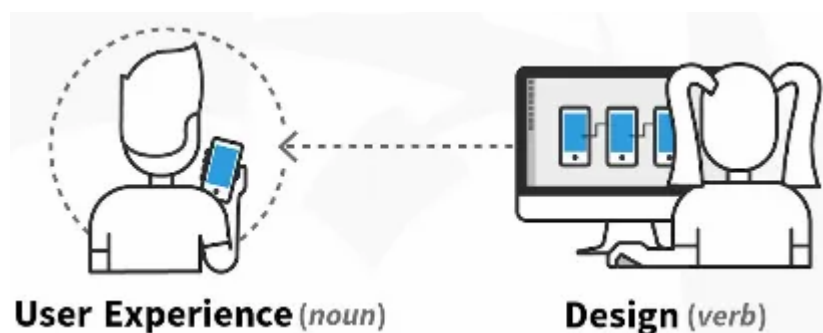


Figure 1.1: Interaction design foundation (Source Retrieve: <https://testbook.com>)

The simplest way to think about user experience design is as a verb and a noun.

For example, when using a physical device, such as a computer mouse, we can control some aspects of the product that influence whether the user enjoys looking at, feeling and holding

- The way it fits in their hand. Is it snug? Is it too big and cumbersome?
- The weight. Does it affect their ability to move it as they wish?
- Its ease of use. Can they use it automatically, or do they have to think hard about it to achieve a goal?

When a person uses a digital product, such as a computer application, a few aspects that we can influence include:

- How intuitively they can navigate through the system.
- The cues that help guide them to their goal.
- The visibility of the essential aspects of a task at the appropriate time

As a UX designer, you should consider the *Why*, *What* and *How* of product use. The *Why* involves the users' motivations for adopting a product, whether they relate to a task they wish to perform with it or to values and views that users associate with the ownership and use of the product. The addresses the things people can do with a product—its functionality. Finally, the *How* relates to the design of functionality in an accessible and aesthetically pleasant way. UX designers start with the *Why* before determining and then, finally, the *How* to create products that users can form meaningful experiences with. In software designs, you must ensure the product's "substance" comes through an existing device and offers a seamless, (fluid experience, Hamidli, N. 2023).

Ux design: user-centered

Since UX design encompasses the entire user journey, it's a multidisciplinary field—UX designers come from various backgrounds such as visual design, programming, psychology and interaction design. To design for human users also means working with a heightened scope regarding accessibility and accommodating many potential users' physical limitations, such as reading small text.

A UX designer's typical tasks vary but often include user research, creating personas, designing wireframes and interactive prototypes, and testing designs. These tasks can vary significantly from one organization to the next. Still, they always demand designers to be the users' advocates and keep their needs at the center of *all* design and development efforts. That's also why most UX designers work in some form of user-centered work process and keep channeling their best-informed efforts until they address all of the relevant issues and user needs optimally.



Figure 1.2: Interaction design iterative process (Source: <https://clay.global/blog/ux-guide/ui-ux-process>)

UI animation is the process of adding motion to UI elements in order to enhance a product's interactivity. UX and UI designers use animation to guide them around the interface, alert users of a change, influence users' decisions, and indicate a relationship between elements—among other uses. UI animation also reduces the mechanical feel of a website or app, creating a much more natural and intuitive experience. In the infant stages of the digital age, it was commonplace for designers to overload their interfaces with animated gifts and bright, flashing colors. But as we began to learn more about the psychology behind how users interact with digital interfaces, it became clear that excessive use of decorative animation detracted from the quality of the site and even resulted in a loss of users, (ruslan, a., hidayati, a. & hendrawan, k. 2024, November).

Interaction designers usually use a few methods and tools to create the greatest user experiences. Some of the most frequent: There are five dimensions, as well as goal-driven design, usability, personas, cognitive psychology, & poka-yoke principle.

The interaction design scholar Gillian Crampton Smith presented the idea of four dimensions of a "interaction design language" in Bill Moggridge book of interviews, *Designing Interactions*. The user's interaction with the screen can be broken down into several dimensions, which together form the interaction itself. Words, pictures, real world

objects/space, and time are the four primary dimensions. IDEXX Laboratories' senior interaction designer Kevin Silver has just introduced a fifth dimension, (behavior, Hamidli, N. 2023).

1D: words should be simple to understand, and written in such a way that they communicate information easily to the end user.

2D: visual representations are all graphics or images, essentially everything that is not text. They should be used in moderation, so as to not overwhelm.

3D: physical objects or space refers to the physical hardware, whether it's a mouse and keyboard, or a mobile device a user interacts with.

4D: time is the length that the user spends interacting with the first three dimensions. It includes the ways in which the user might measure progress, as well as sound and animation.

5D: behavior was added by Kevin Silver in his article, What Puts the Design in Interaction Design. It is the emotions and reactions that the user has when interacting with the system.

These five factors allow an interaction designer to focus on the user's actual experience when interacting with a technology.

Goal-driven design

Goal-driven design (also known as goal-directed or goal-oriented design) investigates the ultimate purpose of a website or app page, as addressed by author Alan Cooper. Instead of focusing on the capabilities of the technology they supply, an interface designer should problem-solve & construct interactions with the user's end purpose in mind. Using this framework (available on Uxbooth), designers can better assist clients in accomplishing their goals through the use of their products or services, (Nurjati, E., Rianto, 2020).

Usability

Usability design is another fundamental framework used by interaction designers. The term "usability" refers to the study of how simple & quick it is to use a given interface. Jakob Nielsen developed ten "heuristics"—overarching guidelines for interface design—to facilitate usability evaluation. Heuristics are referred to as such because they are general rules of thumb rather than strict requirements for interaction design. Uxbooth lists the following as examples:

Consider how easy it is to see the current state of the system. Most company websites have a status (or service health) indicator on their 404 pages for when they go down. Users can get real-time updates on the website's or service's availability, along with other useful data (such contact information). Usability is broken down into these three elements by Alan Dix & colleagues in their book Human-Computer Interaction

1. Learnability: how easy is it for new users to learn the UI's navigation?
2. Flexibility: How many ways can users use the UI for user interactions?
3. Robustness: When errors occur, how well are users supported?

Interaction Design Patterns of Web Chat bots.

The arrangement of graphical UIs (GUIs) on the web has a foundation set apart by change. Moreover, improvement continued until a common conviction was found and rules were spread out. As introduced by, a model language was the justification behind portraying collaboration setup plans, which are often recently involved by organizers as best practices, like data prompts, paginations, or goof messages. To transform into a model, single visual parts or exercises like buttons, toolbars, or drifting must be used with a specific objective and setting by the clients. The creators usually place a strong emphasis on visual representations of the content and concentrate on web and mobile points of contact. The creators unequivocally avoid different connection points. Among them chat bots and other conversational plans, as they are both emerging innovations of interaction design, (Traubinger, V., & Gaedke, M. 2024, June).

The Creative Economy is another name for the Creative Industry. Innovation and creativity are strongly encouraged by the creative economy, which also supports cultural knowledge, especially intangible assets like technology and culture. The creative sector has separate intellectual property rights and is a high-value enterprise. Significant social and economic advantages are provided by the creative sector for the advancement of social innovation. One of the creative economic sectors that are being targeted to boost the national economy is the animation industry, (Nurjati, E., Rianto, Y., Wulandari, R., & Fatmakartika, O. 2020).

Road traffic could be significantly impacted by the heavily explored topic of automated driving. For everyone concerned, the advent of autonomous vehicles (AV) presents new difficulties. According to experts, it will take several years, if not decades, to achieve

complete traffic automation. A mixed traffic environment that includes both automated and non-automated cars as well as other (vulnerable) road users arises throughout the phase of transition towards complete automation. Conflicts will inevitably arise in this mixed traffic.

They can be dealt with by techniques for engagement and communication. However, because automated car drivers are out-of-the-loop (temporary), they will be removing important nonverbal communication channels (such as gestures, facial expressions, or eye contact) amongst road users, which is likely to cause substantial changes to traditional road user interaction, (Gadermann, L., Holder, D., & Maier, T. 2024).

As a result, as civilization has advanced, taking care of the old has emerged as a crucial social concern. The development of product crystals that satisfy consumer demands is one reaction to the social focus. The elderly are demanding increasingly varied items due to the advancement of knowledge and the increase of living conditions, yet the majority of the products on the market today are targeted at the youthful, career-stage demographic. There are very few items for the senior market; therefore there is a lot of room for growth in this sector. The interface for senior mobile phones is primarily made for communication devices used by people over 60. The physiological and psychological development requirements of the elderly are satisfied by this communication equipment interface. The use of intelligent cell phones by the elderly is now quite low, based on the pertinent research that is available. According to market research, older people over 60 currently utilize a percentage of the level of less than 15% of cell phones. It is clear from this situation that there is more room for improvement in the existing cell phone for the elderly available on the market. For the advancement of society as a whole, a proper cell phone interface for senior operations is currently desperately needed, (Yuan, L. 2023).

In conventional seismic designs, structures are presumed to be fixed-supported on the foundation. When it comes to dynamic excitations like earthquakes, the soil actually exhibits noticeable flexibility, which provides the mechanism of soil-structure interaction (SSI). Despite the fact that the earth acts as a cushion beneath the structure foundation, researchers have discovered that this mechanism can occasionally negatively impact the seismic performances of structures, and neglecting Potential hazards to seismic designs are caused by this technique. However, seismic designs using the SSI analysis are currently only applicable to a small number of significant infrastructures, such as nuclear power plants and massive bridges, or to a small number of civil structures for specific reasons due to their complexity and expense. Nonetheless, the fixed-base assumption is used for convenience, and the majority of civil structures receive little consideration when it comes to seismic designs

including SSI. Under seismic excitations, a complex scattering field results from the foundation of a structure, which is often a collection of multi-scatters in infinite half-space. The numerical simulations still require a lot of compute and methodology at this time. In fact, there have been significant improvements made to this issue in recent decades, such as shifting the incident wave to a shallower layer to shorten the near-field range. Reducing the amount of data stored on free-field motion and seismic loads by placing incident waves inside the artificial boundary, using multi-scale simulation to carry out large-scale calculations from the earthquake source to the structure site, and so forth. However, the shear wave velocity, or period, of the site is the sole way to estimate the potentially harmful impacts of SSI for the majority of civil constructions, (Tao, W., Fu, J., & Li, Y. 2024).

As globalization and the internet age progress, an increasing number of people are open to living, working, and studying abroad. They relocate to other cities or nations in search of greater opportunities for personal growth. Homesickness, which is characterized by a persistent yearning for one's homeland and a desire to return, is one of the detrimental consequences of leaving it. Often referred to as nostalgia, homesickness is the distress brought on by being away from home for either internal or external reasons.

Comfort on many levels emotional, social, and physical defines home. For a variety of reasons, including activities, family, emotions, and locations, people miss their homes. Regardless of age, almost everyone has homesickness at some point in their lives. Furthermore, chronic mental health issues and detrimental psychological effects might result from homesickness, (Wang, Y., Han, P., & Yang, B. 2022).

Homesick students reported a variety of physical symptoms, including headaches, exhaustion, and trouble focusing, according to earlier research by Basic ET. and Sun et al. Stronger family links increased the likelihood that students will suffer from acute homesickness, and persistent homesickness resulted in long-term emotional stress and lowered academic achievement. According to Van Tilburg, homesickness is linked to major health issues in both adults and the elderly. Stress, anxiety, and sadness were frequently higher among those who were homesick, and this had a direct effect on their general wellbeing. In the current global climate, this phenomenon is becoming more and more common. These findings highlight how crucial it is to look into strategies for easing homesickness, (Zhou, Y., Nah, K., & Tan, S. 2024).

The fields of user interface (UI) and user experience (UX) design were completely transformed by artificial intelligence. AI tools offer individualized user experiences, automate tedious activities, and provide designers with data-driven insights. Large volumes of user data

are analyzed by machine learning algorithms, which find trends and preferences that human designers would miss. Natural language processing and computer vision improve interface interactions by making them more responsive and intuitive. The brainstorming process is accelerated by generative AI tools that help create design variations. With this AI-driven method, UX/UI designers play a more strategic role, analyzing AI-generated insights and coming to well-informed conclusions rather than just being creative.

Rapid prototyping and A/B testing are made easier by integrating AI into design tools, enabling iterative improvements based on real-time user feedback. AI's influence on UX/UI design is becoming more significant as it develops; pushing the limits of what is feasible in terms of producing user-centric digital experiences, (Zhou, Y., Nah, K., & Tan, S. 2024).

A key factor in the success of FinTech applications is UX/UI design. Financial services, which are typically seen as scary and complicated, revolutionize careful UX/UI design. A wider audience can understand financial ideas thanks to intuitive interfaces that demythologize them. Instilling trust and confidence in users through well-designed UX/UI components is essential for financial transactions and decision-making. A key distinction in the cutthroat FinTech market is excellent UX/UI design. Errors in financial procedures are minimized via user-friendly interfaces, which lower cognitive burden. Users and service providers save time when procedures are streamlined and information hierarchies are clear. AI-driven UX/UI enables personalized experiences that are tailored to each user's requirements and preferences, encouraging engagement and loyalty, (Xu, Y., Liu, Y., Xu, H., & Tan, H. 2024).

User Interface (UI) refers to input and output that facilitates long-term communication between a system and its users, primarily through visual media such as computers, smart phones, and tablets. In contrast, User Experience (UX) refers to user perceptions and responses regarding the use of a product, system, or service that enhances user satisfaction and kenyamanan during their interactions. Web development is defined as the process by which a web developer, who is a programmer, creates World Wide Web applications using the client-server approach. Web development includes tasks like creating and developing websites, including creating elements like buttons, menus, pencarian kotaks, and so on. In web development, user interface and user experience are crucial for determining the success of a website or application. User interface designs that are clear and intuitive not only make it easier for users to interact with technology, but also increase their sensitivity and productivity. Conversely, positive user experience (UX) contributes to the perception of user keseluruhan

and kepuasan, which is crucial for enhancing user experience and encouraging berulang penggunaan, (Pateman, D., & Pramudia, G. 2024).

Evaluation of Mobile Phone User Interface

Somewhat recently, the cell phone has quickly developed from a basic gadget to settle on or get telephone decisions to a complicated sight and sound intuitive framework. Due to the fast improvement of versatile advances and memory gadgets as of late, a cell phone has extended its usefulness to incorporate a MP3 player, computerized camera, Furthermore, advanced mixed media broadcasting (DMB) framework. Subsequently, the portable telephone has been viewed as a typical purchaser machine (Klockar, Carr, Hedman, Johansson, and Bentsen, 2003). The examination of ease of use in cell phones is a recently developing region. Versatile telephones have been acquainted with general shoppers just since the 1990s; in this way, the connected exploration local area has had a somewhat short history (Kjeldskov and Graham, 2003). Subsequently, there is little information, like laid-out strategies what's more, reasonable practices that catch convenience in assessing cell phones, (Ji, Y. G., Park, J. H., 2006).

The design of interactive digital tools and services is undergoing a paradigm shift driven by emerging technology, allowing users to participate in emotional, creative, physical, and full-body experiences. These methodological and technological paradigm shifts are attested to by the recently proposed "somatic turn" in the interaction design and human-computer interaction (HCI) communities, as well as by art-inspired approaches to embodied interaction design (see, for example). In this case, research into automated methods for measuring mid- and high-level movement characteristics which are more complex than low-level characteristics that are obtained directly from physical signals is advancing the design of embodied interactions and creative uses of human movement analysis, such as reducing or delaying the progression of specific pathological conditions, with an emphasis ones Research on the creation of computational techniques for human movement analysis gains from the productive collaboration of several academic fields, including experimental psychology, neuroscience, biomechanics, and the arts and humanities, (Gnecco, G., Camurri, A., 2024).

The significance of user interface (UI) and user experience (UX) in mobile-based online course apps is covered in this article. The use of technology in education, especially online courses that allow for remote learning, is covered in the study. Tinjauan pustaka investigates design thinking, user interface, and user experience as research methodologies that benefit

users. Online course user interfaces use design thinking strategies like empathy, problem definition, ideas, prototype, and pengujian. The results of the study show that this method works well for creating UI/UX designs that satisfy user requirements. Good UI/UX design will make it easier for users to interact and increase their learning experience with online courses. The main take away from this article is the importance of user-centered UI/UX design in the development of online course applications to maximize user learning. Design thinking is an effective method for producing innovative designs that meet user needs, (Ansori, S., Hendradi, P., 2023).

The visual effect can be enhanced through color design. The first movies and cartoons were in black and white, and many scenes had to be recreated using the audience's imagination, which resulted in subpar visual effects and experiences. As the times and associated technologies have evolved, color animation has emerged as a prevalent mode of expression in our daily lives. Highlighting something is inseparable from color design, whether the goal is to recreate an, (Wang, Y., Han, P., & Yang, B. 2022).

The continuous expansion of the global economy and social production, which encourages the development of new technology, has significantly hastened the pace of urbanization worldwide. The living conditions of people worldwide have greatly improved as a result of sharing knowledge and helping one another, and everyone now aspires to a greater standard of living. The progressive development of sizable populations from the initial small settlements that have transcended the constraints of geographic space is known as urbanization. It also refers to the changing style of production, the conversion of natural biological areas into artificial ecosystems, and the migration of people from rural to urban areas. The habits, ideas of life, and cultural practices of the inhabitants have changed, As a result, it is crucial to look at ways to maximize urban space using the current human-centeredness design concept and the interaction design idea, (Deng, Q. 2023).

The fundamental structural connections between sounds are investigated in the study of tonal music. It has developed into a methodical framework for arranging distinct sounds in a hierarchical manner from a continuous viewpoint. Cognitive science insights like musical anticipation and affordance, which produce aural tension and release and impact subsequent behaviors, have further highlighted the cognitive flow that listeners experience from tonal music as structured sound. For example; using tonal cognition provides listener-centered ways to create audio displays of commonplace items, similar to how people understand the harmonic links in simple tunes. As music-cognitive applications in interactive sonification

gained traction, so did interest in tonal cognition. Drawing on common auditory cognition, Gaver introduced the idea of an auditory icon, and Norman briefly investigated sound signals as a substitute for visual displays in a related setting. Blattner et al. classified earcons, or communication sounds, according to musical components like rhythm and pitch, and Brewster thoroughly investigated this in experiments like, (Choi, M., Andres, J., & Martin, C. P. 2024, September).

The cognitive dimensions framework, first proposed by Thomas Green in 1989/91, is a "broad-brush evaluation technique" for interactive digital products and gadgets, as well as non-interactive notations. The framework provides a lightweight method for interaction designers to assess the usability of an existing structure or design. Notations are a standardized language used in the study of cognitive aspects, Goodman, E., (Stolterman, E., & Wakkary, R. 2011, May).

The Poka-Yoke Principle

Poka-Yoke, often known as mistake-proofing, was created by Toyota industrial engineer Shigeo Shingo. By imposing limitations on the user's freedom of action & presenting alternative suggestions, it aids in the prevention of elementary mistakes. This issue arises in interface design when users make unexpected or incorrect usage of a system. The user interface can prevent an inappropriate activity & provide alternative courses of action, such as in the case of an error message. The idea is to keep people going in the right path so they can reach their objective.

History of Interaction design

In the mid-1980s, Bill Moggridge & Bill Verplank coined the term "interaction design," but it took 10 years to catch on. According to Verplank, this was just an application of the term user interface design from the field of computer science to the field of industrial design. After coining the term "soft-face" in 1984 to describe the incorporation of industrial design into software-based products, Moggridge saw this as an upgrade. The Visible Language Workshop, founded by Muriel Cooper at MIT in 1975, and the Interactive Telecommunications Program, established by Martin Elton & later led by Red Burns, is two of the early initiatives in the design of interactive technology. Carnegie Mellon University's Master of Design in Interaction Design was the first degree program of its kind, launched in 1994. Before moving its attention to the "big picture" components of interaction across

people, organizations, culture, service, & system, the program first centered on screen interfaces, Hartson, H. R., (Andre, T. S., & Williges, R. C. 2001).

Interaction design concepts

- **Goal-driven design:** Why does your site or interaction exist? Figure it out and make sure your application does this one thing exceptionally well.
- **Interface as magic:** You don't even really see the best interfaces. "The best interaction designs
- **Don't exist:** they don't take a long time to load/respond; they don't make users think; and they don't give user's cause for grief."
- **Usability:** "Interfaces which make the state of the underlying system easy to understand and use are favored."
- **Affordances:** "The best (industrial/interaction) designs are those that speak for themselves; in which, as the saying goes, form follows function."
- **Learnability:** "A great deal of what comprises a usable interface is made up of *familiar components*. ... The best interaction designers don't reinvent the wheel every time a similar design challenge comes. Rather, they call upon a set of patterns."

Immersion computer technology (ICT), often known as virtual reality (VR), offers a distinctive means of engaging with the ever expanding digital world. Virtual reality (VR) is frequently defined as a collection of technologies that allow users to fully immerse themselves in a world outside of reality. Over time, a number of fundamental VR technologies have emerged that work together to allow users to experience virtual environments. Each of the many sizes and modalities of display technologies aims to provide information to our senses, including sight, hearing, and touch. Sight, hearing, and touch displays have advanced significantly, while taste and smell displays have naturally garnered less attention. Visual displays are available in nearly every possible configuration. Virtual reality facilities typically make use of one or more of the following, Ardianto, (P., Santosa, Y. P 2023).

Industry's Needs of User Experience (UX) Design.

Higher education (HE) and the creative industries both presume that User Experience Design (UX) programs equip students with the necessary abilities, knowledge, and skills to become proficient UX designers. Although fundamental, their premise is essential to the well-being of the creative sector. Since UX is merging with interactive media, technology companies are

growing their design teams, and businesses are adopting UX design, there is a pressing need for UX courses that educate competent designers (Maeda 2018; Sheppard et al. 2018). According to Bakhshi et al. (2017), jobs involving sociotechnical systems and design, such as UX design, are expected to play a significant role in future occupational demand and will be essential to the UK's ability to compete globally. Notwithstanding UX's expansion, there remains debate both domestically and abroad on the applicability of UX education to business demands (Bjoran 2016; Buzzard 2016). The professional role is defined by established design disciplines, such as ergonomics and industrial design, which also have a recognized body of disciplinary knowledge and a clear path to professional practice that informs curriculum, (Branch, J., Parker, C. J., & Evans, M. 2021).

Five Themes for Interaction Design

The following is a summary of the five main themes for interaction design:

Affordance: Design components (such as buttons that appear clickable) should be easy for people to engage with, suggesting their function.

Feedback: Users should be given unambiguous answers for their actions, such as haptic, visual, or audio feedback, so they can determine whether the interaction was effective.

Consistency: To lower the learning curve and assist users in anticipating how various elements will act, keep the design consistent.

Visibility: Key features and information should be readily apparent without being overpowering to the user (e.g., accessible and simple design).

Error Prevention and Recovery: Designs should reduce the possibility of errors and offer simple means of recovery in the event that they do occur (e.g., error messages or undo choices).

The body serves as the final repository for all of our external information, both practical and intellectual. Experience constantly in relation to the reality that our bodies are responding to. The breadth of human knowledge and comprehension surpasses the amount of information we can generate a symbolic explanation of. "We know more than we can tell," says Polanyi. To clarify this claim, think of riding a bicycle: one is maneuvering, balancing, guiding, and pedaling all at once, but bikers are unable to adequately describe the subtleties of an action they successfully do. The fact that cycling is only one of thousands of things our bodies are capable of doing is arguably the most amazing part of this. For personal or educational purposes, permission is allowed to make digital or hard copies of all or part of this work without charge, as long as copies are not made or disseminated for profit or commercial gain

and have this notice and the whole citation on the first page. Any other kind of copying, republishing, posting on servers, or redistributing to lists necessitates previous special permission and/or payment, Klemmer, S. R., Hartmann, (B., & Takayama, L. 2006, June).

Advances in the capabilities of information technology and shifts in their integration with products, services, and business processes are challenging conventional wisdom regarding the development and application of competitive strategy. Three distinct logics have led the prevalent management insights. The logic of positioning states those managers should choose a profitable market niche for their business and use market segmentation, differentiation, or cost leadership as a component of their competitive strategy (Porter 1980). According to this reasoning, companies should align their value chains and operations inside a chosen position to improve performance and offer a compelling value proposition to clients (Porter 2001). The conventional conceptual explanations for the strategic importance of IT in areas such as pricing and customer relationship management, (Woodard, C. J., Ramasubbu, 2013).

Life's greatest moments occur in a flash. One of the characteristics of a "flow" experience—which is said to be extremely fulfilling, difficult, and optimally engaging—is losing track of time. Waiting, on the other hand, can elicit very different feelings. Our thoughts and actions are influenced by our emotions. For example, when we think back on our previous lives, we typically recall more vividly felt experiences than neutral ones. We consider the emotional highs and lows of personal experiences to be indicative of the entire experience. Temporary delays and malfunctions appear to be typical in personal computers. As a result, these unpleasant experiences—which are frequently associated with waiting—may skew our memories of our interactions with computers. What if these experiences might be influenced by designers? We relate the idea of user experience (UX) to the experience of time in this review paper, and we offer proof and recommendations on how interaction design may influence them, (Liikkanen, L. A., & Gómez, P. G. 2013, September).

It appears that representation and interaction are the two main elements of information visualization (Infovis) systems. With roots in computer graphics, the representation component handles the mapping of data to representation and the display of that representation on the screen. During the interaction component, the user and the system communicate while the user explores the data set to uncover insights. The interaction component initially appeared in the realm of human-computer interaction (HCI). Even if representation and interaction are discussed as two separate parts, it is clear that they are not mutually incompatible. For instance, interaction with a system may cause a change in

representation. Nonetheless, the two components seem to include the two fundamental components of Infovis systems, and it is reasonable to consider how each improves the end-user experience, (Yi, J. S., ah Kang, Y., Stasko, 2007).

This study investigates a novel approach to training and education: in-person contact with animated, intelligent entities in interactive learning settings. The paradigm combines two hitherto separate fields of study. The first field offers a fresh model for face-to-face communication in human-computer interaction: animated interface agents (André & Rist 1996, André 1997, Ball et al. 1997, Hayes-Roth & Doyle 1998, Laurel 1990, Maes 1994, Nagao & Takeuchi 1994, Thorisson 1996). In the second field, knowledge-based learning environments (Carbonell 1970, Sleeman & Brown 1982, Wenger 1987), educational software that uses artificial intelligence to adjust to each learner is sought for. A new type of software agent known as an animated pedagogical agent is created by fusing these two concepts (Lester et al. 1999a, Lester, Stone, & Stelling 1999, Rickel & Johnson 1999a, Shaw, Johnson Even though the initial research made it abundantly evident that nonverbal communication is ubiquitous in comparable human discussions, the great majority of work on tutorial and task-oriented dialogues has concentrated on verbal exchanges (Deutsch 1974). We may take advantage of this nonverbal communication by having an animated agent live with the students in the learning environment, (Johnson, W. L., Rickel, J. W., & Lester, J. C. 2000).

This paper reviews the research on learning through dynamic visual aids and offers recommendations for developing animations and simulations that ensure their effectiveness as instructional resources. In addition to the existing design concepts, new and updated ones derived from recent research are provided. Our study focuses on the visual and interface design of these representations and highlights existing research while posing concerns for future research. How should animations and simulations be made to be effective teaching tools? This paper will examine the research on dynamic visual learning. And exchange studies on the interaction and visual design of animations and simulations. Before, we could only use images that were unchangeable after they were made; now, we have tools, (Nurjati, E., Rianto, Y., 2020).

With processor-enabled gadgets omnipresent in daily life and each with its own user interface, the age of ubiquitous computing has come. While desktop interfaces have settled around the WIMP paradigm, interfaces for mobile, ambient, and physical devices are still evolving through experimentation. Designers of desktop computer programs have access to a vast library of development tools, but technologies that make it easier to create cutting-edge

ubiquitous computing devices are just now becoming available. Today's information appliance designers need to be highly experienced in a variety of specialized domains, including as circuit design, embedded microcontrollers, and programming, in order to produce feasible prototypes.

These factors make the current development approach solution-information driven, needing a substantial amount of time and resources to discover the optimum implementation, as opposed to need-information driven, where innovation is guided by the desired user functionality, (Hartmann, B., Klemmer, S. R., Bernstein, 2006, October).

A surface made up of the points that satisfy the arbitrary implicit function f is called an implicit surface. Implicitly defined surfaces have received increased attention in 3D object design because of their special and practical modeling properties, like constraint and blending qualities. Soft objects, a subset of implicit surfaces, are now a hot topic in computer graphics. Meatballs are ideal for modeling people, animals, and other organic things that are extremely difficult to represent using conventional geometric techniques since they gradually and smoothly merge to form genuine, organic-looking sculptures. The meatball approach is intrinsic to interactive design. By simply changing the metaballs adding, removing, morphing, and modifying their parameters details can be added to a basic shape composed of a few metaballs. However, there are two major issues with the meatball approach, (Shen, J., & Thalmann, D. 1995).

Any interaction designer frequently has to deal with a design task in an unknown or only partially known situation, with demanding and stressed clients and users, with scarce information, with new materials and technology, with limited time and resources, with limited knowledge and skill, and with inappropriate tools. For several decades, a significant portion of interaction design research has produced theoretical frameworks, methodologies, instruments, and strategies to aid interaction designers in their work. Significant progress has been made in this subject, and there are now many different approaches, methodologies, and techniques available in the field, (Stolterman, E. 2008).

1.2 Defining Interaction Design in Animation

According to the user-experience (UX) hierarchy, an application's loading time is significant and highly regarded. After two seconds of waiting for basic information-retrieval operations, users' behavior generally changes. Since nothing may occur until a page loads—or is presumed to load—this is not surprising. A number of variables, including as the user's expectations, the application's complexity, and the device's performance, affect how loading time affects bounce rate. The operation itself, the amount of concurrent users, or the state of the network could all contribute to a sluggish response. Performance may be slowed down, for instance, if the loading animation consumes a large amount of CPU or GPU memory. The user's perception of how quickly an application loads is known as perceived loading speed. Even if the actual loading time is somewhat quick, it is crucial since it can significantly affect the user experience, (Pibernik, J., Dolić, J., Mandić, L., & Kovač, V. 2023).

Animation creation approaches are steadily getting better as computer network technology continues to grow. Animation's expressive forms are changing from a single format to interactive ones. Animation is no longer limited to conventional channels like animated movies, television, mobile phones, and digital TV, against the backdrop of the emergence of new media. The audience's experience, including plots, scene designs, and character depictions, is now given more weight in interactive animations. Artists try to determine if viewers can connect with the work and become fully immersed in the scenes. Building relationships and bridges between people and machines, as well as between individuals, is the aim of interactive animation. The majority of production teams are made up of young people who offer a distinct viewpoint, emphasizing entertainment components, current trends, (and fashion specifications, Shan, Q., & bin Abdul Mutalib, A. 2024)

In order to prepare future generations to handle increasingly complex issues in the workplace, higher education is a crucial component. Curricula in higher education are crucial in determining how students learn, which in turn gives them the information and abilities needed to be successful in the business world. New approaches to curriculum development are becoming more and more important as market demands change quickly. One of the most important components of enhancing the educational system is curriculum development. As technology, society, and our knowledge of successful teaching strategies have advanced, so too have new methods for developing curricula. To guarantee that education offers the greatest possible advantages to future generations, curricula must be current, responsive to

shifts in the educational landscape, and sensitive to community needs, (Kim, Y., Pyo, & W. K., 2024).

Due to their inherent learning difficulties, particularly in academic memory, children with intellectual disabilities require education that places a high priority on training, supervision, and assistance in order to reach their full potential. Visual attention, memory, and the ability to distinguish between conceptual and perceptual differences (base, form/model, and shape stability) are among the cognitive elements of visual learning. We use a multi-phase learning methodology. To begin, we play two instructional animation films about letters and numbers, along with animated films that present numbers. We also provide a range of interactive strategies for persons with intellectual disabilities. Additionally, the organization's standards and categories are used to choose participants, (ruslan, a., hidayati, 2024, November).

Development of Animation Industry

Iran's lengthy history of artistic endeavors in calligraphy, miniature painting, pottery, and related fields might be linked to the country's modern animation. These fields are very individualistic and call for training, skill acquisition, patience, and imagination—all of which are essential components of animation production. But in essence, animation is a collaborative effort combining a variety of abilities and knowledge, more like cottage industry than capitalist industrial manufacturing. State-run organizations or some kind of patronage structure have historically sponsored and nurtured the animation industry. Due to financial restrictions and market forces, the animation industry has become more and more venerable, either to the point of complete extinction or full-fledged metamorphosis into an industrial activity.

In order to assist the sector endures competition both domestically and internationally, efforts are being made to restructure it into a more efficient organization that reduces waste and duplication and adopts worldwide standards and norms. Additionally, the Iranian government is eager to support the growth of animation. Given the proliferation of television channels and the increasing demand for programming, particularly among younger audiences, animation is the ideal format for shows since it is simple to adapt narratives to promote the governing ideology, (Golmohammadi, N. 2003).

First, as a result of the current technological advancements, many systems for various application fields have been developed and realized. These systems need to be intelligent enough to make prompt decisions that are presumed to be accurate and precise. If artificial intelligence or computer-based techniques had been used in the modeling and simulation

development process as well, these decisions would be more accurate and precise. Since the 21st century, parametric animation modeling has grown in popularity across a wide range of industries, including video watching and game development. The most important thing to keep in mind when modeling parametric animation is to model parametric animation, as the mode of parametric animation affects the animation's visual effect. The parametric animation process modeling approach is a feasible alternative to traditional modeling software for large-scale parametric animation modeling, which is time-consuming and requires a lot of staff and material resources. The concept of process modeling can be effectively implemented in the research, education, and entertainment sectors. This paper's primary goal is to model the concept using a comparable procedure. Large-scale parametric animation styles are produced in real time by establishing a set of parametric animation interaction design systems using parametric technology and sample-based modeling techniques, (Wang, Y., Han, P., & Yang, B. 2022).

Being a crucial part of the entertainment sector, animation design in particular needs to independently integrate cutting-edge digital information technology, develop innovative techniques, increase animation design efficiency, and fortify the animation works' all-encompassing cultural influence from a social standpoint. Digital media art offers animation design previously unheard-of creative techniques and means of expression in the light of the ongoing advancement and invention of computer and information technology. In light of this, animators should actively include digital media art into their work to enhance the animation's visual appeal and delicateness. In order to give the audience a fresh visual experience and make the animation pieces more decorative and appealing, the character picture should be more three-dimensional and full-bodied, and the scenario should be more realistic and dazzling. Conversely, digital media art gives animation stunning and startling results. Furthermore, digital media art offers more effective tools and a more efficient development method, which raises the effectiveness and caliber of animation design, (Yu, G., & Ma, C. 2022).

The changing of mentalities and social qualities causes a reduction in the social familiarity with different social orders. In such manner, abstract works are basically brought into the world as an impact of societies that convey a humankind mission. Abstract works contain social and human qualities that can be an instrument for character improvement. In this manner, scholarly works can be method for passing on training, messages, thoughts, and sentiments contained in them. One of the Indonesian artists who brought honorable qualities through his work is Buya Hamka. As a current writer, he retained Western plans to blend with

the customs and convictions that exist in Indonesia. Buya Hamka's family was strict, which impacted his life. His way of reasoning and battle can't be isolated in the interest of Muslims. Because of his talent, Buya Hamka was able to compose prose that was full of admiration and beautiful words. Bahar and Hartati, Buya Hamka's artistic craftsmanship of verse is isolated, not explicitly aggregated, and is less notable than other artistic works of Buya Hamka, (Husna, I. 2024).

Project procedures in the creation of visual communications are significantly impacted by the 21st century's rapid advancements in technology. In order to create powerful visual messages that can precisely communicate concepts and meanings to the audience, this modifies and adapts innovative approaches and techniques. The animation industry is also constantly evolving, showcasing new forms that aim to enhance creative possibilities through tried-and-true methods in addition to computerization and application scope extension. The challenge of putting the best visual-narrative media formats into practice, together with the theoretical and scientific basis for doing so, is therefore being updated. In the early decades of the twenty-first century, animation a longstanding aspect of the cinema industry is seen as more than just a stunning spectacle or a technical method of production. With its own design tools, metaphorical language, emotional expressiveness, and influencing power, it is a new self-sufficient kind of audiovisual art that can create a new world and existence in a new space-time. Traditional frame-by-frame animation technologies and the pursuit of efficient design techniques for their use in contemporary design become pertinent in the process of identifying the most expressive design forms, (Shtets, V., & Melnyk, O. 2024).

Many contradictions and conflicts have emerged in people's hearts as a result of the imbalance between individuals and their lives brought about by the rapid expansion of modern society. People are under a lot of psychological strain as a result, and mental illnesses or psychological disorders are likely to develop. By enabling individuals to release tension from the core of their hearts, art appreciation can change people's feelings and break down psychological barriers. There are numerous approaches to art therapy, but one of the most significant is animation, which is a form of cinema and television art. The interactive design of animation, on the other hand, is overlooked in the standard animation design process and is unable to encourage users to engage in empathy, thereby failing to genuinely address the audience's psychological issues. Furthermore, traditional animation's art design ignores how elements like color affect viewers' feelings, making it unable to identify the core of the issue from an animation art design standpoint. Because virtual reality technology may bridge the gap

between virtual and real worlds, it has the potential to be a crucial tool in the creation of immersive animation, (Li, X., Zhang, C., & Wu, Y. 2022).

Salutations from the intriguing world of traditional animation, a timeless art style that has always captivated audiences. Using this beloved method, each frame is painstakingly hand-drawn, giving characters and stories a genuine, unique touch. The Latin word animation is where the word animation originates. Animation generally uses a fast-paced succession of still images to give the impression of movement on models, sketches, and inanimate objects (Madison, These photographs may be computer-generated, hand-drawn, or depict 3D things. Traditional animation refers to the hand-drawn animation. Hand-drawn animation on paper is typically referred to as traditional animation. The majority of productions of the 20th century employed this method. An animator draws the backdrops, characters, and layout on animation paper that is placed above a light box. Every sketch in the animation will be slightly different from the one before and after it, giving the impression that there is movement when everything is captured on camera. Both the industry and academic institutions in the Philippines are familiar with animation. According to Ciit.Content.Admin. (2018), Filipino animators have been making inroads and, (R., Santiago, R., & Marte, A. N. 2023).

In animation design, large models AI and machine learning have transformed the area of animation design by enabling large models that produce realistic, high-fidelity animations. The revolutionary role of intelligent systems in a variety of fields, including animation, is covered by Capobianco et al. Despite not being primarily concerned with animation, it offers insightful information about how intelligent systems can revolutionize a number of industries, including animation. It talks on how AI and machine learning enable high-dimensional data analysis, which is essential in intricate domains like cancer research. It explores how to handle, process, and understand data in high-stakes situations, drawing comparisons to the challenges of animation design. Khuat and associates, (Zhu, J., Hu, C., Khezri, 2024).

Enhancing Character Design Education in Animation

The field of animation has experienced a radical change and now plays a major part in communication, advertising, and entertainment. A fundamental component of this dynamic field, character design is necessary to give animations likable characters, feelings, and stories that viewers can identify with. Higher education schools must develop skilled animators with a deep comprehension of character design ideas in addition to technical skills as the animation

industry grows internationally. The animation industry has grown significantly over the last ten years, with noticeable effects on both the sector and higher education. Universities have made a huge contribution by producing a large number of highly qualified professionals. But this quick career progression has also sparked industrial upgrading, which has led to new difficulties. Higher standards are now maintained for all practitioners in the upgraded business.

As a result, the current animation educational approach is unable to satisfy the changing needs of the market. The curriculum's content has expanded beyond conventional software and tools. It becomes crucial, albeit difficult, to develop and carefully plan animation instruction at the university level, (Wu, J. 2023).

Significant advancements in animation production have resulted from the evolution of the film and television industries, mostly due to the integration of digital virtual human technologies and expression transmission. In addition to changing the realism and aesthetics of animated figures, those innovations have created new opportunities for narrative and personal representation. With an emphasis on their use in television and movies, this study aims to present a thorough analysis of these technologies and their effects on the animation industry

By allowing the transformation of human actors' facial expressions into dynamic characters, expression switch generation represents a paradigm breakthrough in animation. Modern motion capture techniques and algorithms are used in this approach to precisely record and represent the nuances of human expressions. As a result, animated characters are able to convey nuanced feelings and sentiments, approaching portrayals of real-life situations. This By bridging the gap between traditional animation techniques and live-action productions, this generation has given animators new tools to improve the emotional depth and expressiveness of their characters. At the same time, the terrain of person creation is changing due to digital human generation. Making incredibly useful artificial avatars that closely mimic actual people is a trend of this period. Technological developments in 3-D scanning, modeling, and artificial intelligence have made it possible to create digital beings who can emulate human motions and behaviors in addition to being aesthetically intelligent. The visual consistency and plausibility of animated films have increased with the incorporation of these virtual entities, (Zhang, N., & Pu, B. 2024).

The process of architectural design is methodical and takes a while. There is a cycle of interconnected procedures that begin with talking about the fundamental idea behind the design request, visualizing the design, and presenting the work for modification. Because the employer and designer have distinct perspectives, this connection frequently needs to be more methodical. The energy usage of a designer rises dramatically with the length of their work routine.

It is anticipated that digital design will have the least environmental impact and the lowest greenhouse gas emissions. For a future with less energy, this growth must be addressed by implementing technological advancements and modifications to work practices. Landscape design requires further investigation in architectural design. The configuration and alteration of sketches for landscape planning. As drawing software advances, more realistic representations are produced, which leads to the birth of concepts for even more design modifications. Moreover, when architects use traditional design techniques, the revision process presents a challenge. Thus, work efficiency lags more and more due to the quantity of energy and human resources used as well as the extensive revision processes performed on the drawing program, (Ardhianto, P., Santosa, Y. P., 2023).

Stop-motion Animation frequently uses the "persistence of vision" approach, which involves photographing actual objects one at a time and then allowing them to appear continually to give the impression that they are swaying. Animation serves as a medium for artistic expression, and language's presentation facilitates communication.

This need for communication is driving the development of interactive technologies. Animation is only one of several fields that are investigating methods to improve engagement and information transfer. Above all, Digital media augmented reality is continuously being developed and applied to stop-motion animation. Real-life scenarios can be used in animations thanks to augmented reality animations, which enable ever-better interactive animations. When used in conjunction with stop-motion animation, augmented reality technology can make people make watching cartoons more engaging and enable viewers to engage with the animated characters, both of which are crucial for the advancement of stop-motion animation, (Weng, W. 2022).

A change from traditional or offline learning systems to online, or "e-learning," occurred during the COVID-19 pandemic. These modifications promote the presentation of communications as a learning solution and the use of information and communication technologies as a learning source. In contrast, learning is a method of conveying signals from

the message's source to the recipient in classical learning, as per cognitive theory. It is envisaged that technology can serve as a remedy and meet the educational demands of students. Students enrolled in online courses are typically expected to be self-sufficient. Learning resources are the materials that students use to learn. If learning is not correctly designed, this will be detrimental.

Learning is an activity that takes place both inside and outside of the classroom and involves teachers and students using a variety of learning tools, (Firmansah, M. L. H. 2022).

Mobile-Application Loading-Animation Design

According to the user-experience (UX) hierarchy, an application's loading time is significant and highly regarded. After two seconds of waiting for basic information-retrieval operations, users' behavior generally changes. Since nothing may occur until a page loads—or is presumed to load—this is not surprising. A number of variables, including as the user's expectations, the application's complexity, and the device's performance, affect how loading time affects bounce rate. The operation itself, the amount of concurrent users, or the state of the network could all contribute to a sluggish response. Performance may be slowed down, for instance, if the loading animation consumes a large amount of CPU or GPU memory. The user's perception of how quickly an application loads is known as perceived loading speed. Even if the actual loading time is somewhat quick, it is crucial since it can significantly affect the user experience, (Pibernik, J., Dolić, J., 2023).

Animation is frequently regarded as a hilarious medium, which may be due to the popularity of comical animated movies and video books or the humor-focused nature of the early illustrations created for the medium. Puig claims that a number of well-known figures, including Tom and Jerry, Donald Duck, Mickey and Minnie Mouse, Scooby-Doo, and others, created some sort of stereotype regarding the general expression of the medium. These images were meant for children, but they managed to make the serious expressions of adults laugh. As new animation techniques developed, storytelling moved beyond comedy to depict something solemn and sometimes deeply introspective. Animation is one of the most significant visual arts in India in terms of representation and cinematography. Disney animator Clair Weeks helped popularize the art form in the country with *The Banyan Tree* through the American technical cooperation mission. But the first example of nonfiction animation was found in Winsor McCay's documentary *The Sinking of the Lusitania*, which reenacted the entire incident of the ship being sunk by a German torpedo, (Majeed, T., Sinha, A., 2023).

1.3 Industry Demand for Multi-Skilled Animators

The artistic feast and visual pleasure offered to the public are growing more startling as the film business continues to grow. People have started pursuing spiritual activities as their living standards have increased, which has led to the creation of animated films that cater to people's spiritual demands and the eventual formation of the animated film business. In the modern period, films and television shows have gained new value, particularly with the extensive use of 3D special effects technology. Comprehensive and advanced computer 3D technology must be able to enable the creation of 3D animation, and computer calculations must accurately replicate the modeling process and materials in order to replicate real-world scenarios. These additional benefits, in addition to its realistic effects, are what give 3D animation its distinct advantages. Using 3D technology may efficiently produce beautiful fantasy scenarios and, to a certain degree, substitute laborious video editing and cast members' on-location scene filming, significantly increasing productivity and the creative caliber of the final product, (Li, P. 2023).

Investigating the Role of Animation in Micro interactions

A micro interaction alludes to the short second when a client plays out a solitary activity through an intelligent framework's UI with the goal that the framework executes one explicit capability. For example, when the customer presses the button that puts her cell phone in silent mode. UI (UI) and client experience (UX) creators remember micro interactions for the point of interaction plan to keep the client centered, help her in recognizing an activity's result, and work with the development of a psychological model of the framework and its connection point to her (Kraft and Hurtienne; Saffer; Boyd and Bond). Giving clear and Reasonable input is a fundamental necessity of a micro interaction's plan. To satisfy this necessity, UI/UX creators frequently use liveliness, This straightforwardly influences, (Sosa-Tzec, O., & Stolterman Bergqvist, E. 2021, June).

Implementation of Two-Dimensional (2D) Animation

The creation of characters, storyboards, and backdrops in two-dimensional (2D) environments is the main goal of 2D animation. The figurines may move left and right and up and down, which is frequently mistaken for traditional animation. 2D geometric transformation allows for the manipulation of the 2D visual elements, including rotation, scaling, and positional changes.

The creation of key frames and in-between frames are the two most taxing steps in the creation of 2D animation. Most cartoon studios create the massive volumes of still animation by hand, which is labor-intensive and time-consuming. Three-dimensional animation has several advantages over two-dimensional animation; including intricate lighting and shading, ease of camera mobility, realism, and high asset reuse from scene to scene. It is employed in robots, computers, entertainment, sports, and the military, (Ansori, S., Hendradi, P., & Nugroho, S. 2023).

It is standard procedure to enclose conventional robotic components in fabric exteriors in order to produce animated plush toys. Although this method is excellent in terms of mobility capabilities, it has two significant disadvantages. First, the substantial, organic deformations anticipated during normal contacts are impeded by the implanted electromechanical components' rigidity. Second, the internal mechanisms can be highly challenging to design and fabricate, making them mostly inaccessible to casual users. Using cable-driven setups is an alternate tactic that we use for our work. In this context, cables arranged inside the plush toys' soft bodies are activated by tugging or contracting them to produce motions. However, ensuring that the motions that arise are beneficial necessitates resolving a difficult design issue, (Bern, J. M., Chang, K. H., & Coros, S. 2017)

Computer-based human motion and behavior simulation is a dynamic and difficult field. Many papers have been proposed nevertheless, descriptions of integrated real-time human animation systems are lacking. This paper describes the HUMANOID environment, which is devoted to the creation of virtual human-based multimedia, virtual reality, and computer-aided design applications. The integration of extremely diverse elements, including the environment model, the humanoid model, and many motion generators, makes this setting special. The following amenities are supported by the HUMANOID environment:

Real-time interactive manipulation display on a standard graphic workstation

- Multiple motion generators and their blending: key framing, inverse kinematics, dynamics, walking, and grasping
- Flexible design and management of multiple humanoid entities
- Skin deformation of a human body, including the hands and face
- A multi-layer facial animation module
- A method of speeding up calculations using a dedicated parallel machine or by dividing the calculation load among several workstations

Motion Dynamics in Key Frame Animation

Key frame animation approaches have been shown in earlier research to be an effective method for animating free-form graphics. With this method, the artist creates key images at certain points in an animation sequence, and the playback software uses interpolation to calculate the images in between. The ability to interpolate between related key pictures enables the animation of distortion or shape change. In contrast to mathematically specified distortion, which necessitates trial-and-error experimentation, it allows for a straightforward and intuitive approach to action specification. When a classically trained animator switches to computer animation, one advantage of key frame animation techniques is their similarity to traditional hand animation techniques, which makes the transition easier, (Burtnyk, N., & Wein, M. 1976).

1.4 Impact of Interaction Design on Animation Production

Art and technology have undergone distinct historical phases in the long-term growth and evolution of economic civilization. The production process, cross-development, and ongoing integration from shallow to deep and interpenetrating have all been experienced simultaneously by the two. The result of the integration and advancement of science, technology, and art can be seen in every facet of life in the modern era. The Internet society now exhibits typical digital traits due to the ongoing development of computer and network technologies. Numerous new multimedia technologies have emerged as a result of social life, industrial and agricultural output, and other factors and they are extensively employed in the field of art design. Traditional three-dimensional animation can provide viewers with a, (Shan, F., & Wang, Y. 2022).

Due to the rapid advancement of computer technologies, computational methods for the analysis and design of multimode mechanical systems are widely employed in engineering practice. General-purpose software tools such as Automated Dynamic Analysis of Mechanical Systems ADAMS, Dynamic Analysis and Design System DADS, and Working Model were developed to tackle intricate engineering design and analysis problems. Even though these software programs are quite powerful, users are expected to have a thorough understanding of the subject, which leads to challenging learning curves. Specialized software such as Artas' Simulation and Analysis of Mechanisms SAM` and the Linkage Interactive Computer Analysis and Graphical Enhanced Synthesis Package can be used to synthesis and analyze planar mechanisms, (Cheng, H. H., & Trang, D. T. 2006).

Nowadays, a lot of user interfaces employ animations. When users turn on their phones, they may see an animation that instructs them on how to unlock them. Users can browse maps with the aid of fluid animations, which can also provide clues about what occurred to a window application after it was minimized. The taxonomy of animation developed by Baecker and Small 25 years ago clarified the various functions that animation may perform in user interfaces. In this groundbreaking study, they revealed the basic notion that animation can aid in making interfaces easier to comprehend, going beyond the early use of animation to demonstrate procedures and algorithms. In order to demonstrate how animations could assist users in tracking things of interest, making decisions, and determining how to proceed, their article presented a series of largely fictitious scenarios.

For almost ten years, computers have been utilized to help create animated sequences, yet the resulting animation still lacks the lifelike characteristics that conventional hand animation gives to creatures. Some progress has been made in modeling physical rules to provide realistic motions for inanimate objects like machines and chains. However, physics and internal impulses work together to give animate beings their lifelike motion.

The purpose of this study is to enable the interactive design of simulated creature motion that appears accurate and meets user-specified goals and objectives. Therefore, rather than serving as the main motivation for simulation, the rules of physics offer potential limitations on motion, (Cohen, M. F. 1992, July).

Object-Oriented 3D Modeling, Animation and Interaction

It might be difficult to create dynamic, animated 3D apps. Various paradigms and metaphors have been proposed for object-oriented 3D graphics. Making dynamic and interactive 3D apps is difficult for several reasons. A certain rendering technology is often strongly linked to geometric modeling. The developer has to understand the underlying rendering library in order to use the 3D graphics toolkit.

Converting applications to rendering systems using a new rendering technique is difficult since the toolkit design is based on assumptions about the rendering pipeline (e.g., converting from an instantaneous mode library to a radiosity-based library). This problem is addressed by toolkits like as GRAMS and GROOP, which separate the graphics layer from the rendering layer.

They provide a range of pre-existing shapes and traits that, (Döllner, J., & Hinrichs, K. 1997).

Analysis and specification errors are common in distributed systems. Even if the designer takes every precaution, there is a considerable probability that functional and temporal issues will be introduced early in the design process. The complexity of distributed systems is almost impossible to manage in a conventional programming environment. The design process of complex systems can only be handled by advanced design tools. A new trend in high-level electrical systems design is the use of complex graphical design tools [8]. It is expected that visualization and animation tools that make it easier to analyze and run concurrent systems will grow more and more important in the years to come. Most of the most used and recognized graphical tools describe program dynamics statically. Very little attention has been paid to, (Deng, Q. 2023).

The interactive modeling of urban areas with high realism and appropriate behavior is one of the primary issues in computer graphics. Simulating vehicle traffic is crucial for producing realistic, interactive urban environments since it is a continuous and dynamic activity in real cities. Furthermore, since more than half of the world's population lives in cities, there is a lot of interest in large-scale traffic modeling, planning, and visualization. Applications in virtual environments, including virtual tourism, games and movies, navigation services, traffic monitoring, eco-routing, and urban planning and redesign, are increasingly requiring realistic vehicle traffic. Urban modeling has received a lot of attention. Urban procedural modeling and urban 3D reconstruction are surveyed by Vanegas et al. and Musial ski etc, (Gadermann, L., Holder, D., & Maier, T. 2024).

Interactive Design of 3-D Computer-Animated Legged Animal Motion

Animals, as opposed to inanimate objects, coordinate their movements with their postural objectives. In computer animation, computational models of legged animal motion must replicate the coordinated motion that arises from the planning techniques animals employ to accomplish their objectives. Our discussion is based on the interactive design of kinematic motion and how it integrates with dynamic control schemes for the body and limbs. The interactive specification of limb motion is described first, followed by the challenge of creating animation for animal locomotion and, lastly, non-periodic animal dance, (Girard, M. 1987, January).

Many of today's most important scientific issues, such as resource management and environmental monitoring, depend on the ability to capture, analyze, and visualize dynamic spatial processes. The ability to recognize and track changes in complex physical systems is

necessary to obtain understanding of how they operate. For thousands of years, cartographers have been perfecting the use of two-dimensional maps as static spatial representations to illustrate dynamic spatiotemporal phenomena. As early as adding the time dimension, cartographers experimented with using animated map displays to congruently portray dynamic geographic processes. Dynamic cartographic representations, such as interactive map animations and simulations, two- and three-dimensional computer animations, and cartographic films, have become more and more popular since, (Harrower, M., Fabrikant, S., & Dodge, M. 2008).

As he lurked among CHI-Web discussants who were overusing and misusing the term, Don Norman felt compelled to define affordance in his essay "Affordance, conventions, and design," in order to voice his opinion. We think there is more to be said about the affordance concept, especially in terms of making it understandable and beneficial for usability practitioners and designers, even though we agree with the majority of Norman's views. "Hope it doesn't stop the discussion again" was Norman's opening paragraph, which encouraged us to join the discourse. We accomplished this by restating the importance of this powerful concept, restating the differences in Norman's language, and contributing some of our own ideas regarding the use of affordance in interface design, (Hartson, R. 2003).

Evolution for Computer Animation and Graphics

Content generation is the process of producing models, levels, textures, animations, lighting, and other computer visuals for use in video games, movies, and television. Media producers have to devote a lot of time and money to content development in order to produce the complex graphics and gaming material of today. Offering extensive character customization possibilities within games and providing distribution mechanisms that enable users to create their own material outside of games are becoming more and more popular ways for the video game industry to partially address this problem.

Furthermore, sandbox games that leverage content creation tools as games, such as The Sims¹, Second Life², and Spore³, have been more popular recently. The construction of homes, vehicles, clothing, and animals are the primary gameplay components of these games. (Thus, there, Sims, K. 1991, July).

Interaction and Usability of Simulations & Animations

Generally speaking, complex systems are costly, risky, and challenging to train. Developers utilize interactive simulations to try to build a rich environment that students may freely

explore. These simulations can depict the circumstances of actions and occurrences in the real world and support a constructivist learning approach within multimedia learning. Problem-based learning (PBL), which is essential for medical education, is strongly related to this. Furthermore, this approach requires that learning be student-centered, which positively affects students' motivation and gives them more autonomy and initiative. To facilitate knowledge acquisition, the best possible mix of media and information features should be sought for. Guttormsen-Schär et al. claim that it is possible to combine media and information according to their unique characterization. However, the User Interface (Marcus) and, more crucially, the wants, desires, and requirements of the users, need to be given more attention, (Holzinger, A., & Ebner, M. 2003, September).

1.5. Research Scope and Significance

To animate something is to give it life. It can produce visuals that viewers perceive as realistic. A lot of 3D films are incredibly realistic and are frequently used as visual effects in new films.

An essential component of the creative economy is the animation industry. TV, movies, advertising, new media, and computer and video games are just a few of the many creative industries. Aside from that, it offers audiences worldwide live entertainment, television shows, and animated feature films. Animating an object that will move requires a transformation. An image is retained by the human eye for 0.1 seconds. Consequently, when a projector plays an animated film at a speed above 10 frames per second, the motion on, (Islam, M. B., Shamsuddin, A. K., 2013).

The evolution of any kind of art is closely tied to its changing environment and dependence on science and technology. Interactive animation is no exception. Interactive animation is growing in popularity as a kind of digital animation due to advancements in computer and network interaction technologies. Interactivity is one of its primary traits. Viewers of the interactive animation can actively participate in the plot's development or even use their own opinions, passions, and desires in addition to interacting with the characters and scenes through a variety of interactive gadgets. Control the animation's storyline. This suggests that users can choose and customize the information source to meet the audience's need to choose animation development. Consequently, the interactive animation permits unbridled and adaptable participation. The interactive element allows the viewer to alternate between the "other" outside the animation and the "participant" and "master," challenging not just the

creative aesthetics of traditional animation but also its aesthetic objects, aesthetic experience, and aesthetic significance. A change has occurred, (Jingjing, Z. 2019, October).

Interactive Control for Physically-Based Animation

In computer graphics, interactive simulation has a lengthy history, primarily in driving and flying simulators. The ability to replicate the movements of articulated human models at speeds that are close to real-time has recently been made achievable. Similar to how flight simulators have allowed for an unrestricted investigation of flying behaviors, this opens up new possibilities for experimenting with simulated character motions and behaviors. Unfortunately, directing human or animal motions is not as well understood as operating an airplane or a car, as the interface between our intents and muscle actions is unclear, complicated, and unobservable. Therefore, the challenge of building a tool that enables us to interactively experiment with the dynamics of human and animal motions, (Laszlo, J., van de Panne, M., & Fiume, E. 2000, July).

Many contradictions and conflicts have emerged in people's hearts as a result of the imbalance between individuals and their lives brought about by the rapid expansion of modern society. People are under a lot of psychological strain as a result, and mental illnesses or psychological disorders are likely to develop. By enabling individuals to release tension from the core of their hearts, art appreciation can change people's feelings and break down psychological barriers.

There are numerous approaches to art therapy, but one of the most significant is animation, which is a form of cinema and television art. The interactive design of animation, on the other hand, is overlooked in the standard animation design process and is unable to encourage users to engage in empathy, thereby failing to genuinely address the audience's psychological issues. Furthermore, traditional animation's art design ignores how elements like color affect viewers' feelings, making it unable to identify the core of the issue from an animation art design standpoint, (Limano, F. 2021).

Influence of Digital Media Technology on Animation Design

Because current science and technology are developing so quickly, there are always a lot of innovative ideas being produced. In addition to producing a number of exceptional animated films and television series, the application of digital media technology in the field of animation television design has opened up new avenues for the industry's overall expansion. Digital media technology has brought about a significant and unprecedented shift in television animation design, which has aided both the film and television animation industries'

expansion and development while simultaneously offering viewers a new aesthetic. The employment of digital media technology in television animation has resulted in more vibrant and colorful scene, role action, role modeling, and color effects.

Following the 1980s, as digital media technology continued to advance, 3D animation technology also advanced to a rapid pace. The release of the film "Titanic" in 1988 marked the formal beginning of the 3D era, (ruslan, a., hidayati, a. 2024, November).

Digital Media Technology in Animation Design

As science and technology continue to improve, the animation industry has expanded rapidly. Most of the animations were two-dimensional in the early stages of production, while characters and story scenes had weak three-dimensional effects.

With the advent of three-dimensional production equipment, animation began to use layers and three dimensions. Animation design and production now use digital media technology, which blends computer and digital information technology. This technique is essential for improving the visual impact of the animations. Technologies for digital media Because of its increased compatibility and openness, digital media technology can successfully change the traditional model of information delivery and offer an audience a greater variety of audio-visual delight. This significantly affects the design and creation of, (Liu, G. 2020, and April). Many types of externalization are necessary for interaction design. At different stages of the process, design representations must thoroughly examine the intended use scenario while being sufficiently tentative to allow intended users and other stakeholders to participate and engage. Developing concepts for the non-existent is frequently the designer's job. The use cases that are envisioned increasingly entail demanding physical locations, mobile use, and complex technology. In light of these circumstances, a third prerequisite for the representation methodology is that it permits the usage of scenarios and the expression of concepts that would be impractical or impossible to construct using traditional prototyping methods. (The finding that low-fidelity paper prototypes are not very useful for virtual reality design is a clear example, (Löwgren, J. 2004).

The Fourth Industrial Revolution has strengthened the relationship between open innovation and convergence for successful economic innovation. Over the past ten years, the creative industries which prioritize innovation and creativity have expanded quickly on a global scale as a result of the development of digital technology and rising consumer demands. Creative industries, which combine business, technology, and the arts, are seen as a good way to ensure a nation's competitiveness in an integrated global economy. The creative industries are based

on creativity, talent, and ability, which have the potential to create jobs and income through the development and exploitation of intellectual property. TV, video games, music, fashion, and architecture are examples of typical industries, (Ma, L., Qian, C., Liu, Z., & Zhu, Y. 2018).

It has long been a challenge in computer graphics to create an interactive system that allows a beginner to easily and rapidly create a realistic human animation. However, when developing such a system, there are two primary challenges to overcome. Above all, the motions that are produced must seem natural. Individuals are very adept at judging whether an animated film is realistic or not. Even if a movement accomplishes the intended task for example, punching a specific spot on a boxing may be considered unsatisfactory if it appears robotic, jerky, uncoordinated, or contains any noticeable visual artifacts like foot sliding. The second challenge is to provide an easy-to-use interface for animation generation. A range of user limits must be supported by the system in order to design, (Min, J., Chen, Y. L., & Chai, J. 2009).

Computer virtual simulation technology in 3D animation production

The development of 3D animation technology has advanced rapidly due to scientific and technological advancements, and the three-dimensional animation that is being shown is gradually becoming flawless. Nowadays, a lot of small and medium-sized businesses will use three-dimensional animation as their primary medium for spreading corporate culture and service concepts. The primary reason is that 3D animation can provide good results and flawlessly depict the intended effects.

As a result, three-dimensional animation's range of applications is growing. One of the key methods of 3D animation is computer virtual technology, which can not only improve the sensory effect but also greatly influence the virtual environment's success through its development, (Mo, C. 2017, November).

Animation Techniques in Human-Robot Interaction User

When the Kismet robot first came out, people could communicate with it by moving or talking to it instead of using a control center. Additionally, the robot must respond in order for human-robot collaboration (HRI) to work. An individual can better grasp what a moving robot is doing and collaborate with it if it moves.

In order to make progress difficult, we witnessed the eccentricity of action piling to some extent exceptional edges of a thing in filmmaking. Artists follow rules to such an extent that

their work is narrative and persuasive. In fact, the ideas are applied in PC Delineations, which emphasize the need to take robot standards into account. In any case, how much do robots use development systems and how, (Ploetzner, R. 2024).

New Approach to Curriculum Development

In essence, curriculum planning comprises selecting, compiling, and organizing the instructional materials that students will be taught. Making ensuring that students acquire information, abilities, and comprehension pertinent to their future requirements is the aim. But creating curricula is not an easy undertaking. There has been a significant change in the paradigm for curriculum development in recent years.

A fresh method for creating curricula has surfaced, emphasizing more inclusive, results-driven, and holistic thinking. This method takes into account the following factors:

1. **Relevance in Social Context:** While developing a new curriculum, educators should take into account social impact and the context in which students will use their knowledge in addition to academic material. This involves educating pupils to be contributing members of society and responsible citizens.

Project-Based Learning: Students must actively participate in research or problem-solving projects as part of the project-based learning model, which is frequently included into new curriculum. It supports students' growth in critical thinking, creativity, and teamwork.

Formative Assessment: Under the new method, evaluation serves as a tool for more than just assigning grades at the conclusion of a class. That aids pupils in developing their comprehension.

Student Involvement: Students are viewed as active participants in the creation of the curriculum. The curriculum is tailored to their learning requirements, and their ideas are respected. **Variety & Inclusivity:** The new curriculum aims to foster inclusivity and accommodate the variety of its student body. Accessibility for pupils with special needs is part of this, (Mahardhani, A. J., Nadeak, 2023).

Learning changes in educational animation

A major change in the animation and computer sectors is represented by the incorporation of edge intelligence into animation design, especially when working with huge models. The efficiency and speed of data processing are improved by edge computing, a distributed computing paradigm that moves computation and data storage closer to the point of demand, particularly for resource-intensive processes like animation design . With previously unheard-of levels of realism and complexity, the introduction of huge models in animation has completely changed how animators and designers approach their work. These models, however, need a lot of processing power and frequently call for the usage of cloud computing infrastructures, which might result in latency and bandwidth problems. Edge intelligence appears as a remedy, fusing advanced analytics, machine learning, and edge computing power to maximize, (Ploetzner, R. 2024).

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Chapter 2

Literature review

2.1 Historical Development of Interaction Design in Animation

The animation industry's adoption of interaction design is the result of the merging of two quickly developing fields, each with a rich history, unique techniques, and a wide range of applications. Examining the corpus of literature that supports the theoretical and applied nexus of interaction design and animation is crucial to placing this research in context. The goal of this overview is to give readers a thorough grasp of the major ideas, developments, and difficulties that have influenced both disciplines and their potential for collaboration.

From hand-drawn methods to advanced digital technologies, animation has historically concentrated on telling stories through sequential visuals. But as demand for interactive material has increased, its focus has shifted to include user agency and engagement. On the other hand, interaction design has become a multidisciplinary approach that emphasizes the user experience, including usability, accessibility, and emotional engagement. Video games, and animation, and instructional resources are just a few examples of the immersive and interactive applications made possible by the incorporation of these principles into animation.

The first part of this literature review looks at the development of animation and interface design across time, following its philosophical underpinnings and technological breakthroughs. It then explores research showing how interface design can improve audience immersion, storytelling, and user engagement. The review also looks at academic studies and industrial case studies that demonstrate the use of interaction design in animation operations.

The review also points up gaps in the literature, especially when it comes to animators' difficulties implementing interaction design concepts and the necessity of interdisciplinary cooperation. This section establishes the foundation for the study by combining knowledge from both academic and commercial sources, highlighting how crucial it is to comprehend and use interaction design in the animation sector.

Understanding Interaction Design (IxD)

Interaction design and animation technologies

Qiaoling Zeng (2022) et al, in their research “Interactive Animation Design of Egyptian Totem Elements under the Digital Media Technology” the study aims to create an interactive

work through the combination of ancient Egyptian totem culture and computer under the support of digital media technology. It not only reflects the potential generated by the intersection of culture, art, and technology, but also shows the breadth and depth of ancient Egyptian culture. This paper describes the dynamic interactive design process based on the study of ancient Egyptian totem culture. It emphasizes the importance of cross-research methodology in the new era of science and technology, and shows that any kind of science and technology in art design only serves the theme and presentation form of art design, rather than dominates art.

Interaction design and animation technologies

Xiaoxia Li et al. (2022), et al, in their research, “A super pan-genomic landscape of rice”, states that people's lives and careers become increasingly disrupted as a result of varying degrees of mental health issues brought on by the mounting pressures of modern social life. Cartoons are a healthy dose of reality that can help you snap out of your dream state and back into the real world. One method of art therapy is animation, and the heart of animation treatment is animation art design. Traditional animation art design, on the other hand, is unable to evoke deep feelings in viewers. As a result of the total immersion it provides, virtual reality has the potential to alleviate psychological tension in the audience. This article first optimizes animation modeling technology, then combines it with art design, then proposes the idea of animation art design based on virtual reality technology by using art design & interactive technology to build virtual space. The program's goal is to use animation art design to create a virtual animation that will help patients overcome psychological hurdles. Several studies have found that users' psychological perception of virtual reality experiences improves to 78% when the animation's overall style is comfortable and warm, and that their emotional fluctuation range decreases to less than 10% while watching interactive animations. When the animation style is relatively gloomy and dismal, the user's psychological perception drops to 45%, the audience is highly likely to recall a negative life experience, and the risk of inducing psychiatric diseases rises to 69.1%. This demonstrates how the reassuring qualities of animation's aesthetic can help people overcome emotional and mental blocks.

Yingquan Wang (2022), et al, in their research, “An Intelligent Animation Interaction Design Algorithm Based on Example and Parameterization” intelligent design for the animation interaction is very challenging and needs to be resolved on priority basis. If this design is based on smart learning based mechanism, then it will be more appropriate and effective. Therefore, based on the idea of process modeling, the concrete method is based on example

modeling and parameterization, and the VC programming environment is the tool. Animated interactions are not counted. The animation parameterization in the sample animation software and its attribute information are calculated, and the principle and realization process of the new animation interaction design are given, as well as the calculation method and steps of each area of animation elements. The same interaction design pattern can be filled in different areas by using parametric methods. In practice, they have increased the diversity of animation interaction design. The method proposed in this paper can quickly and automatically generate a virtual animation design network according to the user's design ideas and can be controlled by the user in real time interactively, providing a good interface and a new way for the user to design animation environment modeling.

James Branch et al. (2021), et al, in their research, "Do User Experience (UX) Design Courses Meet Industry's Needs? Analyzing UX Degrees and Job Adverts" Higher education institutions now offer a wider variety of UX-related degree programs in response to the rising need for qualified UX professionals. Despite the growth in training opportunities, professionals in the UX design field have voiced concerns that current educational offerings fall short of what is required. This research investigates the topic by asking: (1) what skills do you need to graduate with a UX degree? How well the skills taught in UX & related degree programs and what do is expected of graduates by companies compare? The researchers examined 93 program & module specification documents from 34 UX and UX-related degree programs in the UK, as well as 50 job postings for UX designers, to provide answers to these questions. The research shows that UX is taught in silos within academic institutions and has yet to develop into a comprehensive field. UX education programs are evolving in a wide variety of directions. Finally, the results demonstrate that industry & academia value distinct things. Research into UX practice and pedagogy, inter-institutional partnerships, and stronger connectivity to UX practice groups are all highlighted by the report.

Natural interaction and multi-sensory experience make virtual reality animation enter an unprecedented stage of art perception. Its interactive methods and strategies, and the sensory experience of interactive feedback need to be theoretically sorted out and found new laws. This paper mainly analyzes the application of "interaction perception" mode principle, natural interaction mode and interactive feedback in virtual reality animation, demonstrates that natural interaction mode and multi-sensory experience provide a new creation form for animation creation, and makes thinking on the interaction form and experience form of virtual reality animation in the future. Fujian Jiangxia (2021)

Surya Saputra et al. (2021), et al, in their research, “ Efforts to Improve the Physical Conditions of Banyuwangi Teenage and Junior Wrestling Athletes After Corona virus Outbreak Covid-19” It is now widely accepted that creative activities play a crucial role in driving economic growth on a worldwide scale. Each country has a slightly distinct definition of the creative economy and creative industry, as well as a slightly different set of sub-sectors within each. Among these various forms of expression, Animation may be found in the creative industries of many different nations. Animation's evolution as a subset of the creative sector is distinctive. The current state of animation as a field is examined in this report. Computer animation, including the history of animation technology, is just one of several issues discussed in this analysis and review of relevant literature. The business practices of the animation industry, particularly in various developing countries and Southeast Asia, are discussed in Animation as a Creative Industry. The results show that the animation sector is fertile ground for creative endeavors like animation productions, both in terms of potential partners for outsourcing and new ideas for intellectual property.

Ping Hu (2021), et al, in their research,” bond activation in light alkenes a theoretical perspective” is used to learn and complement each other between different modes of micro animation image sequence, so as to improve the performance of the model and its generalization ability. This paper proposes a micro animation recognition method based on dual flow network information interaction. The experiment uses three micro animation databases animebase, move and move II to evaluate the effect of the method. This paper uses 3d-cnn as the basic network, and uses optical flow sequence diagram to assist training. The research shows that although the flow visualization application in the two-dimensional display interactive environment also provides interactive controls, due to the lack of depth information, users need to use the mouse to drag repeatedly to adjust the angle of view in order to put the interactive controls in the correct position. Therefore, the interaction simulation in the new media app can better increase the rendering effect of micro animation. For example, the range of seed location selection and data cutting can be expanded by 35%, the fluency of interaction can be improved by 18%, and the demand for hardware can be reduced by 5%–10%. The system can provide efficient and natural interaction for users in typical flow visualization scenarios.

For example, when the customer presses the button that puts her cell phone in silent mode. interactive animation into the design of mobile apps, and uses the interactive features and unique display capabilities of interactive animation to provide a more advanced digital

information dissemination method. Through its interactivity, participation, and resulting entertainment, it caters to the needs and preferences of internet users in the new era. The main content is to explore the interactive animation of the interface, which is designed to attract users to pay attention to the content and increase their stickiness. It analyzes the design elements that affect use of products, and summarizes the design principles and methods of interactive animation for mobile apps. For design practice, they are used to validate the advantages of interactive animation in enhancing user experience.

Manuel Rebol (2021), al, in their research, "Passing a Non-verbal Turing Test: Evaluating Gesture Animations Generated from Speech" They propose a real-time system for synthesizing gestures directly from speech. Our data-driven approach is based on Generative Adversarial Neural Networks to model the speech-gesture relationship. They utilize the large amount of speaker video data available online to train our 3D gesture model. Our model generates speaker-specific gestures by taking consecutive audio input chunks of two seconds in length. They animate the predicted gestures on a virtual avatar. They achieve a delay below three seconds between the time of audio input and gesture animation.

Zhiyuan Ying (2021), al, in their research, "Interactive Film and Television Animation Special Effects Production Techniques in Visual Design" Film and television special effect embodies the new development of the combination of visual technology and art. It has become an effective expression method of contemporary movies and an indispensable technical guarantee for creative realization. This article mainly studies the special effects of interactive film and television animation in visual design. This article attempts to take the perspective of visual design as an entry point, push traditional film and television animation to the forefront of technology, and combine the new characteristics of film and television animation with the changes in science to analyze the influence of traditional film special effects theory on digital technology. The changes in the spatial form that have occurred underneath. In this special effects creation, film and television special effects technology and space performance theory are combined. In theory, the three spatial forms in film and television special effects creation are redefined and expressed according to creative practice. They are spatial expression from scratch, spatial expression combining virtual and real, and interactive expression between space and people or things. Technically, it has achieved a breakthrough in its own capabilities. Experimental data shows that under the three backgrounds of medium saturation + high brightness, low brightness + high saturation, and

medium brightness + high saturation, there is no more comfortable foreground color to match with it, showing obvious visual discomfort.

Tatiana Kikot (2020), in their research, “Digital Platform development for the Animation Sector” Today, Portuguese animation is recognized as a significant cultural artifact. More than 200 awards and commendations were given out in the most famous festivals for the medium. There is a lot of potential for Portuguese animation to grow into a thriving business that benefits the country economically and also becomes a mainstream cultural phenomenon. The lack of specialized media that can raise the profile of those making a difference in this field is a real issue. To address this void, the author has been advised to create a new digital platform, one that currently does not exist. Literature reviews, case studies, and usability testing with in-person observations were just some of the methods utilized in conjunction with the "the practice-based approach" to answer the study questions. Finally, a working prototype was created to back up the theory. The Portuguese Animation Platform is an online archive for animation works created by amateurs and experts alike. Users can easily and quickly communicate with one another and share their knowledge on this platform. Usability testing was used to investigate both the User Interface (UI) & User Experience (UX) from the perspective of the intended audience. The collected data allowed for the discovery of problems and the exposure of where enhancements were required. Everyone who took part in the study was enthusiastic and optimistic that their experience will improve as a result. Therefore, the study's central research question was confirmed, lending credence to the premise that digital platforms might facilitate the spread of information & increase participation. Sustainable expansion of the animation industry may benefit from this study and its potential applications.

2.2 Principles and Theories of Interaction Design

Geng Liu et al. (2020), al, in their research, “Role of the Eye in Transmitting Human Corona virus What We Know” and What We Do Not Know the widespread adoption of digital media technology is a direct result of the rapid progress of modern computer technology, information transmission, etc. Integrating digital media technology into the design & production of animation TV works enables richer contents & forms of animation, bringing more genuine visual enjoyment to the viewer. Animated television shows have been revolutionized by the tools & resources made available by digital media. The main focus of this study is on the expansion of digital media technology and its connected aspects. The field is investigated purely for its potential use in the future of TV animation production.

E ka Nurjati et al. (2020), al, in their research, “Indonesian Animation Industry: Its Mapping and Strategy Development” The animation, video, & film sub sector's comparatively low contribution to GDP (0.17%) is a major issue for the Indonesian economy. However, Indonesia has the potential to expand its animation sector because to its creative population. This study included in-depth interviews for a descriptive purpose. Companies studied include CV Imaji Studio, PT the Little Giantz, PT Ayena MandiriSinema, & PT Kinema Systrans Multimedia. The investigation shows that animation studios face various challenges, including a shortage of animators, inadequate infrastructure, expensive equipment, and insufficient numbers of qualified trainees & teachers. For a successful strategy to emerge, input from all relevant parties is required. Stakeholders include representatives from the private sector, public sector, community, academic community, & media. The private sector has taken the lead in creating amenities including co working areas, incubator programs, & dependable monetary system. The onus is placed on the community to organize the display & education. Academics are responsible for creating instructional materials & advancing animation technology. The media serves as a marketing platform for animated goods.

Syed Muhammad Hazry Asraf et al. (2020), al, in their research, “Mobile Application Outdoor Navigation Using Location-Based Augmented Reality (AR)” The Industrial Revolution has led to significant advancements in the 21st century. Therefore, technical advancements have also been infused into the realm of animation. It's challenging to transmit information accurately & interactive way to users. In presenting information to users in a more visually appealing and user-friendly format. As a result, the most effective methods now available are animation & motion capture. Therefore, this project's findings may have far-

reaching consequences for the animation industry in terms of making video or animation more engaging in 2D.

Animation Design Based on Technology.

Chen Haiyan (2020), al, in their research, “Research on 3D Animation Design Based on Technology” Judging from the initial time of animation production, China started relatively late in this area. Driven by the advancement of computer technology and social needs, 3D animation and virtual reality technology have made significant progress. Domestically, it has achieved good results in the production of three-dimensional animation, and has been widely used in various online games and many TV works. Virtual reality technology has diversified development forms. Compared with traditional three-dimensional animation technology, it has obvious interactive and real-time characteristics, and can bring the audience a good perception experience in many aspects. The application of virtual reality technology in the creation and design of 3D animation can break thoroughly improve the interactivity of 3D animation, which is beneficial to promote the animation industry to a higher level. Under the current circumstances, the integration of technology and media is in a stage of rapid development. One of the important directions of future animation art creation is virtual reality immersive content, which is increasingly noticed by the society. This article introduces the basic characteristics of virtual reality technology and three-dimensional animation design, studies three-dimensional animation design based on technology, and analyzes the application of virtual reality technology in three-dimensional animation design; We discuss how to give full play to the advantages of virtual reality animation interaction within the scope of existing technologies, analyze the narrative laws, and provide references for the use of virtual reality technology for three-dimensional animation creation.

Development of Interactive Art

Yuanyuan Ji (2020), al, in their research, “The Key to The Future Development of Interactive Art – Virtual Reality Technology” As one of the frontier technologies, VR has gradually penetrated into film, drama, game, new media art and many other fields in different forms, like new media, new language and new art. From the perspective of VR animation creation practice, this paper discusses the influence of interactive design in VR space on emotional expression and user emotional experience. The specific issues include the definition of emotional interactive design of VR animation, analysis on VR interactive mode, analysis on

the status and problems of VR animation creation, research on emotional expression, emotional interactive design process and methods of VR animation interactive elements.

Kun Feng (2020), in their research, “Interactive Design for Audio-Visual Language of Marine Animation: A Simulation Study” the application of virtual simulation technology in the interactive design of an ocean animation audio-visual language provides a new interactive experience for ocean animation and users. Compared with the traditional design mode, virtual simulation technology can improve the satisfaction of users, improve the efficiency of the design scheme, interact with the audience's audio-visual language, and become part of the audio-visual language art of marine animation. This study first analyzes the interactive design points of an audio-visual language of marine animation, then introduces the advantages of the application of virtual simulation in the interactive design, and finally delivers an interactive design scheme of marine animation based on virtual technology.

Lingwei Zhu (2020), in their research, “Research on Color Design in Interactive Animation Design Software” as Internet product, interactive animation is a member of the animation family with particularity. However, as an expression form of animation, it generally conforms to the basic characteristics of animation. As a dynamic way of visual expression, color plays a very important role. This article mainly studies and analyzes the importance of color design in interactive animation design software and its practical application. It is hoped that the reading of this paper can provide some help and inspiration to researchers in the field of interactive animation design and contribute to the development of China's interactive animation design industry.

Trenton Schulz (2019), al, in their research, “Animation Techniques in Human-Robot Interaction User Studies” there was many different ways a robot can move in Human-Robot Interaction. One way is to use techniques from film animation to instruct the robot to move. This article is a systematic literature review of human-robot trials, pilots, and evaluations that have applied techniques from animation to move a robot. Through 27 articles, they find that animation techniques improves an individual's interaction with robots, improving the individual's perception of qualities of a robot, understanding what a robot intends to do, and showing the robot's state or possible emotion. Animation techniques also help people relate to robots that do not resemble a human or robot. The studies in the articles show further areas for research, such as applying animation principles in other types of robots and situations, combining animation techniques with other modalities, and testing robots moving with animation techniques over the long term.

Jie Liu et al. (2019), al, in their research, “A Review on Recent Treatment Technology for Herbicide Atrazine in Contaminated Environment” Integrates traditional elements of the country through research This article integrates traditional elements of the country through research, introduces other scientific developments, and makes full use of technical advantages by discussing the interconnected concepts of animation design & digital media technology; it also combines the application value & application requirements of digital media technology in animation design and production. Some steps include establishing a method for communication across platforms & increasing relevant personnel training strategies. These actions are meant to raise the general public's understanding of the benefits of using digital media technologies in the animation industry.

Gaosheng Luo et al. (2019), al, in their research, “A Unified Scalable Simulation Framework for General Visual-Language Robot Interaction” the field of interactive design encompasses many different areas of study. By highlighting the interconnectedness and timeliness of subjects like psychology, computer science, and literature with design science, the curriculum's breadth, depth, and relevancy are all bolstered. When creating an interactive product, it's important to draw from a wide range of disciplines & skill sets, not just those directly related to the design process, such as visual communication design, modeling design, structural design, & product design. The interactive design curriculum should progress gradually from an introductory level to more advanced topics. Knowledge logic structure and development method, knowledge longitudinal development, knowledge horizontal development, & theoretical knowledge teaching and innovative practice capacity should all receive equal weight. An ideal knowledge framework of interactive design for students, featuring a dynamic cycle of theory, practice, theory, & re-practice.

Xueying Niu et al. (2019), al, in their research, “Socially Beneficial Metaverse: Framework, Technologies, Applications, and Challenges” the advancement of animation & human-computer interface technologies is greatly aided by motion capture technology. Many of the issues plaguing virtual reality games & somatosensory games in human-computer interaction may be traced back to the current state of the technology. The player's sensory experience is the game's central focus. The designer's structured changes are taken into account while the existing technology is improved to provide a better user experience. This paper proposes a scheme to improve the existing motion capture technology, elaborates on the benefits and drawbacks of this design, the specific design method, and its Meaning and specific benefits,

all based on the overall environment of the animation industry & combined with the principle of human-computer interaction technology and user experience supremacy.

Zhao Jingjing (2019), in their research, “Research on Color Design in Interactive Animation Design of Multiculturalism in the Information Age” Interactive animation design, as a branch of the animation field, has received much attention in recent years. From web pages to personal operating systems, more and more interactive designs are emerging in people's lives. As an important part of the interactive animation design field, rich color design will surely enter the designer's vision in the field of interactive animation design. In this paper, the multi-culture of information age integrates the basic concepts and characteristics of interactive animation, and illustrates the visual turn of interactive animation aesthetic objects with specific cases. Combined with the technical and cultural characteristics of interactive animation, this paper expounds interactive animation. Virtual interaction. Animate the aesthetic experience and bring it to the participants. A more realistic immersive experience that analyzes the use of color design in interactive animation design.

Xueying Niu (2019), in their research, “Human-Computer Interaction Design in Animation Industry” Motion capture is an important technology in the development of the animation industry combined with human-computer interaction technology. Many problems existing in the field of VR games and somatosensory games in human-computer interaction are derived from the limitations of technological development. At the heart of the somatosensory game is the user experience. Improving the existing technology enables the user have a better experience, while also taking into account the designer's structured modifications. Based on the overall environment of the animation industry, combined with the principle of human-computer interaction technology and user experience supremacy, this paper proposes a scheme to improve the existing motion capture technology, expounds the advantages and disadvantages of this design, the specific design method and its Meaning and specific benefits.

Lei Ma et al. (2018), in their research, the animation industry has grown exponentially the animation industry has grown exponentially over the past decade, thanks to both technological advancements and the opening of new markets. Disney, like other industry leaders, is always looking for ways to diversify its product & service offerings, whereas Pixar and DreamWorks are primarily concerned with technology management. The animation business in China is booming thanks to support from the market & government. Most Chinese businesses, however, lack the skills & experience to formulate effective innovation plans. Therefore, the

purpose of this article is to look into China's animation industry's (a relative newcomer) innovation system. The literature & survey of the relevant field are discussed. An in-depth case study of a Chinese firm is performed to go deeper into the specifics. This firm is targeting long-term success by breaking into the character business & service sector through its open innovation system, which involves collaboration with industry, academia, & government. Conclusions include: government plays a critical role in the early stage of building the innovation system; innovation is a dynamic process with new configurations at each level; and a combination of internal knowledge management & open innovation is important. They then draw some findings and make some suggestions for future research after discussing some of the most pressing problems with the animation industry's innovation system.

Diane Wei Lewis et al. (2018), in their research, "Shiage and Women's Flexible Labor in the Japanese Animation Industry" Because of its relationship with imagination, entertainment, & relaxation, animation art For the majority of anime's existence, women have been responsible for Shiage (finishing), which includes inking, coloring, & cleaning up drawings. Shiage may seem like a minor part of the creative process, but it actually reflects major shifts in anime production history since it is more susceptible to the influence of technological breakthroughs and labor redistribution than other components of cell-style animation. Because of its relationship with imagination, entertainment, & relaxation, animation art gained popularity in the late 1970s. This shift in perception was reflected in the ads for animation jobs in women's publications. These commercials portrayed Shiage as a fulfilling way to exercise one's imagination and improve oneself. The animation business, as well as the opportunistic companies that positioned themselves between would-be workers & studios, benefited from this phenomena because it demonstrates how the convergence of production and consumption in "presumption" promoted new kinds of value extraction and labor exploitation.

Tom Hitron et al. (2018), in their research, "Digital Outdoor Play: Benefits and Risks from an Interaction Design Perspective" Children's growth is aided by time spent playing outside. The well-documented fall in outdoor play may be countered by incorporating technology into traditional games like Heads-Up, according to human-computer interaction (HCI) studies. The addition of digital features to outdoor play areas, however, may reduce the positive effects of play on children's socialization, imaginative development, & physical fitness. They introduce the planning and development of a new prototype for digitally enhanced outdoor play. Based on our testing with 48 kids, they know that this new outdoor play equipment encourages

cooperative play and stimulates creative thinking among kids. When compared to the original, the digitally-enhanced version was found to have lower levels of social collaboration and creative problem solving. Nonetheless, they demonstrated that some sensing & feedback characteristics better supported the advantages of outdoor play. Collaborative play and original thought were found to improve with non-accumulated feedback, for instance. For those developing playground equipment, they offer guidance based on solid data.

Can Mo (2017), in their research, “Application of computer virtual simulation Technology in 3D animation production” Continuous development of computer technology in the continuous development of computer technology, the application system of virtual simulation technology has been further optimized and improved. It also has been widely used in various fields of social development, such as city construction, interior design, industrial simulation and tourism teaching etc. This paper mainly introduces the virtual simulation technology used in 3D animation. Based on analyzing the characteristics of virtual simulation technology, the application ways and means of this technology in 3D animation are researched. The purpose is to provide certain reference for the 3D effect promotion days after.

James M. Bern (2017), al, in their research, “Interactive Design of Animated Plushies” Computational approach to creating animated plushiest They present a computational approach to creating animated plushiest, soft robotic plush toys specifically-designed to reenact user-authored motions. Our design process is inspired by muscular hydrostat structures, which drive highly versatile motions in many biological systems. They begin by incrementing simulated plush toys with a large number of small, independently-actuated, virtual muscle-fibers. Through an intuitive posing interface, users then begin animating their plushiest. A novel numerical solver, reminiscent of inverse-kinematics, computes optimal contractions for each muscle-fiber such that the soft body of the plushiest deforms to best match user input. By analyzing the co-activation patterns of the fibers that contribute most to the plushiest motions, our design system generates physically-realizable winch-tendon networks. Winch-tendon networks model the motorized cable-driven actuation mechanisms that drive the motions of our real-life plush toy prototypes. They demonstrate the effectiveness of our computational approach by co-designing motions and actuation systems for a variety of physically-simulated and fabricated plushiest.

Tomas Mitku et al. (2017), in their research “The born-global phenomenon in creative industries” History of the Study implementing efficient cultural policy tools is necessary to promote systematic development & growth of creative industries rather than a haphazard

process. Because creative sectors are so broad, categorizing them can be difficult. One of the most successful approaches to encourage expansion & development in the audiovisual sector appears to be indirect state funding. The case of indirect state aid in Lithuania demonstrates how much room for improvement there is in the application and use of this instrument. The goal of this piece is to examine how well Lithuania's indirect state aid is designed to foster the growth & development of the country's animation sector. This paper uses two different approaches to collect its data. The first is a survey of the state of the animation industry in Lithuania, and it takes the form of a quantitative questionnaire. The second approach uses qualitative semi-structured interviews with officials of government entities that administer the local fiscal incentive scheme & representatives of the audiovisual industry to acquire detailed information about the Lithuanian film tax incentive. Results and Additional Value: While the results suggest that the Lithuanian film tax incentive was successful in attracting new investment to the country's film industry & economy as a whole, they show that it had no such effect on the country's animation sector. Based on the data collected, it is clear that a generic cultural policy instrument is not what is needed, but rather sector-specific indirect aid tools.

Minggang wang (2016), in, their research, "The Interaction Design Research About 3D Demo Animation in Smart Home" in those years, with the rapid development of technology, people's living standards are generally improved and have played a very important role in our future life. Nowadays, they live in a fast-paced era that leaded by information, the heavy and boring instructions inevitably become a kind of burden before using appliances. In addition, it is a painful sorrow among the children, the old or the special people. However, the rise of 3D demo animation solves the problems very well. It exhibits the products from all aspects by the form of animation. Besides, in order to make users have more direct experiences, some film design companies put the interaction technology into it. It is direct interaction that brings users a combined feel of novelty, favor and trust, at the same time; it reduces the distance between products and users. So, products made by animation as well as interaction design should be explained from users' view when design the 3D demo animation of smart home, which can make demo animation be more functional and interesting through some simple actions such as click, litter to let users know and use the appliance cheerfully. The interaction designs of the 3D demo animation not only pay attention to the different gender region different requirements of age groups, but also study the different needs of special populations. It notices their needs on the basis of general design. This article lists some excellent 3D animation works at home and abroad, which display the products and the unique cultural image of the corporate by the way of interaction. This passage researches the physiological

and psychological characteristics of the users when they touch the new product, then, it analyzes the design principle of the 3D demo animation as well as the users' experiences. In the end, these papers not only make an analysis but also make a summary on the shortcomings of the interaction design. At the same time, it puts forward direction and suggestions for improvement of interaction design.

2.3. Impact of Interaction Design on User Experience in Animation

Fanny Chevalier (2016), al, in, their research, "Animations 25 Years Later: New Roles and Opportunities" Animations are commonplace in today's user interfaces. From bouncing icons that catch attention, to transitions helping with orientation, to tutorials, animations can serve numerous purposes. They revisit Becker and Small's pioneering work Animation at the Interface, 25 years later. They reviewed academic publications and commercial systems, and interviewed 20 professionals of various backgrounds. Our insights led to an expanded set of roles played by animation in interfaces today for keeping in context, teaching, improving user experience, data encoding and visual discourse. They illustrate each role with examples from practice and research, discuss evaluation methods and point to opportunities for future research. This expanded description of roles aims at inspiring the HCI research community to find novel uses of animation guide them towards evaluation and spark further research.

Industry use of virtual reality in product design

Leif P. Berg et al. (2016), al, in, their research, "Industry use of virtual reality in product design and manufacturing: a survey" Virtual reality (VR) was first described in a research paper published in 1999 by Fred Brooks, a pioneer in the field & professor of computer science at the University of North Carolina at Chapel Hill (Brooks in IEEE Compute Graph Appl 19(6):16, 1999). Brooks found out that virtual reality "barely works" after doing an exhaustive assessment of the sector. In his study, he detailed several sectors that had successfully used these technologies to foster widespread innovation. Across many different fields, virtual reality was being used to improve the design, evaluation, & training processes. In the past two decades, researchers from both the academic & business worlds have amassed a wealth of information on a wide range of VR-related topics. As technology has progressed, designers & engineers have had more opportunities to naturally connect with and examine data. It has been 16 years since Brooks first conducted this study. How did They get here? This study aims to provide an overview of the state of virtual reality as it pertains to its application as a decision-making tool in product design, particularly in engineering-centric companies. A survey of the business community was performed between the fall of 2014

& spring of 2015 to achieve this goal. A number of sites were visited to collect data on the use of VR in various sectors. In total, 18 VR businesses were visited, and another 2 were contacted by phone or video chat. The writers spoke with sixty-two professionals from a wide range of fields and enterprises. Both past successes & current difficulties were discussed. Advances in VR hardware have been impressive, but it was the software and the choices it enables that received the most focus. The findings indicate that VR is here to stay; it provides the desired experience. It has reached a stable & usable state of development. Virtual reality is already being put to use in a variety of fields to help with decision making and open up new avenues for creativity. The results of this poll might be used as a starting point for further explorations into VR hardware and software.

O. Alharbi, E. Baines (2015), al, in, their research, “Challenging Barriers to the Evolution of the Saudi Animation Industry Life-Cycle” in recent years, historians have become increasingly interested in the development of many creative industries. Despite the abundance of studies on this topic in North America, Europe, & East Asia, research on the Saudi Arabian and broader Arabian animation industry is scant. Existing research indicates that advanced economies like the United States, Japan, and the United Kingdom have entered the Maturity phase of the animation industry life cycle. However, developing nations still in the sector Introduction stage of the lifecycle confront difficulties in advancing their sector. The animation industry in many nations is still in its early stages; Saudi Arabia is no exception. Since these difficulties are shared by many developing-country sectors in their infancy, this article seeks to find solutions to them so that the Saudi animation industry can progress through its life-cycle. A conceptual framework for developing recommendations to facilitate the transition to a strong Growth phase industry has been provided through an analysis of these obstacles in light of Porter's early mobility hurdles. In-depth interviews, document analysis, & participant observations were just some of the qualitative methods used to compile data for this study. The study also used a comparative case study approach to look into the life-cycle of the animation business, focusing on three countries with more advanced animation sectors than Saudi Arabia. The United Kingdom is used as an example of a mature animation market, Egypt as an example of an established Growth stage market, and the United Arab Emirates as an example of a young Growth market. For the Saudi animation sector to flourish, this study recommends implementing effective tactics that emerge from the comparative case studies.

Computational Design of Linkage-Based Characters

Damien Gauge (2014), al, in, their research, “Computational Design of Linkage-Based Characters” They present a computational design tool for creating physical characters using temerities networks of rigid and elastic elements that are in static equilibrium. Whereas the task of designing general tensegrities is very difficult to automate, they show that a modular design paradigm allows users of our system to intuitively build intricate structures that approximate the shape of complex characters. The underlying concept exploited by our method is that simple tensegrities can be used as building blocks to create increasingly complex figures. To this end, They propose a dedicated optimization scheme in order to compute the lengths of elastic cables such that, when fabricated, the structure assumes the desired shape under gravity while remaining compliant and responsive to user interaction. They demonstrate the flexibility of our system by designing several types of tensegrities characters, one of which they also fabricate.

Zichen Xiang(2014), al, in, their research, “Research on interactive animation elements of interaction picture book based on children's cognition” Children's interaction picture books can not only attract children's attention but also can affect the recognition memory effect for content of the picture books. This paper starts with the animation medium in interaction picture books, classifies the interactive animation in existing interaction picture books, to gain samples of different degree of influence on children's attention. A memory test experiment for the selected reading samples was carried out. Experiment results show that the picture book will exert different influence on children's cognitive memory effect when reading it along with the change of the attributive character of animated elements and their different ways of combination. This research can provide a reference for the design and production of related children's interaction picture books.

Garcia-Dorado (2014), al, in, their research, “Designing Large-Scale Interactive Traffic Animations for Urban Modeling” Designing and optimizing traffic behavior and animation is a challenging problem of interest to virtual environment content generation and to urban planning and design. While some traffic simulation methods have appeared in computer graphics, most related systems focus on the design of buildings, roads, or cities but without explicitly considering urban traffic. To our knowledge, our work provides the first interactive approach which enables a designer to specify a desired vehicular traffic behavior (e.g., road occupancy, travel time, emissions, etc.) and the system will automatically compute what realistic 3D urban model (e.g., an interconnected network of roads, parcels, and buildings)

yields the specified behavior. Our system both altered and improved traffic behavior in novel procedurally-generated cities and in road networks of existing cities. Our urban models contain up to 360 km of roads, 300,000 vehicles, and typically cover four hours of simulated peak traffic time. The typical editing session time to “paint” a new traffic pattern and to compute the new/changed urban model is two to five minutes.

Benjamin Walther-Franks (2014a), in, their research, “Direct Animation Interfaces: An Interaction Approach to Computer Animation” Creativity tools for digital media have been largely democratized, offering a range from beginner to expert tools. Yet computer animation, the art of instilling life into believable characters and fantastic worlds, is still a highly sophisticated process restricted to the spheres of expert users. This is largely due to the methods employed: in key frame animation dynamics are indirectly specified over abstract descriptions, while performance animation suffers from inflexibility due to a high technological overhead. The reverse trend in human-computer interaction to make interfaces more direct, intuitive, and natural to use has so far hardly touched the animation world: decades of interaction research have scarcely been linked to research and development of animation techniques. The hypothesis of this work is that an interaction approach to computer animation can inform the design and development of novel animation techniques. Three goals are formulated to illustrate the validity of this thesis. Computer animation methods and interfaces must be embedded in an interaction context. The insights this brings for designing next generation animation tools must be examined and formalized. The practical consequences for the development of motion creation and editing tools must be demonstrated with prototypes that are more direct, efficient, easy-to-learn, and flexible to use. The foundation of the procedure is a conceptual framework in the form of a comprehensive discussion of the state of the art, a design space of interfaces for time-based visual media, and a taxonomy for mappings between user and medium space-time. Based on this, an interaction-centered analysis of computer animation culminates in the concept of direct animation interfaces and guidelines for their design. These guidelines are tested in two point designs for direct input devices. The design, implementation and test of a surface-based performance animation tool takes a system approach, addressing interaction design issues as well as challenges in extending current software architectures to support novel forms of animation control. The second, a performance timing technique, shows concepts from video browsing can be applied to motion editing for more direct and efficient animation timing.

2.4 Industry Trends and Demand for Interaction Design Skills

Md Baharul Islam (2014), al, in their research “Child Education through Animation: An Experimental Study” Teachers have tried to teach their students by introducing text books along with verbal instructions in traditional education system. However, teaching and learning methods could be changed for developing Information and Communication Technology. It's time to adapt students with interactive learning system so that they can improve their learning, catching, and memorizing capabilities. It is indispensable to create high quality and realistic leaning environment for students. Visual learning can be easier to understand and deal with their learning. They developed visual learning materials in the form of video for students of primary level using different multimedia application tools. The objective of this paper is to examine the impact of students’ abilities to acquire new knowledge or skills through visual learning materials and blended leaning that is integration of visual learning materials with teacher’s instructions. They visited a primary school in Dhaka city for this study and conducted teaching with three different groups of students, (i) teacher taught students by traditional system on same materials and marked level of students ability to adapt by a set of questions, (ii) another group was taught with only visual learning material and assessment was done with 15 questionnaires, (iii) the third group was taught with the video of solar system combined with teachers instructions and assessed with the same questionnaires. This integration of visual materials with verbal instructions is a blended approach of learning. The interactive blended approach greatly promoted students ability of acquisition of knowledge and skills. Student’s response and perception were very positive towards the blended technique than the other two methods. This interactive blending leaning system may be an appropriate method especially for school children.

Tim Westcott et al. (2014), in their research “An overview of the global animation industry” Unlike other forms of entertainment media, animation is really international in scope. Due of the large amount of manual labor required to create an animated film, production generally spans multiple nations & sometimes even continents. Unlike live-action drama, animation is less dependent on cultural context while being dubbed. Children under the age of nine, the show's primary demographic, readily consume animation from any country. These inherent qualities of the genre persist, but the industry is becoming more difficult for producers as a result of increased competition in the broadcasting marketplace. Organizationally, organizations in this field range from global media behemoths like Walt Disney, Time Warner, & Viacom Inc. to sole proprietorships consisting of a single designer and his or her computer using the newest design software.

Filmmaking as Design Mediation in HCI

Jinyi Wang ET AL. (2014), in their research “Filmmaking as Design Mediation in HCI” A disconnect between HCI academia & industry has been a source of increased worry in recent years. They discussed revisualization animation, which is adopted from the film industry, as a tool to improve communication between researchers & designers, and They explore strategies presented in HCI for boosting communication between these groups. As part of a design study project at a furniture manufacturer, they animated a short film and gathered initial user input to examine the possible benefit. They propose a methodology for communicating design research that is both concise and portable, taking into account interaction dynamics & provisionally. While they did find some common ground between the researchers and the practitioners, They also found that the two groups had different expectations for the animation.

Prospects and Challenges of the Animation Industry

Md. Bharul Islam et al. (2013), al, in their research “Prospects and Challenges of the Animation Industry in Bangladesh” Numerous underdeveloped nations can credit the expansion of the animation industry to their current economic prosperity. It has been pointed out that the low cost of labor in these countries makes them ideal locations for the production of high-quality international animation. The researchers went to a few different animation studios in the country's capital to get a sense of the state of the industry there. In-depth interviews, phone calls, and website visits were only some of the methods used to gather information from 16 animation and multimedia businesses. The primary goal of this research is to examine the animation industry in Bangladesh and to identify its strengths, weaknesses, opportunities, and threats.

Yu Wu et al. (2010), al, in their research the animation business is a rising sector of the economy. Animation that places a premium on culture & arts is poised to explode in popularity in the 21st century, as seen by the growth of the worldwide creative industries. The United Kingdom's animation business has risen to the top as the country has become a global leader in the creative industries. Using the following three categories, this article provides a detailed analysis of the British animation sector. They looked at the role of creativity, education, and government policies in its success, and then combined that analysis with the current state of China's animation industry to compile a list of takeaways that They hope will spark new ideas for the sector's future growth. The creation of an animation takes a large

amount of time, has many people working on it, and uses many different kinds of media. Bringing the concept of collaborative design into the animation design process, this study seeks to identify the challenges and low-efficiency areas that result from a lack of collaboration across the entire design process. In order to increase productivity and facilitate better communication and data sharing, we they address the technologies related to the four areas of collaborative application: pre-creation, work allocation, data management, and collaborative perception. Finally, two examples of collaborative invention in animation design are provided, one involving the redesign of a character's relationship in a script, and the other involving the creation of a collaborative template for an animation sequence.

Eric Brochu (2010), al, in their research “A Bayesian Interactive Optimization Approach to Procedural Animation Design” The computer graphics and animation fields are filled with applications that require the setting of tricky parameters. In many cases, the models are complex and the parameters unintuitive for non-experts. In this paper, they present an optimization method for setting parameters of a procedural fluid animation system by showing the user examples of different parameterized animations and asking for feedback. Our method employs the Bayesian technique of bringing in “prior” belief based on previous runs of the system and/or expert knowledge, to assist users in finding good parameter settings in as few steps as possible. To do this, they introduce novel extensions to Bayesian optimization, which permit effective learning for parameter-based procedural animation applications. They show that even when users are trying to find a variety of different target animations, the system can learn and improve. They demonstrate the effectiveness of our method compared to related active learning methods. They also present a working application for assisting animators in the challenging task of designing curl-based velocity fields, even with minimal domain knowledge other than identifying when a simulation “looks right”.

Daniel C. McFarlane ET AL. (2009), al, in their research “Interactive dirt: increasing mobile work performance with a wearable projector-camera system” At first look, the idea that people working on essential tasks would welcome interruptions from their laptops may appear ludicrous. People need peace & quiet to think things through before acting, thus interruptions are not welcome. However, the ability to (a) keep tabs on one's ever-evolving information environments, (b) work effectively with others in the system, and (c) oversee autonomous services in the background is equally crucial to job success. To master these essential skills, people may need to query a huge number of information sources at once, keep a constant eye out for vital occurrences, and interact with other humans in real time. However, while

automated systems reduce the need for ongoing monitoring, the warnings they generate may disrupt other work. Concurrent multitasking, mixed-initiative interaction, support for delegation & supervisory control of automation, including intelligent agents, and other distributed, background services and technologies that increase human-human communication are all examples of such interrupting technologies that are already commonplace.

Design elements for simulations and animations that are beneficial in education

Jan L. Plass (2009), al, in their research “Design factors for educationally effective animations and simulations” Learning from dynamic visual representations This paper reviews research on learning from dynamic visual representations and offers principles for the design of animations and simulations that assure their educational effectiveness. In addition to established principles, new and revised designs principles are presented that have been derived from recent research. Our review focuses on the visual design and interaction design of these visualizations and presents existing research as well as questions for future inquiry.)

Jianyuan Min (2009), al, in their research “Interactive Generation of Human Animation with Deformable Motion Models” This article presents a new motion model *deformable motion models* for human motion modeling and synthesis. Our key idea is to apply statistical analysis techniques to a set of recaptured human motion data and construct a low-dimensional deformable motion model of the form $x = M(\alpha, \gamma)$, where the deformable parameters α and γ control the motion's geometric and timing variations, respectively. To generate a desired animation, they continuously adjust the deformable parameters' values to match various forms of user-specified constraints. Mathematically, they formulate the constraint-based motion synthesis problem in a Maximum a Posteriori (MAP) framework by estimating the most likely deformable parameters from the user's input. They demonstrate the power and flexibility of our approach by exploring two interactive and easy-to-use interfaces for human motion generation: direct manipulation interfaces and sketching interfaces.

Erin J. Hastings (2009); al, in their research “Evolving Content in the Galactic Arms Race Video Game” Interactive Evolutionary Computation (IEC) creates the intriguing possibility that a large variety of useful content can be produced quickly and easily for practical computer graphics and gaming applications. To show that IEC can produce such content, this paper applies IEC to particle system effects, which are the *de facto* method in computer graphics for generating fire, smoke, explosions, electricity, water, and many other special effects. While particle systems are capable of producing a broad array of effects, they require

substantial mathematical and programming knowledge to produce. Therefore, efficient particle system generation tools are required for content developers to produce special effects in a timely manner. This paper details the design, representation, and animation of particle systems via two IEC tools called NEAT Particles and NEAT Projectiles. Both tools evolve artificial neural networks (ANN) with the Neuron Evolution of Augmenting Topologies (NEAT) method to control the behavior of particles. NEAT Particles evolves general-purpose particle effects, whereas NEAT Projectiles specializes in evolving particle weapon effects for video games. The primary advantage of this NEAT-based IEC approach is to decouple the creation of new effects from mathematics and programming, enabling content developers without programming knowledge to produce complex effects. Furthermore, it allows content designers to produce a broader range of effects than typical development tools. Finally, it acts as a concept generator, allowing content creators to interactively and efficiently explore the space of possible effects. Both NEAT Particles and NEAT Projectiles demonstrate how IEC can evolve useful content for graphical media and games, and are together a step toward the larger goal of automated content generation.

Kenny K. N. Chow (2009), al, in their research “Active Animation: An Approach to Interactive and Generative Animation for User-Interface Design and Expression” The traditional view of animation is a medium-specific perspective: animation is a sequence of images on film. In contrast, they employ a wider, interdisciplinary theoretical lens, based on a phenomenological perspective of animation. They describe animation as the experience of artifacts imbued with apparent “animacy,” or “liveliness,” and identify a range of media artifacts where an account of animacy is key to understanding and designing their functionality. These artifacts range from computer interface mechanisms such as bouncing and stretching icons to interactive cartoons that may be used for informational, entertainment, or socio-critical purposes. They introduce the term “active animation” to describe this range of artifacts. Insights from textual analyses in the humanities-based field of animation studies can enable analysis and design of active animation, and likewise animation studies can be informed by insights regarding agency in artificial intelligence research, theories of embodied cognition and conceptual blending from cognitive science, and psychological approaches to movement and perception. To exemplify the technical design potential of our approach, they present a cognitive semantics-based interactive and generative multimedia system that they have implemented called the Generative Visual Renku system as a case study active animation. The upshot is that our interdisciplinary animacy-oriented perspective highlights

how gesture and movement allow interactive and generative digital artifacts to convey non-verbal meaning to users.

Map animation in geographic visualization

Harrower (2008), al, in their research “The role of map animation in geographic visualization” Geographic Visualization: Concepts, Tools and Applications is a ‘state-of-the-art’ review of the latest developments in the subject. It examines how new concepts, methods and tools can be creatively applied to solve problems relevant to a wide range of topics. The text covers the impact of three-dimensional displays on user interaction along with the potentialities in animation and clearly explains how to create temporally sensitive visualizations. It also explores the potential for handling mobile data and representing uncertainty; as well as the role of participatory visualization systems and exploratory methods.

2.5 Educational Approaches to Teaching Interaction Design in Animation

Pawit Mongkolprasit, et al. (2007), al, in their research “Further the Future: The Exploratory Study in 3D Animation Marketing Trend and Industry in Thailand” There has been a recent uptick in the number of Thai media outlets producing 3D animation, making it all the more important to gauge talent levels. When teaching in a university's Animation and Multimedia program, scholars must equip their students with skills that are marketable in the field. The current research utilized an exploratory research approach to learn more about this topic, the qualifications of possible employees, and the potential of Thailand's animation sector. Three prominent figures from three different companies were interviewed. The confirmation phase questionnaire was developed with input from the interview data. The data as a whole demonstrated the need for professionals with knowledge of 3D animation, knowledge of computer graphics, solid communication skills, a strong sense of responsibility, and the capacity to meet strict deadlines. In addition, it was discovered that 3D animation has been used in many different types of media, including movies, TV shows, TV commercials, online ads, and mobile apps.

Web-based mechanism analysis and animation system

Harry H. Cheng (2006), al, in their research “Mobile-C: a mobile agent platform for mobile C/C++ agents” A Web-based mechanism analysis and animation system is presented in this article. The system is developed in Ch, an embeddable C/C++ interpreter, and Ch Mechanism Toolkit. It allows users to solve complicated planar mechanism problems conveniently on-

line. Users can input the required data to define a mechanism in a Web browser and then click a button for kinematic and dynamic analysis, graphical plotting, and animation for four bar, crank-slider, geared five bar, six bar linkages and cam-follower systems. Examples are provided to illustrate its ease of use as well as its suitability for distance learning. The Web-based system for mechanism analysis and animation is available on the Web at

Bill Tomlinson (2005), in their research “From Linear to Interactive Animation: How Autonomous Characters Change the Process and Product of Animating” There are significant differences between the art of animating for linear media such as film and video and the art of animating for interactive media such as computer and video games. In particular, these differences arise from the shift from linear characters to autonomous interactive characters. This article describes differences between linear animation and interactive animation in several areas of character design -- character intelligence, emotional expressiveness, navigation, transitions among animations, and multi-character interaction. These differences provide insight into the processes of both forms of animation and the final products that they create, and may provide a starting point for linear animators interested in becoming familiar with interactive animation.

Jonas Lowgren (2004), in their research “Animated use sketches as design representations”

At certain points in the process, there is a need for design representations that (1) explore the intended use situation in some detail, and still (2) appear tentative enough to afford participation and engagement by intended users and other stakeholders. The designer's task is often to create ideas on the not-yet-existing. The envisioned use situations increasingly involve complicated technology, mobile use and demanding physical environments. Under these conditions, a third requirement on the representation technique is that it (3) allows for expression of ideas and use situations that would be impractical or impossible to create in conventional prototyping techniques. (An obvious example is the observation that lo-fi paper prototypes are of limited use for virtual reality design.)

Andreas Holzinger (2003), al, in their research “Interaction and Usability of Simulations & Animations: A case study of the Flash Technology” When designing and developing simulations & animations for e-Learning purposes, basically two factors are essential: Interaction Design and Graphic Design. Both aspects are well addressed by using different Authoring Tools including the vector-based Flash technology. Although it has improved since its release, Flash still encourages superfluous animation and thus increases the likely hood of

poor design. This paper is the result of practical experiences within two large projects (VMC-Graz, iVISiCE) in different domains (Medicine, Civil Engineering) where Flash - amongst several other tools – was used as a tool for creating interactive content. The work is interesting due to the match of experiences of both domains resulting from Usability studies. It is essential that we include the perspective of human-computer interaction as early as possible to enhance design, an approach that is still rarely included in the solutions of traditional programmers and technologically oriented content developers.

Face-to-Face Interaction in Interactive Learning Environments

W. Lewis Johnson (2000), al, in their research “Animated Pedagogical Agents: Face-to-Face Interaction in Interactive Learning Environments” Recent years have witnessed the birth of a new paradigm for learning environments: animated pedagogical agents. These lifelike

Autonomous characters co habit learning environments with students to create rich, face-to-face learning interactions. This opens up exciting new possibilities; for example, agents can demonstrate complex tasks, employ locomotion and gesture to focus students’ attention on the most salient aspect of the task at hand, and convey emotional responses to the tutorial situation. Animated pedagogical agents offer great promise for broadening the bandwidth of tutorial communication and increasing learning environments’ ability to engage and motivate students. This article sets forth the motivations behind animated pedagogical agents, describes the key capabilities they offer, and discusses the technical issues they raise. The discussion is illustrated with descriptions of a number of animated agents that represent the current state of the art.

Joseph Laszlo (2000), al, in their research “Interactive Control For Physically-Based Animation” They propose the use of interactive, user-in-the-loop techniques for controlling physically-based animated characters. With a suitably designed interface, the continuous and discrete input actions afforded by a standard mouse and keyboard allow for the creation of a broad range of motions. They apply our techniques to interactively control planar dynamic simulations of a bounding cat, a gymnastic desk lamp, and a human character capable of walking, running, climbing, and various gymnastic behaviors. The interactive control techniques allow a performer's intuition and knowledge about motion planning to be readily exploited. Video games are the current target application of this work.

A generic system for interactive real-time animation

M. Duecker (1997), al, in their research “A generic system for interactive real-time animation” The authors present a new approach to an interactive design and analysis environment for visual languages. The main components, i.e., editor animator and interpreter are introduced. Their interactions are being investigated emphasizing the interpreter-animator interaction and defining an interface supporting different levels of automation. The interpreter performs the executions on a logical level and triggers the animator. The interactive animation provides a very high degree of likeness since it is based on the tight integration of the animator and editor. The proposed architecture permits the distributed implementation of a system for real-time animation. Their concepts are validated by the implementation of a debugging environment for the complete visual programming language Pictorial Janus.

Animations or visualizations attract student interest

Owen Astrachan (1998), al, in their research “Animation, Visualization, and Interaction in CS 1 Assignments” Programs that use animations or visualizations attract student interest and offer feedback that can enhance different learning styles as students work to master programming and problem solving. In this paper they report on several CS 1 assignments they have used successfully at Duke University to introduce or reinforce control constructs, elementary data structures, and object-based programming. All the assignments involve either animations by which they mean graphical displays that evolve over time, or visualizations which include static display of graphical images. The animations do not require extensive programming by students since students use classes and code that they provide to hide much of the complexity that drives the animations. In addition to generating enthusiasm, they believe the animations assist with mastering the debugging process.

Real-time animation of realistic virtual humans

P. Kalra (1998), al, in their research “Real-time animation of realistic virtual humans” The authors have been working on simulating virtual humans for several years. Until recently, these constructs could not act in real time. Today, however, many applications need to simulate in real time virtual humans that look realistic. They have invested considerable effort in developing and integrating several modules into a system capable of animating humans in real-time situations. This includes interactive modules for building realistic individuals and a texture-fitting method suitable for all parts of the head and body. Animating the body, including the hands and their deformations, is the key aspect of the system; to their knowledge, no competing system integrates all these functions. They also included facial

animation, as demonstrated below with virtual tennis players. They have developed a single system containing all the modules needed for simulating real-time virtual humans in distant virtual environments (VEs). The system lets one rapidly clone any individual and animate the clone in various contexts. People cannot mistake virtual humans for real ones, but they think them recognizable and realistic.

Jianhua Shen (1995), al, in their research “Interactive shape design using metaballs and splines” Implicit surfaces have received increased attention in the design and animation of 3D objects, since they possess some useful advantages over the traditional parametric surfaces. However, interactive design of such surfaces generally suffers from the relatively slow display speed and lack of efficient control facilities. This paper experiments the combination of the implicit surface technique and spine technique, in order to enhance the modeling capability of the implicit surface in practice, particularly in the design and animation of articulated characters.

Lloyd P. Rieber (1990), in their research “Animation in computer-based instruction” Although the use of animated visuals is both common and popular among *CBI* designers, the theoretical and empirical foundations for their use has not been firmly established. Animated visuals represent a subset of instructional visuals; for this reason, general conclusions from research on static visuals are thought to extend to animated visuals. The extent to which animated visual research represents elaborations or departures from static visual research is questioned, however. The purpose of this paper is to review current empirical evidence of the effectiveness of animated visuals in instruction. Tentative design recommendations resulting from this review are presented. Current applications of computer animations in instruction are discussed and a brief summary of static visuals research is also presented.

Mathieu Desbrun (1986), al, in their research “Adaptive sampling of implicit surfaces for interactive modeling and animation” A novel adaptive sampling technique for implicit surfaces that can be applied to animation and interactive modeling This paper presents a new adaptive sampling method for implicit surfaces that can be used in both interactive modeling and animation. The algorithm samples implicit objects composed of blending primitives and efficiently maintains this sampling over time, even when their topology changes (during fractures and fusions). It provides two complementary modes of immediate visualization: displaying “scales” lying on the surface, or “primitive-wise” polygon inaction. The sampling method efficiently avoids unwanted blending between different parts of an object. Moreover,

it can be used for partitioning an implicit surface into local bounding boxes that will accelerate collision detection during animation and ray-intersections during final rendering.

Dynamic animation: interaction and control

Jane Wilhelms (1988), al, in their research “Dynamic animation: interaction and control” animated motions can be constrained using equations of motion. The use of the dynamics equations of motion offers a means of constraining animated motion to physical reality. *Dynamic simulation* treats objects as masses acting under the influence of forces and torques. Motion is derived by solving the dynamics equations of motion, rather than being exactly specified by an animator. Though dynamic simulation can create complex motion with less user input than strictly *kinematic* (Position-based) methods, it is also computationally expensive and difficult to control. The equations of motion are, in themselves, not difficult to program, but adding constraints for controlled motion is complex. The control issues are now being further explored. These include: low-level control issues such as collision response, elasticity, friction, joint limits, damping, and general motion constraints; user-interface issues such as interface design, menu options, and integration into a general animation system; and high-level control issues such as the automatic generation of coordinated, goal-directed motion. This paper concentrates on the first two of these areas, and describes an animation system, Kaya, developed to explore them.

2.6 Case Studies of Successful Animation Projects Using Interaction Design

R. Boulic (1995), al, in their research “Object-Oriented 3D Modeling, Animation and Interaction” Object-oriented 3D graphics and animation framework they present an object-oriented 3D graphics and animation framework which provides a new methodology for the symmetric modeling of geometry and behavior. The toolkit separates the specification of geometry and behavior by two types of directed acyclic graphs, the geometry graph and the behavior graph, which are linked together through constraint relations. All geometry objects and behavior objects are represented as DAG nodes. The geometry graph provides a renderer-independent hierarchical description of 3D scenes and rendering processes. The behavior graph specifies time- and event-dependent constraints applied to graphics objects. Behavior graphs simplify the specification of complex animations and 3D interactions by providing nodes for the management of the time and event flow (e.g. durations, time layouts, time repeaters, actions). Nodes contain, manipulate and share instances of constrainable graphical abstract data types. Geometry nodes and behavior nodes are used to configure high-level 3D

widgets, i.e. high-level building blocks for constructing 3D applications. The fine-grained object structure of the system leads to an extensible reusable framework which can be implemented efficiently. They describe the HUMANOID environment dedicated to human modeling and animation for general multimedia, VR, and CAD applications integrating virtual humans. They present the design of the system and the integration of the various features: generic modeling of a large class of entities with the BODY data structure, realistic skin deformation for body and hands, facial animation, collision detection, integrated motion control and parallelization of computation intensive tasks.

Interactive Design of 3-D Computer-Animated Legged Animal Motion

Michael Girard (1987), in their research “Interactive Design of 3-D Computer-Animated Legged Animal Motion” They present a visually interactive approach to the design of 3-D computer-animated legged animal motion in the context of the PODA computer animation system. The design process entails the interactive specification of parameters which drive a computational model for animal movement. The animator incrementally modifies a framework for establishing desired limb and body motion as well as the constraints imposed by physical dynamics (Newtonian mechanical properties) and temporal restrictions. PODA uses the desired motion and constraints specified by the animator to produce motion through an idealized model of the animal's adaptive dynamic control strategies.

Interactive animation of parametric models

Pat Hanrahan (1985), al, in their research “Interactive animation of parametric models” Parametric models of three-dimensional characters this paper describes a program which allows parametric models of three-dimensional characters and scenes to be interactively controlled for computer animation. The system attempts to span the two most common approaches to animation: language-driven or programmed and visually-driven or interactive. Models are designed in a geometry language which supports vector and matrix arithmetic, transformations and instancing of primitive parts. As a result, constraints and functional dependencies between different parts can be programmed. Control is achieved by parameterizing the model. Subsets of parameters can be connected to different logical input devices, establishing an input mode to control the model's shape. Parameter sets can be stored to form a database of positions. Positions then can be mapped to frames and interpolated to animate the model.

C. Csuri (1979), al, in their research, “Towards an Interactive High Visual Complexity Animation System” A computer animation system is discussed which employs interactive techniques and presents a unified approach to the graphical display of complex three dimensional data. The system facilitates the generation, manipulation and display of highly detailed data with the aid of interactive devices and a video interface to a standard color TV monitor. The system enables the animator to create a variety of objects (including texture) and to specify the necessary transformations for animation sequences. A run length processing technique combined with a brute force Z-buffer algorithm has been newly designed and implemented that can handle the intersection of several million faces, lines and points. This makes possible a full range of visual cues to simulate fire, smoke, water and complex 3-D texture such as grass, hair and bark. Basic concepts and approaches are described. The display algorithm and the procedure model to generate texture are presented and the implications of the system for computer animation are discussed. Extensions to the system are outlined which include a unique graphics display processor currently under construction that includes a partial implementation of the display algorithm in hardware.

N. Burtnyk (1976), al, in their research, “Interactive Skeleton Techniques for Enhancing Motion Dynamics in Key Frame Animation” Significant increase in the capability for controlling motion dynamics in key frame animation is achieved through skeleton control. This technique allows an animator to develop a complex motion sequence by animating a stick figure representation of an image. This control sequence is then used to drive an image sequence through the same movement. The simplicity of the stick figure image encourages a high level of interaction during the design stage. Its compatibility with the basic key frame animation technique permits skeleton control to be applied selectively to only those components of a composite image sequence that require enhancement.

2.7 Gap Found in literature review

In the analysis of interaction design's applicability in the animation sector, the following research gaps have been identified

1. Insufficient Tran's disciplinary frame works for interaction designers and animators to work together effectively.
2. Not enough importance is placed on education and training to provide animators the abilities they need to design interactions.
3. There aren't many case studies that focus on the particular opportunities and difficulties faced by the animation sector.
4. Limited experiential research on how interface design affects user happiness and engagement.

By offering practical approaches and insights to improve the incorporation of interaction design into animation workflows, this study seeks to close these gaps.

2.7 Hence this research aims in

Hence, this research aims to systematically explore the **need for interaction design** and its **relevance in the animation industry**, focusing on the transformative impact of interactive technologies and user-centered approaches on traditional animation workflows. The study intends to:

1. Recognize how important interface design is to improving animation narrative and user engagement.
2. Examine the opportunities and difficulties of incorporating interface design concepts into animation techniques.
3. Create a conceptual framework that connects animation and interface design, providing useful tactics for educators and experts in the field to adjust to the changing digital environment.

By tackling these goals, the study hopes to support the expansion and innovation of the animation sector while highlighting the critical role that interaction design plays in satisfying the demands of modern audiences and producing engaging, user-centered experiences.

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Chapter 3

Research Methodology

3.1 Objectives of Research Study

- 1) To study faculty and students differ in their perception of the role of interaction design in curriculum
- 2) To study faculty and students differ in their perception of role of interaction design in animation
- 3) To study faculty and students differ in their perception of the role of animation in interaction design in the job market.
- 4) To study faculty and students differ in their perception of the role of animation interaction design in career growth and advancement in the animation industry.
- 5) To study students, faculty, and experts differ in their perception of the role of interaction design in the future of animation.
- 6) To study students, faculty, and experts differ in their perception of the role of the animation curriculum in creatively skilled animators.

3.2 Research Hypothesis

Hypothesis 1: student expectation will impact interaction design curriculum.

Ho. null hypothesis: student expectation will do not impact interaction design curriculum.

Hypothesis 2: industry expectation will impact interaction design curriculum.

Ho. null hypothesis: industry expectation will do not impact interaction design curriculum.

Hypothesis 3: faculty expectation will impact interaction design curriculum.

Ho. null hypothesis: faculty expectation will do not impact interaction design curriculum.

Hypothesis 4: industry requirement of student will impact interaction design curriculum.

Ho. null hypothesis: industry requirement will do not impact interaction design curriculum.

Hypothesis 5: User interface UI and User experience UX design will impact interaction design curriculum.

Ho. null hypothesis: User interface UI and User experience UX design will do not impact interaction design curriculum.

Hypothesis 6: interaction design curriculum will impact skills.

Ho. null hypothesis: interaction design curriculum will do not impact skill.

Hypothesis 7: skills will impact job in animation industry.

Ho. null hypothesis: skill will do not impact job in animation industry.

Hypothesis 8: skills will impact career growth in animation industry.

Ho. null hypothesis: skill will do not impact career growth in animation industry.

Hypothesis 9: job performance will impact growth in animation industry.

Ho. null hypothesis: job performance will do not impact growth in animation industry.

Hypothesis 10: job performance will mediate relation between skill and career growth in animation industry.

Mediation effects of job between skill and growth one of the objectives of the study was to check whether the job can mediate the relationship between skill and growth mediation effects were examined using bootstrapping in ANOS 21result of mediation analysis given in the table below

Table: 3.1 Mediation effects of jobs

Path	Direct effect	Indirect effect	result
Skills	b=0.062	b=0.045	Full
Growth	P=0.445	P=0.004	Mediation

It is interesting to note that the

Direct effect is in significance (b=0.062, P=0.445) and

Indirect effect is significance (b=0.045, P=0.004)

Hence the hypotheses that job performance mediate relationship between skill and growth is proved.

3.3 Research Methodology

Research is a systematic process of inquiry or study that seeks to understand current affairs, solve issues, discover new information, or advance our understanding of a given subject. It involves the methodical gathering, examination, and interpretation of information or proof using a range of methods and tools, depending on the field.

3.3.1 Research approach

Research approaches are strategies and tactics that range from general theories to specific methodologies for collecting, evaluating, and interpreting data. The following three types of research approaches are being employed

Qualitative Research, **Quantitative Research**, Exploratory Research

3.3.2 Quantitative research

In this research used the quantitative research method

Quantitative research is a systematic investigation that uses numerical measurement and statistical analysis to quantify facts and phenomena? It comprises collecting structured data, usually through surveys, trials, or pre-existing datasets, in order to test hypotheses or look into relationships between variables. The primary goals are to identify trends, extrapolate findings to larger groups, and make forecasts. Essential elements of quantitative research include tests, surveys with closed-ended questions, and quantitative data processing techniques including regression, correlation, and statistical modeling. This approach is unbiased, emphasizes validity and dependability, and is widely used in fields including social sciences, natural sciences, and market research.

3.3.3 Geographical Location of Study

This study was carried out in the districts of Pune, Mumbai, Sangli, Kolhapur, and Aurangabad in the Indian state of Maharashtra. This shows that nine government and twenty-one private animation, fine art, and design collages were chosen for research projects, together with Pune-based industry professionals.

3.4 Research Design

The fact that the majority of the colleges on the list are located in Mumbai attests to the city's standing as a center for fine arts and design education. Prestigious establishments like the Sir J.J. School of Art are among them. The media and visual effects areas of the contemporary creative industries are served by a number of design and animation colleges in Navi Mumbai. Despite having fewer universities, the cities of Pune, Kolhapur, Aurangabad, and Sangli support local art education.

3.4.1 Selection of Study Participants

The researcher has used the geographical topology where the Maharashtra having different cities to classify the study participants; this is where the students, faculty and experts are given response For this purpose, 6 blocks have been chosen, which are given below:

Table: 3.2 the population of Maharashtra.

Pune	Mumbai	Navi Mumbai	Sangli	Kolhapur	Aurangabad
------	--------	-------------	--------	----------	------------

Faculty, students, and experts are chosen from these blocks to participate in this research study's Interaction Design and Career Growth consideration.

3.5 Sample size determination using mean method

Sample size was determined using sample size determination by mean method.

Variables in study were measured using a 5-point measurement scale; hence the mean method was adopted.

Formula

$$N = \frac{z^2 * s^2}{e^2}$$

Where, 'z' is the standard score associated with confidence level (90% in the current case). Hence standard scores equals to 1.645 (borrowed from normal table)

'S' is the variability in the data set, computed as a ratio of range / 6. Range is equal to 5-1 = 4 (the difference between minimum and maximum value in the 5point scale). 6 refers to ± 3

standard deviation values on the X axis of the standard normal curve, which takes in all the data set in study.

Hence $S = 4/6 = 0.66$

E is the tolerable error = 9% (in the current study).

$$\text{Sample size } n = \frac{1.645^2 * 0.66^2}{0.09^2} = 145$$

To deal with non-responses a buffer of 10% of the sample size is taken as buffer

$$145 * 0.1 = 14.5, \quad 145 + 14.5 = 159.5(160)$$

Hence, questionnaires were distributed to 160 respondents and hence, the final sample size is freezed at 160

3.5.1 Sampling Element:

Students, faculty, and experts in the block indicated above serve as the sampling element for the current research study. The sample size is determined using the mean technique.

3.5.2 Sample Unit

The sample unit for a current research study consists of six cities that are home to professionals who work and teach facilities, and students.

3.5.3 Sampling Frame

The department and the knowledgeable head of the department have collaborated to develop the sample frame.

3.5.4 Sampling Method

In the current study, a 5-point measuring scale mean approach has been employed. The rationale behind choosing this is described below.

3.5.5 The objective of choosing this is mentioned below

In order to ensure respondent convenience and minimize bias, a 5-point scale is used in research to gather data that is balanced, trustworthy, and readily analyzed. With a structured

response format, it enables researchers to measure attitudes, opinions, and perceptions in an efficient manner. The scale's neutral midway aids in identifying strong and weak ideas while capturing moderate viewpoints. It also streamlines statistical analysis, which facilitates the interpretation of trends and patterns. Its broad acceptance in a variety of disciplines, including the social sciences, business, and psychology, guarantees the validity and comparability of study findings.

3.5.6 Survey Instrument

The purpose of the questionnaire was to facilitate the collection of answers from professionals, Faculties, and students. The survey's primary goal is to gather demographic data about experts, Faculties, and students, including their age, occupation, and level of education. The survey also looks at job advancement and interaction design.

The purpose of the questionnaire was to provide participants a better understanding of the variables affecting learning that is job-oriented and curriculum-based.

The 75 items in the questionnaire addressed every aspect required for the study. The researcher employed the reliability testing methodology to assess the questionnaire's validity and reliability.

3.6 Reliability test

Table: 3.3 Reliability statistics of survey instrument

Variables	Pearson Correlation Coefficient Spearman's Correlation Coefficient	Result
The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting	0.990	Reliability Supported
The current industry demands for professionals with skills in interaction design	0.992	Reliability Supported

3. Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries	0.978	Reliability Supported
4. Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	0.977	Reliability Supported
5. Students need to pursue additional training or education in interaction design based on the perceived industry demand	0.992	Reliability Supported
6. Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market	0.975	Reliability Supported
7. Interaction design is important in shaping the success of animations and user experiences in the animation industry	0.980	Reliability Supported
8. The curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry	0.995	Reliability Supported
9. There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	0.971	Reliability Supported
10. The curriculum prepares students for emerging trends and advancements in the animation industry	0.994	Reliability Supported
11. Interaction Design is essential for the future of animation	0.954	Reliability Supported
12. Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	0.994	Reliability Supported
13. The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	0.995	Reliability Supported

14. The The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry..	0.994	Reliability Supported
15. Future animation projects will require students to understand both traditional animation and interaction design.	0.994	Reliability Supported
16. As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	0.994	Reliability Supported
17. Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps	0.995	Reliability Supported
18. In the future, interaction design will be crucial for creating immersive and engaging animation experiences.	0.995	Reliability Supported
19. Interaction design is reshaping traditional animation by enabling more interactive storytelling.	0.995	Reliability Supported
20. The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction.	0.976	Reliability Supported
21. Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover.	0.995	Reliability Supported
22. Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry.	0.979	Reliability Supported
23. Graduates with skills in both animation	0.994	Reliability

and interaction design will be more successful in the job market.		Supported
24. Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	0.994	Reliability Supported
25. The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	0.981	Reliability Supported
26. Learning interaction design can increase the chances of career growth and advancement in the animation industry.	0.979	Reliability Supported
27. The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.	0.975	Reliability Supported
28. Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	0.994	Reliability Supported
29. Following features are Interaction design please rate them in the order of importance's		
A: User Control	0.963	Reliability Supported
B: Feedback	0.995	Reliability Supported
C: Consistency and Standards	0.994	Reliability Supported
D: Simplicity and Minimalism	0.994	Reliability Supported
E: Flexibility and Efficiency of Use	0.983	Reliability Supported

The scale's capacity to produce consistent findings is referred to as reliability. It shows the degree of reliability of a scale. The test-retest method is a simple and standardized way to

evaluate reliability with which dependability can be evaluated. This approach involves administering the identical tool to the same respondents twice.

Reliability is then established by correlating the two sets of data. Consistency is evaluated using the **Pearson** and **Spearman correlation coefficients**; results that are dependable are indicated by coefficients greater than 0.9.

The above reliability statistics indicate that the questionnaire was very reliable to capture the data required for the study. The alpha value of 0.983 suggests strong reliability, and it consists of 29 items.

To understand the validity researcher has adopted **Pearson** and **Spearman correlation coefficients** two types of validity which are mentioned below:

3.6.1 Pearson Correlation Coefficient

The degree and direction of the linear link between two continuous variables are measured by the Pearson Correlation Coefficient (r). It has a range of 0 (no linear correlation) to 1 (perfect positive correlation) and -1 (perfect negative correlation). The covariance of the variables divided by the product of their standard deviations forms the basis of the formula. A linear relationship, normally distributed data, and the absence of notable outliers are the presumptions made by Pearson's r . In statistics, it is frequently used to assess associative and predictive association

3.6.2 Spearman's Correlation Coefficient

Quantifies how strongly and in which direction two variables have a monotonic relationship (either increasing or decreasing). It is robust to outliers and non-linear correlations because it is computed by ranking the data and evaluating the correlation between these ranks. With 0 denoting no monotonic relationship, the coefficient goes from -1 (perfect negative monotonic relationship) to 1 (perfect positive monotonic relationship). Spearman's is appropriate for ordinal, non-parametric, or non-linear data since it does not make the same assumptions as Pearson's regarding linearity or normalcy. It is frequently applied when there are outliers or when the data deviates from Pearson's assumptions.

3.6.3 Pilot Testing

160 people with farming experience who use precision irrigation systems were used to test the instrument prior to the final data collection. This survey's requirement that respondents rate

the questions' readability and grammar accuracy as well as provide recommendations for further enhancements is another crucial component. Thankfully, no such changes were recommended, and no items or questions were removed due to their unreliability. There were multiple-choice questions on the survey.

3.7 Validity test

Validity is the ability of the instrument to produce accurate results. It is the extent to which the scale / instrument measures what it is supposed to measure. Validity is quality assessment of a measurement instrument. If a scale is not validated or is not valid the results are doubtful and incorrect. In the current study, content validity ratio and content validity Index suggested by C H Lawshe (1975) is used to compute validity index and confirm validity. It is an essential method for gauging agreement among experts regarding how essential a particular item is. Lawshe (1975) proposed that each expert will respond to each item using a 3-point scale: 'essential,' 'useful, but not essential,' or 'not necessary'. According to Wilson et. al. (2012) who recalculated the critical values of Lawshe's Content Validity Ratio, a CVR value of 0.741 and above (for $\alpha = 0.05$ and a two-tailed test, and 7 experts) is an indication of validity of an instrument. Following table shows responses from seven experts to all FIFTEEN variables under study. All experts perceived the content of the question and response options to each question of the variable ESSENTIAL (hence CVR is 1) except for THREE variable, wherein, one expert found the contents NOT NECESSARY, hence the CVR was 0.75 which is above the required threshold 0.741, the overall Content validity Index is 0.95, which is also above the required threshold 0.741, hence validity of the instrument/ questionnaire is supported

Table: 3.4 Validity test variables

SR. NO	VARIABLES
1	Interaction design
2	UI user interface design
3	UX user experience design
4	Curriculum
5	Skills
6	job
7	Programs
8	Industry
9	animation
10	Career growth
11	Career opportunities
12	AR, VR, and AI
13	Evolving industry
14	Traditional animation
15	Internship

Table: 3.5 Content validity ratio and content validity index

Variable	Expert1	Expert2	Expert3	Expert4	Expert5	Expert6	Expert7	CVR
V1	x	x	x	x	X	x	x	1
V2	x	x	x	x	X	x	x	1
V3	x	x	x	x	X	x	x	1
V4	X	x	x	NN	X	x	x	0.75
V5	x	x	x	x	X	x	x	1
V6	x	x	x	x	NN	x	x	0.75
V7	x	x	x	x	X	x	x	1
V8	x	x	x	x	X	x	x	1
V9	x	x	x	x	x	x	x	1
V10	x	x	x	x	x	x	x	1
V11	x	x	x	x	x	x	x	
V12	x	x	x	x	x	x	x	1
V13	x	x	x	x	x	x	x	1
V14	x	x	x	x	x	x	x	1
V15	x	x	x	x	x	x	NN	0.75
							CVI	0.94

$$\text{CVR} = \frac{n_e - N/2}{N/2} = \frac{6-3.5}{3.5} = 0.75$$

n_e = number of experts saying Essential, N = number of experts

CVI (content validity index) is the average of CVRs

X = ESSENTIAL, NN = Not Necessary

3.8 Validating the hypothesis model

Validating the hypothesis model research is a scientific investigation of the problem. It is a systematic search for new information. It involves contributing to the body of knowledge by secretly answering questions not previously answered. As a contribution to the body of knowledge, the researcher has proposed the following hypothetical model and mathematically validated the model using path analysis.

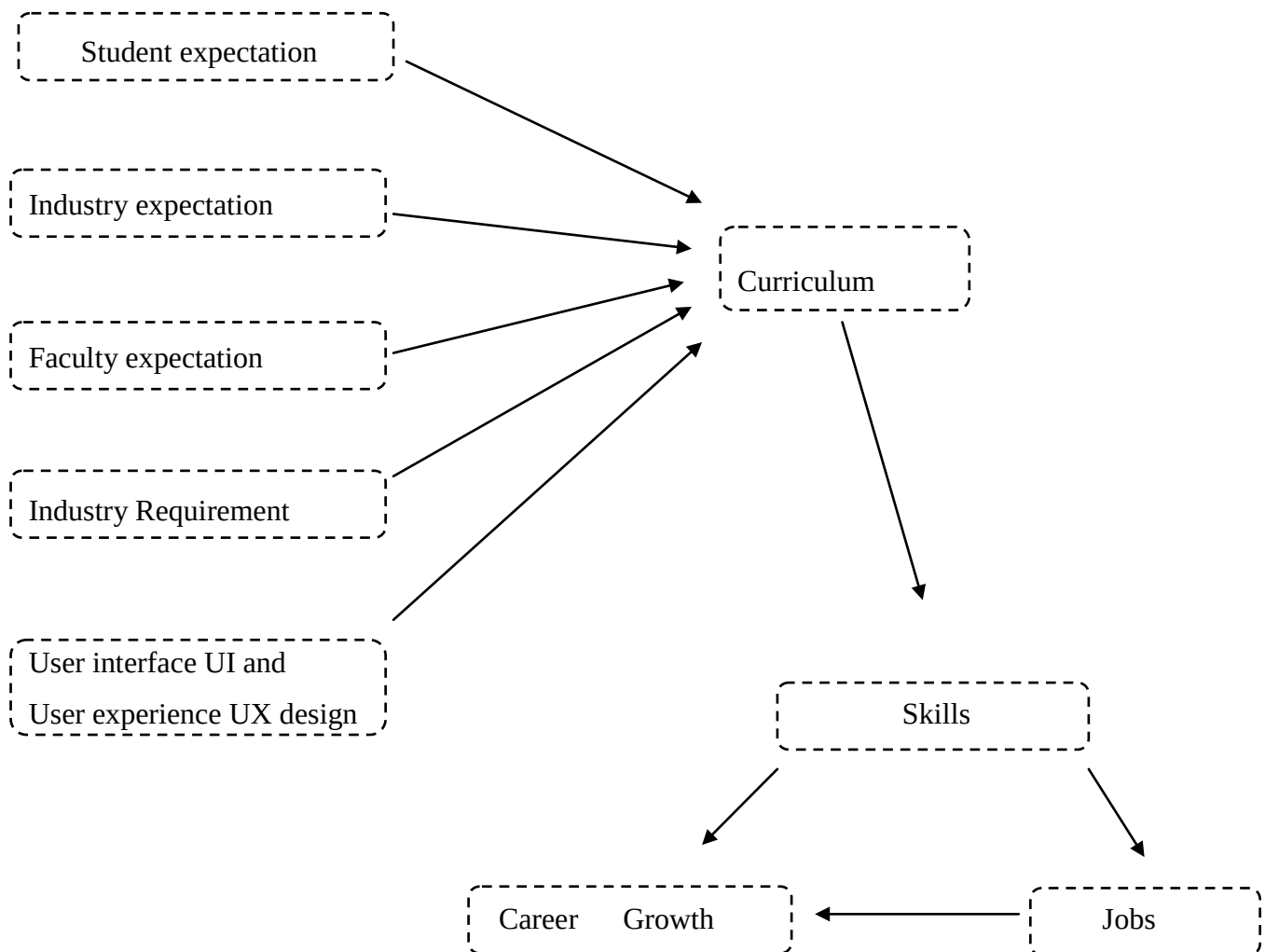


Figure: 3.1 Interaction Design and Career Growth Model

The above model includes five independent variables (Student expectation, Industry expectation, Faculty expectation, Industry Requirement, User interface UI and User experience UX design)

Moderating variables (Curriculum, Skills, Jobs)

Dependent variables (Career and Growth)

It is hypothesized that student requirements, Industry requirements, Faculty requirements, Industry partnerships, User interface UI, and User experience UX design will influence curriculum design, and Curriculum Design will further impact skills.

Skills will further impact jobs and career growth. It is also hypothesized that a job will mediate the relationship between skills and career growth.

Chapter 4

Data Analysis and Interpretation

4.1 Introduction

This chapter examines the necessity of interaction design and its applicability in the animation industry for colleges and universities by analyzing the data gathered using an online survey questionnaire technique. The questionnaire's goal was to gather opinions on topics pertaining to the study questions from a wide range of respondents who were particularly involved in Indian design education programs. It was predicted that the opinions of this sizable sample of respondents who were involved in design education and practice would reveal whether or not Indian design departments and schools place a high priority on teaching their students the country's future designers the principles of socially conscious design. Based on the questions asked in the survey, this chapter has been divided into three Parts. The first part presents the profile of the respondents, showing the cross-section of Participants. The second part analyses the perception of the respondents on growth of design Education programmers /institutions in Maharashtra. The third part looks into the relevance of socially responsible design and its bearing on the design education programmer. And the chapter deals with coding of data, labeling of data, analyzing the data and testing the claimed hypotheses by the researcher. The below section will have analysis of each variable involved into the study.

4.2 Interpretation of Demographic Results

4.2.1 Frequency distribution for Age

Respond to asked comment on age using four response options

(1=18 and less than 28, 2 = 28 and less than 38, 3=38 and less than 48, 4=48 and above)

Table 4.1: Frequency distribution for Age

group			Frequency	Percent	Valid Percent	Cumulative Percent
Student	Valid	18 and less than 28	282	98.9	98.9	98.9
		28 and less than 38	3	1.1	1.1	100.0
		Total	285	100.0	100.0	
Faculty	Valid	18 and less than 28	5	2.9	2.9	2.9
		28 and less than 38	43	25.3	25.3	28.2
		38 and less than 48	91	53.5	53.5	81.8
		48 and above	31	18.2	18.2	100.0
		Total	170	100.0	100.0	
Expert	Valid	18 and less than 28	13	8.0	8.0	8.0
		28 and less than 38	96	58.9	58.9	66.9
		38 and less than 48	45	27.6	27.6	94.5
		48 and above	9	5.5	5.5	100.0
		Total	163	100.0	100.0	

For students: 98.9 Percent are between the age group 18 to 28 and

1.1 are between 28to 38

Hence majority between age group to 28 to 38

For Faculty: 2.9 Percent are between the age group 18 to 28,

25.3 are between 28 to 38 and

53.5 are between 38 to 48 and

18.2 are above 48

Hence majority between age group to 38to 48

For Expert: 8.0 Percent are between the age group 18 to 28,

58.9 are between 28 to 38 and

27.6 are between 38 to 48 and

5.5 are above 48

Hence majority between age group to 28 to 38

Pie Chart

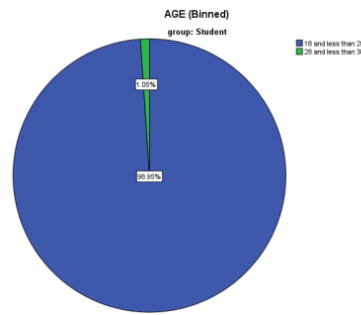


Figure 4.1: Student Age

Among students, 1.1 percent is between the ages of 28 and 38, while 98.9 percent are between the ages of 18 and 28.

Therefore, the majority are in the 28–38 age range.

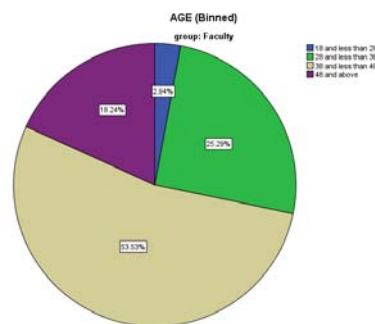


Figure 4.2: Faculty Age

Faculty: 2.9 percent of faculty members are between the ages of 18 and 28, 25.3 are between the ages of 28 and 38, 53.5 are between the ages of 38 and 48, and 18.2 are over 48.

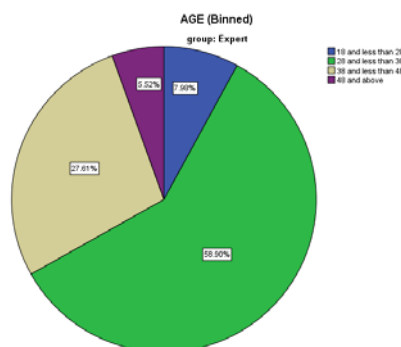


Figure 4.3: Expert Age

Experts: 8.0 percent are between the ages of 18 and 28, 58.9 percent are between the ages of 28 and 38, 27.6 percent are between the ages of 38 and 48, and 5.5 percent are over the age of 48.

4.2.2 Experience frequency distribution

Respond to asked comment on age using three response options

(1= less than 10, 2 = 10 and less than 20, 3=20 and above)

Table: 4.2 Frequency distribution for Experience (Binned)

Group			Frequency	Percent	Valid Percent	Cumulative Percent
Student	Missing	System	285	100.0		
Faculty	Valid	less than 10	58	34.1	34.1	34.1
		10 and less than 20	87	51.2	51.2	85.3
		20 and above	25	14.7	14.7	100.0
		Total	170	100.0	100.0	
Expert	Valid	less than 10	87	53.4	53.4	53.4
		10 and less than 20	65	39.9	39.9	93.3
		20 and above	11	6.7	6.7	100.0
		Total	163	100.0	100.0	

For Faculty: 34.1 Percent are experience less than 10,

51.2 are between 10 to 20 and

14.7 are above 20

Hence majority between experience 10 to 20

For Expert: 53.4 Percent are experience less than 10,

39.9 are between 10 to 20 and

6.7 are above 20

Hence majority less than 10

4.2.3 Frequency distribution for expert designation

Table 4.3: Distribution of frequencies for expert designation

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	UI Designer	32	17.6	19.6	19.6
	UI/UX Designer	26	14.3	16.0	35.6
	Animator	20	11.0	12.3	47.9
	Graphic Designer	22	12.1	13.5	61.3
	3D Artist	23	12.6	14.1	75.5
	2D Artist	13	7.1	8.0	83.4
	VFX Artist	13	7.1	8.0	91.4
	Game designer	6	3.3	3.7	95.1
	web designer	8	4.4	4.9	100.0
	Total	163	89.6	100.0	
Missing	System	19	10.4		
Total		182	100.0		

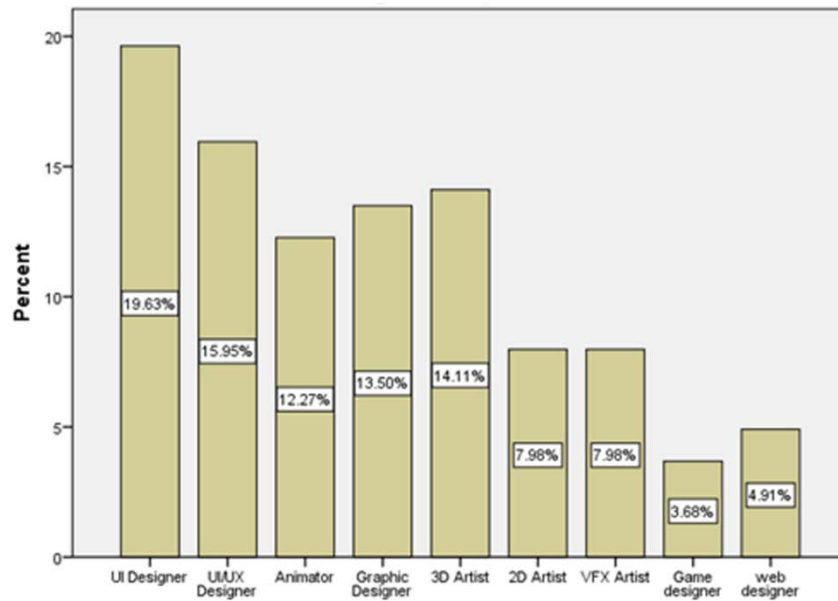


Figure 4.4: Frequency distribution for expert designation

Expert Designation:

17.6 Percent are UI Designer ,14.3 Percent are UI/UX Designer, 11.0 Percent are Animators, 12.1 Percent are Graphic Designer, 12.6 Percent are 3D Artist, 07.1 Percent are 2D Artist 07.1Percent are VFX Artist 03.3 Percent are Game designer, 04.4 Percent are web designer

Analysis of Expert Designations

The data represents the distribution of expert designations in a survey of 182 participants, of which 163 provided valid responses,

1. **UI Designer Dominance:** The UI Designer designation is the most common among respondents, accounting for **19.6%** of valid responses and representing **17.6%** of the total dataset.
2. **UI/UX Designer and Animator:** The next significant categories are **UI/UX Designers** (16.0%) and **Animators** (12.3%), collectively making up almost **30%** of the valid responses.
3. **Mid-level Representation:** **Graphic Designers** (13.5%), **3D Artists** (14.1%), and **2D Artists** (8.0%) form a substantial mid-tier presence. Together
4. **Specialized Roles:** Less common designations include **VFX Artists** (8.0%), **Game Designers** (3.7%), and **Web Designers** (4.9%), collectively comprising around **16.6%** of the valid responses.

5. **Cumulative Insights:** By examining cumulative percentages, we see that more than 75% of the valid responses are concentrated within the first five categories (UI Designer to 3D Artist), reflecting the predominance of generalist and versatile design skills.

4.2.4 Frequency distribution for faculty designation

Table 4.4: Faculty designation frequency distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Head of the department	10	5.5	5.9	5.9
Assistant Professor	71	39.0	41.8	47.6
Design Faculty	18	9.9	10.6	58.2
Fine Art Faculty	30	16.5	17.6	75.9
VFX Faculty	10	5.5	5.9	81.8
Animation Faculty	16	8.8	9.4	91.2
Game Design Faculty	11	6.0	6.5	97.6
Associate professor	4	2.2	2.4	100.0
Total	170	93.4	100.0	
Missing System	12	6.6		
Total	182	100.0		

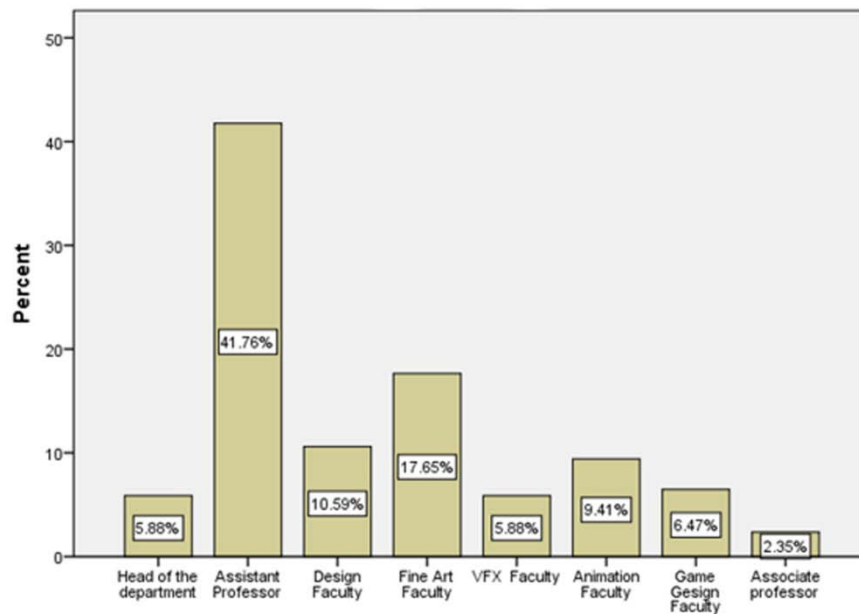


Figure 4.5: Frequency distribution for faculty designation.

Faculty Designation

5.5 Percent are Head of the department, 39.0 Percent are Assistant Professor, 9.9 Percent are Design Faculty, 16.5 Percent are Fine Art Faculty, 5.5 Percent are VFX Faculty, 8.8 Percent are Animation Faculty, 06.0 Percent are Game Design Faculty, 03.3 Percent are Game designer, 02.2 Percent are Associate professor

Analysis of Faculty Designations

The data illustrates the distribution of faculty designations among 182 participants. Out of these, 170 provided valid responses,

Assistant Professors Leading the Group: The **Assistant Professor** designation is the most prevalent, making up **41.8%** of valid responses and **39.0%** of the total dataset. This indicates that a significant proportion of faculty members hold this title,

Fine Art and Design Faculty:

Fine Art Faculty (17.6%) and **Design Faculty** (10.6%) are the next prominent categories, together comprising **28.2%** of valid responses.

Specialized Faculty Roles:

Faculty dedicated to niche disciplines such as **Animation (9.4%)**, **VFX (5.9%)**, and **Game Design (6.5%)** make up **21.8%** of the valid responses.

Leadership and Senior Faculty:

Heads of Departments represent **5.9%**, while **Associate Professors** form a smaller **2.4%** of valid responses.

Pie Chart

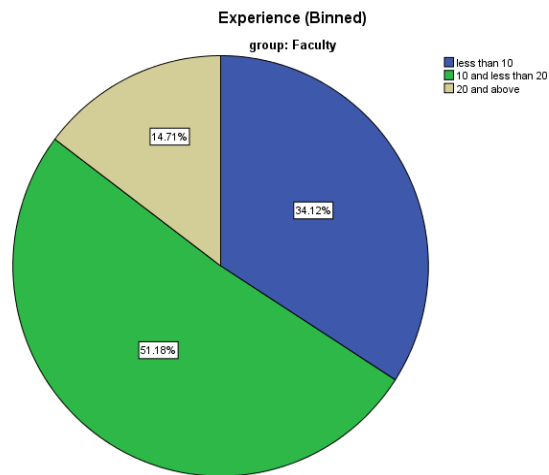


Figure 4.6: Analysis of Faculty Designations

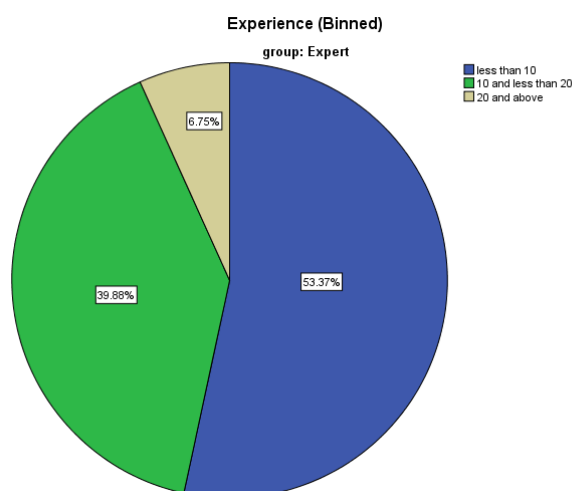


Figure 4.7: Analysis for faculty and expert experience

4.3. Group Statistics Experts, Students, and Faculty

Faculty and Students: differ in perception of ‘The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting’

Statistical Test: –independent sample T Test

Null hypothesis:

Ho: Faculty and Students do not differ in perception of ‘the students who now for animation program little integration of features of Interaction designs as part of college curriculum interesting’

$[\mu_1 = \mu_2]$

Alternative hypothesis: Faculty and Students differ in perception of ‘the students now from animation program now integration of features of Interaction designs as part of college curriculum interesting’

Level of significance: $\alpha = 0.05$.

$[\mu_1 \neq \mu_2]$

Table 4.5: Group statistics of students who are currently choosing animation courses.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting	Equal variances assumed	.033	-3.341
	Equal variances not assumed	.856	-3.412

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting	Equal variances assumed	.001	-.2864
	Equal variances not assumed	.001	-.2864

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting	Equal variances assumed Equal variances not assumed	
	.0857	-.4548
	.0839	-.4514

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
The students who now opts for animation programs, find the integration of features of interaction design as part of college curriculum interesting	Equal variances assumed Equal variances not assumed	
	-.1179	
	-.1213	

Interpretation

Student mean =4.2,

Faculty mean =4.4,

T = -3.34,

P = 0.001 since the P value (0.001) is less than α (0.05) the null hypothesis is rejected and hence it is concluded that

Faculty and Students differ in perception of 'The students who now opt for animation programs, find the integration of features of interaction design as part of college curriculum

interesting’ From the mean values it can be further concluded that there is a gap in faculty-student perception of features of Interaction designs in college curriculum being interacting faculty is agreed to this more than the students.

4.3.1 Interpretation of Non-demographic Results

Group Statistics Student and Expert

Student and Expert differ in perception of “the integration of technology and software tools in animation courses are satisfactory and beneficial”

Statistical Test independent sample T- test

Null hypothesis Ho: Student and Expert do not differ in perception of the integration of technology and software tools in animation courses are satisfactory and beneficial

$$[\mu_1 = \mu_2]$$

Alternative hypothesis H1 Faculty and Students differ in perception of ‘the students now from animation program now integration of features of Interaction designs as part of college curriculum interesting’

Level of significance $\alpha = 0.05$.

Table 4.6: Group statistics of the integration of technology.

Group	N	Mean	Std. Deviation	Std. Error Mean
The integration of technology and software tools in the animation courses are satisfactory and beneficial Student	285	4.130	.9120	.0540
Expert	163	4.049	1.1537	.0904

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The integration of technology and software tools in the animation courses are satisfactory and beneficial	15.115	.000	.817
			.767

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The integration of technology and software tools in the animation courses are satisfactory and beneficial	446	.414	.0807
	278.218	.444	.0807

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The integration of technology and software tools in the animation courses are satisfactory and beneficial	.0988	-.1135
	.1053	-.1265

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
The integration of technology and software tools in the animation courses are satisfactory and beneficial	Equal variances assumed .2750 Equal variances not assumed .2880

Students mean =4.1

Expert mean =4.04

P = 0.44

Since the P value (0.414) is more than α (0.05) the null hypothesis is accepted hence it is concluded that Students and Experts do not differ in their perception of the integration of technology and software tools in animation courses are satisfactory and beneficial

Based on the mean values it can be further concluded that both students and experts agree that 'The integration of technology software tools in the animation courses and satisfactory and beneficial'

Group Statistics Student and Expert

Students and Expert: differ in perception of 'The curriculum of animation programs should focus more on Interaction Design'

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Expert do not differ in perception of 'the curriculum of animation programs should focus more on Interaction Design'

$[\mu_1 = \mu_2]$

Alternative hypothesis Students & Expert differ in perception of 'the curriculum of animation programs should focus more on Interaction Design'

$[\mu_1 \neq \mu_2]$

Level of significance $\alpha = 0.05$.

Table 4.7: Group statistics of the curriculum of animation programs.

Group	N	Mean	Std. Deviation	Std. Error Mean
The curriculum of animation programs should focus more on Interaction Design Student	285	3.863	1.1743	.0696
Expert	163	3.994	1.2644	.0990

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
The curriculum of animation programs should focus more on Interaction Design	Equal variances assumed	2.214	.138	-1.102
	Equal variances not assumed			-1.080

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
The curriculum of animation programs should focus more on Interaction Design	Equal variances assumed	446	.271	-.1307
	Equal variances not assumed	317.234	.281	-.1307

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The curriculum of animation programs should focus more on Interaction Design	Equal variances assumed .1186	-.3638
	Equal variances not assumed .1210	-.3688

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Upper
The curriculum of animation programs should focus more on Interaction Design	Equal variances assumed .1024	
	Equal variances not assumed .1074	

Interpretation

Since the P value (0.271 and .281) is greater than α (0.05) the null hypothesis is accepted and hence it is concluded that Students & Expert do not differ in their perception of ‘The curriculum of animation programs should focus more on Interaction Design’ and from the mean values it can be further being concluded that both are agreed ‘the curriculum of animation programs should focus more on Interaction Design’

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Students & Faculty differ in perception of ‘rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.8: Group statistics of the rise of interactive platforms

Group	N	Mean	Std. Deviation	Std. Error Mean
The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	Student 285	4.105	.9873	.0585
	Faculty 170	3.759	1.3568	.1041

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	25.368	.000	3.138
			2.902

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	453	.002	.3464
	276.221	.004	.3464

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	.1104	.1295
	.1194	.1114

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.	Equal variances assumed .5634
	Equal variances not assumed .5814

Interpretation

Student mean =4.105,

Faculty mean =4.759,

T = -3.138,

P = (.002 and .004) Since the P value is less than α (0.05) the null hypothesis is rejected and hence it is concluded that Students & Faculty differ in perception of ‘rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation’

and from the mean values it can be further concluded that both agreed ‘rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation’ and student are agreed to this more than the experts.

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘Animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘Animation becomes more interactive; students need to develop skills in user experience (UX) and user interface (UI) design’

[$\mu_1 = \mu_2$]

Alternative hypothesis Students & Faculty differ in perception of ‘Animation becomes more interactive; students need to develop skills in user experience (UX) and user interface (UI) design’

Level of significance $\alpha = 0.05$.

Table 4.9: Group statistics as animation becomes more interactive

Group	N	Mean	Std. Deviation	Std. Error Mean
As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	Student 285	3.968	1.1996	.0711
	Faculty 170	3.806	1.2370	.0949

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	Equal variances assumed	.869	1.382
	Equal variances not assumed		1.371

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	Equal variances assumed 453	.168	.1625
	Equal variances not assumed 346.852	.171	.1625

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	Equal variances assumed .1176	-.0686
	Equal variances not assumed .1185	-.0706

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.	Equal variances assumed .3937
	Equal variances not assumed .3957

Interpretation

Student mean =3.968,

Faculty mean =3.806,

T = -1.382,

P = (.168 and .171) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Students & Faculty do not differ in perception of 'Animation becomes more interactive; students need to develop skills in user experience (UX) and user interface (UI) design'

And from the mean values it can be further concluded that both agreed that 'Animation becomes more interactive; students need to develop skills in user experience (UX) and user interface (UI) design'

Group Statistics Student and Faculty

Students and Faculty: differ in perception of 'Interaction design is reshaping traditional animation by enabling more interactive storytelling'

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of 'Interaction design is reshaping traditional animation by enabling more interactive storytelling'

Alternative hypothesis Students & Faculty differ in perception of 'Interaction design is reshaping traditional animation by enabling more interactive storytelling' [mean1 $\neq$ mean2].

Level of significance $\alpha = 0.05$.

Table 4.10: Group statistics of the interaction design is reshaping traditional animation

Group	N	Mean	Std. Deviation	Std. Error Mean
Interaction design is reshaping traditional animation by enabling more interactive Faculty storytelling.	285	4.126	1.0738	.0636
	170	3.882	1.2864	.0987

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Interaction design is reshaping traditional animation by enabling more interactive Faculty storytelling.	Equal variances assumed	6.779	.010	2.175
	Equal variances not assumed			2.078

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Interaction design is reshaping traditional animation by enabling more interactive Faculty storytelling.	Equal variances assumed	453	.030	.2440
	Equal variances not assumed	307.109	.039	.2440

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Interaction design is reshaping traditional animation by enabling more interactive storytelling.	Equal variances assumed .1122	.0235
	Equal variances not assumed .1174	.0130

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
8.Interaction design is reshaping traditional animation by enabling more interactive storytelling.	Equal variances assumed .4644
	Equal variances not assumed .4749

Interpretation

Student mean =4.126,

Faculty mean =3.882,

T = -2.175,

P = (.030 and .039) Since the P value is less than α (0.05) the null hypothesis is rejected and the Alternative hypothesis is accepted, hence it is concluded that Students & Faculty differ in their perception of 'Interaction design is reshaping traditional animation by enabling more interactive storytelling'

From the mean values, it can be further concluded that both do not agree that 'Interaction design is reshaping traditional animation by enabling more interactive storytelling' and Students agreed to this more than the Faculty.

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Students & Faculty differ in perception of ‘The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.11: Group statistics of the implementation of interaction design in animation.

Group	N	Mean	Std. Deviation	Std. Error Mean
The implementation of Student interaction design in animation will lead to rise in demand by Faculty audience and their satisfaction.	285	4.137	1.0509	.0623
	170	3.794	1.3095	.1004

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The implementation of Equal variances assumed interaction design in animation will lead to rise in demand by Equal variances not assumed audience and their satisfaction.	13.912	.000	3.064
			2.900

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction.	453	.002	.3427
	297.657	.004	.3427

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction.	.1118	.1229
	.1182	.1102

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction.	.5625
	.5753

Interpretation

Student mean =4.137,

Faculty mean =3.794,

T = -3.064,

P = (.002 and .004) Since the P value is less than α (0.05) the null hypothesis is rejected and hence it is concluded that Students & Faculty differ in perception of 'The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction' and from the mean values it can be further being concluded that both are not agreed 'The implementation of interaction design in animation will lead to rise in demand by audience and their satisfaction' 'Students are agreed to this more than the Faculty.

Group Statistics Student and Expert

Students and Expert: differ in perception of 'Future animation industry trends will prioritize user-centric experiences over traditional linear narratives'

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Expert do not differ in perception of 'Future animation industry trends will prioritize user-centric experiences over traditional linear narratives'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Students & Expert differ in perception of 'Future animation industry trends will prioritize user-centric experiences over traditional linear narratives'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.12: Group statistics of the future animation industry trends.

Group	N	Mean	Std. Deviation	Std. Error Mean
Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.	285	3.965	1.1653	.0690
Student Expert	163	3.982	1.1836	.0927

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.	1.150	.284	-.145
Equal variances assumed			
Equal variances not assumed			-.144

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.	446	.885	-.0167
Equal variances assumed			
Equal variances not assumed	333.026	.885	-.0167

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.	Equal variances assumed	.1151
	Equal variances not assumed	.1156
		-.2429
		-.2440

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.	Equal variances assumed	.2095
	Equal variances not assumed	.2107

Interpretation

Student mean =3.965,

Expert mean =3.982,

T = -.145,

P = (.885 and .885) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Students & Expert do not differ in perception of 'Future animation industry trends will prioritize user-centric experiences over traditional linear narratives' and from the mean values it can be further being concluded that both students and experts are agreed 'Future animation industry trends will prioritize user-centric experiences over traditional linear narratives'.

Group Statistics Student and Faculty

Students and Faculty :differ in perception of ‘Graduates with skills in both animation and interaction design will be more successful in the job market’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘Graduates with skills in both animation and interaction design will be more successful in the job market’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Students & Faculty differ in perception of ‘Graduates with skills in both animation and interaction design will be more successful in the job market’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.13: Graduates with animation and interaction design skills thrive in the job market.

Group	N	Mean	Std. Deviation	Std. Error Mean
Graduates with skills in both animation and interaction design will be more successful in the job market. Student	285	4.116	1.0799	.0640
Faculty	170	3.859	1.2654	.0971

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Graduates with skills in both animation and interaction design will be more successful in the job market. Equal variances assumed	5.970	.015	2.301
Equal variances not assumed			2.211

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Graduates with skills in both animation and interaction design will be more successful in the job market.	Equal variances assumed 453	.022	.2570
	Equal variances not assumed 312.614	.028	.2570

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
Graduates with skills in both animation and interaction design will be more successful in the job market.	Equal variances assumed .1117	.0375
	Equal variances not assumed .1162	.0283

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
Graduates with skills in both animation and interaction design will be more successful in the job market.	Equal variances assumed .4765
	Equal variances not assumed .4857

Interpretation

Student mean =4.116,

Faculty mean =3.159,

T = -2.301,

P = (.022 and .028) Since the P value is less than α (0.05) the null hypothesis is rejected and alternative hypothesis is accepted. Hence it is concluded that Students & Faculty differ in perception of 'Graduates with skills in both animation and interaction design will be more successful in the job market'

And from the mean values it can be further being concluded that both are not agreed 'Graduates with skills in both animation and interaction design will be more successful in the job market' Students are agreed to this more than the Faculty.

Group Statistics Student and Expert

Students and Expert: differ in perception of 'faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects'

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Expert do not differ in perception of 'faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Students & Expert differ in perception of 'faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.14: Faculty should encourage integrating animation and interaction design for real-world projects.

Group	N	Mean	Std. Deviation	Std. Error Mean
Faculty should encourage Student students in learning of combination of animation and Expert interaction design to simulate real-world projects.	285	4.168	1.0480	.0621
	163	4.037	1.1858	.0929

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Faculty should encourage Equal variances assumed students in learning of combination of animation and Expert interaction design to simulate real-world projects.	3.689	.055	1.218
			1.178

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Faculty should encourage Equal variances assumed students in learning of combination of animation and Expert interaction design to simulate real-world projects.	446	.224	.1316
	304.421	.240	.1316

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects.	Equal variances assumed .1080	-.0807
	Equal variances not assumed .1117	-.0882

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
Faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects.	Equal variances assumed .3439	
	Equal variances not assumed .3514	

Interpretation

Student mean =4.166,

Expert mean =4.037,

$T = 1.218$, $P = (.224 \text{ and } .240)$ Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Students & Expert do not differ in perception of ‘faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects’

And from the mean values it can be further being concluded that both students and experts are agreed ‘faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects’.

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology’

$[\mu_1 = \mu_2]$

Alternative hypothesis Students & Faculty differ in perception of ‘Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology’

$[\mu_1 \neq \mu_2]$.

Level of significance $\alpha = 0.05$.

Table 4.15: Industry partnerships keep animation programs aligned with interaction design trends.

Group	N	Mean	Std. Deviation	Std. Error Mean
Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	Student 285	4.046	1.0622	.0629
	Faculty 170	3.712	1.3343	.1023

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	22.309	.000	2.942
			2.779

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	453	.003	.3338
	295.762	.006	.3338

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	.1135	.1108
	.1201	.0974

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
13. Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.	Equal variances assumed	.5569
	Equal variances not assumed	.5703

Interpretation

Student mean =4.046,

Faculty mean =3.712,

T = 2.942,

P = (.003 and .006) Since the P value is less than α (0.05) the null hypothesis is rejected and alternative hypothesis is accepted. Hence it is concluded that Students & Faculty differ in perception of ‘faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects’ and from the mean values it can be further being concluded that both are not agreed ‘faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects’ students are more agreed than Faculty.

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design’

[$\mu_1 = \mu_2$]

Alternative hypothesis Students & Faculty differ in perception of ‘The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design’

[$\mu_1 \neq \mu_2$]

Level of significance $\alpha = 0.05$.

Table 4.16: Animation education must prioritize UX and UI design.

Group	N	Mean	Std. Deviation	Std. Error Mean
The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	Student 285	3.874	1.2211	.0723
	Faculty 170	3.729	1.3837	.1061

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	Equal variances assumed	6.923	.009	1.159
	Equal variances not assumed			1.123

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	Equal variances assumed	453	.247	.1443
	Equal variances not assumed	321.236	.262	.1443

Independent Samples Test

		t-test for Equality of Means	
			95% Confidence Interval of the Difference
		Std. Error Difference	Lower
The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	Equal variances assumed	.1244	-.1003
	Equal variances not assumed	.1284	-.1084

Independent Samples Test

		t-test for Equality of Means	
			95% Confidence Interval of the Difference
			Upper
The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.	Equal variances assumed	.3888	
	Equal variances not assumed	.3969	

Interpretation

Student mean =3.874,

Faculty mean =3.729,

T = 1.159,

P = (.247 and .262) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Students & Faculty do not differ in perception of 'The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design' and from the mean values it can be further being concluded that both are agreed 'The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design'.

Group Statistics Student and Faculty

Students and Faculty: differ in perception of ‘learning interaction design can increase the chances of career growth and advancement in the animation industry’

Statistical Test –independent sample T Test

Null hypothesis (H0) – Students & Faculty do not differ in perception of ‘learning interaction design can increase the chances of career growth and advancement in the animation industry’

[$\mu_1 = \mu_2$]

Alternative hypothesis Students & Faculty differ in perception of ‘learning interaction design can increase the chances of career growth and advancement in the animation industry’

[$\mu_1 \neq \mu_2$]

Level of significance $\alpha = 0.05$.

Table 4.17: Learning interaction design enhances animation career growth.

Group	N	Mean	Std. Deviation	Std. Error Mean
Learning interaction design can increase the chances of career growth and advancement in the animation industry.	Student 285	4.095	1.0320	.0611
	Faculty 170	3.788	1.3198	.1012

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Learning interaction design can increase the chances of career growth and advancement in the animation industry.	Equal variances assumed	16.605	.000	2.756
	Equal variances not assumed			2.592

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Learning interaction design can increase the chances of career growth and advancement in the animation industry.	Equal variances assumed	453	.006	.3065
	Equal variances not assumed	291.656	.010	.3065

Independent Samples Test

		t-test for Equality of Means	
			95% Confidence Interval of the Difference
		Std. Error Difference	Lower
Learning interaction design can increase the chances of career growth and advancement in the animation industry.	Equal variances assumed	.1112	.0879
	Equal variances not assumed	.1182	.0738

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Learning interaction design can increase the chances of career growth and advancement in the animation industry.	Equal variances assumed	.5251
	Equal variances not assumed	.5392

Interpretation

Student mean =4.095,

Faculty mean =3.788,

T = 2.756,

P = (0.006 and .010) Since the P value is less than α (0.05) the null hypothesis is rejected and hence it is concluded that Students & Faculty differ in perception of 'learning interaction design can increase the chances of career growth and advancement in the animation industry'

And from the mean values it can be further being concluded that both are not agreed 'learning interaction design can increase the chances of career growth and advancement in the animation industry' students are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'current industry demands for professionals with skills in interaction design'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty & Expert do not differ in perception of 'current industry demands for professionals with skills in interaction design'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty & Expert differs in perception of 'current industry demands for professionals with skills in interaction design'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.18: The industry demands professionals with interaction design skills.

Group	N	Mean	Std. Deviation	Std. Error Mean
The current industry demands for professionals with skills in interaction design Faculty	170	4.041	1.1633	.0892
Expert	163	4.215	1.0408	.0815

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
The current industry demands for professionals with skills in interaction design	Equal variances assumed	1.211	.272	-1.433
	Equal variances not assumed			-1.436

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
The current industry demands for professionals with skills in interaction design	Equal variances assumed	331	.153	-.1735
	Equal variances not assumed	329.436	.152	-.1735

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
The current industry demands for Equal variances assumed	.1211	-.4118
professionals with skills in interaction design Equal variances not assumed	.1209	-.4113

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
The current industry demands for Equal variances assumed	.0648
professionals with skills in interaction design Equal variances not assumed	.0642

Interpretation

Faculty mean =4.041,

Expert mean =4.215,

T = 1.433,

P = (.153and .152) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of ‘current industry demands for professionals with skills in interaction design’ And from the mean values it can be further being concluded that both are agreed ‘current industry demands for professionals with skills in interaction design’

Experts are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries’

$$[\mu 1 = \mu 2]$$

Alternative hypothesis Faculty& Expert differ in perception of ‘Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries’

$$[\mu 1 \neq \mu 2]$$

Level of significance $\alpha = 0.05$.

Table 4.19 Mastering interaction design is essential for industry demands.

Group	N	Mean	Std. Deviation	Std. Error Mean
Learning and Implementation Faculty of Interaction design is crucial, which meets the demands of Expert today's industries	170	4.024	1.3143	.1008
	163	4.018	1.0569	.0828

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries	5.178	.024	.039
			.039

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
19.Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries	331	.969	.0051
	321.346	.969	.0051

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries	.1310	-.2526
	.1304	-.2515

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries	Equal variances assumed .2629 Equal variances not assumed .2617

Interpretation

Faculty mean =4.024,

Expert mean =4.018,

T = .039,

P = (.969and .969) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries'

And from the mean values it can be further being concluded that both are agreed 'Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries'.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of ‘nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.20: Many animation jobs and internships demand interaction design skills.

Group	N	Mean	Std. Deviation	Std. Error Mean
Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	Faculty	170	4.018	1.1841
	Expert	163	3.982	1.1888
				.0908
				.0931

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	Equal variances assumed	1.361	.244
	Equal variances not assumed		.277
			.277

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	Equal variances assumed 331	.782	.0361
	Equal variances not assumed 330.297	.782	.0361

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	Equal variances assumed .1301	-.2198
	Equal variances not assumed .1301	-.2198

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
Nowdays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field	Equal variances assumed .2919
	Equal variances not assumed .2919

Interpretation

Faculty mean =4.018,

Expert mean =3.982,

T = .277,

P = (.782 and .782) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field' And from the mean values it can be further being concluded that both are agreed 'nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field'.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of 'Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.21: Integrating interaction design enhances students' job competitiveness.

Group	N	Mean	Std. Deviation	Std. Error Mean
Incorporating interaction design Faculty skills into the curriculum will enhance competitiveness of Expert students in the job market	170	3.753	1.3226	.1014
	163	4.092	1.0530	.0825

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Incorporating interaction design Faculty skills into the curriculum will enhance competitiveness of Expert students in the job market	Equal variances assumed	7.065	.008	-2.581
	Equal variances not assumed			-2.594

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Incorporating interaction design Faculty skills into the curriculum will enhance competitiveness of Expert students in the job market	Equal variances assumed	331	.010	-.3391
	Equal variances not assumed	320.282	.010	-.3391

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market	.1314	-.5975
Equal variances assumed		
Equal variances not assumed	.1307	-.5963

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
21. Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market	Equal variances assumed	-.0807
	Equal variances not assumed	-.0819

Interpretation

Faculty mean =3.753,

Expert mean =4.092,

T = -2.581,

P = (.010 and .010) Since the P value is less than α (0.05) the null hypothesis is rejected and hence it is concluded that Faculty & Expert differ in perception of ‘Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market’ And from the mean values it can be further being concluded that both are not agreed ‘Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market’ expert are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of ‘curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.22: Group statistics of the curriculum covers essential skills for an animation career.

Group	N	Mean	Std. Deviation	Std. Error Mean
The curriculum adequately Faculty	170	3.871	1.2667	.0971
cover the essential skills and Expert	163	4.012	1.1276	.0883
knowledge needed for a career				
in the animation industry				

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
The curriculum adequately	Equal variances assumed	.614	.434	-1.076
	Equal variances not assumed			-1.079
cover the essential skills and				
knowledge needed for a career				
in the animation industry				

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry	Equal variances assumed 331	.282	-.1417
	Equal variances not assumed 329.204	.281	-.1417

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry	Equal variances assumed .1316	-.4006
	Equal variances not assumed .1313	-.4000

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
The curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry	Equal variances assumed .1172	
	Equal variances not assumed .1166	

Interpretation

Faculty mean =3.871,

Expert mean =4.012,

T = -1.076,

P = (.282 and .281) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry'

And from the mean values it can be further being concluded that both are agreed 'curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry' expert are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'there is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'there is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of 'there is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.23: Group statistics of the Animation courses balance theory and hands-on experience.

Group	N	Mean	Std. Deviation	Std. Error Mean
There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	170	3.847	1.2114	.0929
Faculty Expert	163	4.141	1.1160	.0874

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	Equal variances assumed	.237	-2.301
	Equal variances not assumed	.627	-2.305

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	Equal variances assumed	.022	-.2940
	Equal variances not assumed	.022	-.2940

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	Equal variances assumed .1278	-.5454
	Equal variances not assumed .1276	-.5450

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges	Equal variances assumed -.0427	
	Equal variances not assumed -.0431	

Interpretation

Faculty mean =3.847,

Expert mean =4.141,

T = -2.301,

P = (.022 and .022) Since the P value is less than α (0.05) the null hypothesis is rejected and hence it is concluded that Faculty & Expert differ in perception of ‘there is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges’

And from the mean values it can be further being concluded that both are not agreed ‘there is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges’ expert are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘the curriculum prepares students for emerging trends and advancements in the animation industry’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘The curriculum prepares students for emerging trends and advancements in the animation industry’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of ‘The curriculum prepares students for emerging trends and advancements in the animation industry’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.24: Group statistics of the curriculum equips students for emerging animation trends.

Group	N	Mean	Std. Deviation	Std. Error Mean
The curriculum prepares Faculty	170	3.888	1.2938	.0992
students for emerging trends and advancements in the Expert animation industry	162	4.074	1.1825	.0929

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The curriculum prepares Equal variances assumed	.031	.861	-1.364
students for emerging trends and Equal variances not assumed			-1.367
advancements in the animation industry			

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
The curriculum prepares students for emerging trends and advancements in the animation industry	Equal variances assumed	330	.173	-.1858
	Equal variances not assumed	329.432	.173	-.1858

Independent Samples Test

		t-test for Equality of Means	
			95% Confidence Interval of the Difference
			Std. Error Difference
The curriculum prepares students for emerging trends and advancements in the animation industry	Equal variances assumed	.1362	-.4538
	Equal variances not assumed	.1359	-.4532

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
The curriculum prepares students for emerging trends and advancements in the animation industry	Equal variances assumed	.0821
	Equal variances not assumed	.0816

Interpretation

Faculty mean =3.888,

Expert mean =4.074,

T = -1.364,

P = (.173 and .173) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'the curriculum prepares students for emerging trends and advancements in the animation industry'

And from the mean values it can be further being concluded that both are agreed 'the curriculum prepares students for emerging trends and advancements in the animation industry' expert are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'Interaction Design is essential for the future of animation'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'Interaction Design is essential for the future of animation'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of 'Interaction Design is essential for the future of animation'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.25: Group statistics of the interaction design is essential for the future of animation.

Group	N	Mean	Std. Deviation	Std. Error Mean
Interaction Design is essential for the future of animation Faculty	170	3.953	1.1295	.0866
Expert	163	3.865	1.2248	.0959

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Interaction Design is essential for the future of animation	7.148	.008	.681
Equal variances assumed			
Equal variances not assumed			.680

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Interaction Design is essential for the future of animation	331	.496	.0879
Equal variances assumed			
Equal variances not assumed	326.081	.497	.0879

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference Lower
Interaction Design is essential for the future of animation	.1290	-.1659
Equal variances assumed		
Equal variances not assumed	.1293	-.1664

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Interaction Design is essential for the future of animation	Equal variances assumed	.3418
	Equal variances not assumed	.3422

Interpretation

Faculty mean =3.953,

Expert mean =3.865,

T = .681,

P = (.496 and .497) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'interaction design is essential for the future of animation' And from the mean values it can be further being concluded that both are agreed 'interaction design is essential for the future of animation'

Faculty & Expert: differ in perception of 'Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry' [$\mu_1 = \mu_2$]

Alternative hypothesis Faculty& Expert differ in perception of 'Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry'

[$\mu_1 \neq \mu_2$]

Level of significance $\alpha = 0.05$.

Table 4.26: Group statistics of the AR, VR, and AI drive interaction design growth in animation.

Group	N	Mean	Std. Deviation	Std. Error Mean
Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	170	3.953	1.2631	.0969
	161	3.932	1.2996	.1024

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	1.201	.274	.151
			.151

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	329	.880	.0213
	326.747	.880	.0213

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	Equal variances assumed .1409	-.2559
	Equal variances not assumed .1410	-.2561

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.	Equal variances assumed .2984	
	Equal variances not assumed .2986	

Interpretation

Faculty mean =3.953,

Expert mean =3.932,

T = .151,

P = (.880 and .880) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of ‘Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry’ And from the mean values it can be further being concluded that both are agreed ‘Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry’

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘Future animation projects will require students to understand both traditional animation and interaction design’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘future animation projects will require students to understand both traditional animation and interaction design’
[$\mu_1 = \mu_2$]

Alternative hypothesis Faculty& Expert differ in perception of ‘future animation projects will require students to understand both traditional animation and interaction design’ [$\mu_1 \neq \mu_2$]

Level of significance $\alpha = 0.05$.

Table 4.27: Group statistics of the Future animation projects require traditional and interaction design skills.

Group	N	Mean	Std. Deviation	Std. Error Mean
Future animation projects will require students to understand both traditional animation and interaction design.	Faculty 170	3.876	1.3063	.1002
	Expert 163	4.018	1.3075	.1024

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Future animation projects will require students to understand both traditional animation and interaction design.	Equal variances assumed	.686	.408	-.991
	Equal variances not assumed			-.991

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
Future animation projects will require students to understand both traditional animation and interaction design.	Equal variances assumed 331	.323	-.1419
	Equal variances not assumed 330.388	.323	-.1419

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
Future animation projects will require students to understand both traditional animation and interaction design.	Equal variances assumed .1433	-.4238
	Equal variances not assumed .1433	-.4238

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
Future animation projects will require students to understand both traditional animation and interaction design.	Equal variances assumed .1399
	Equal variances not assumed .1399

Interpretation

Faculty mean =3.876,

Expert mean =4.018,

T = -.991,

P = (.323 and .323) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'future animation projects will require students to understand both traditional animation and interaction design' And from the mean values it can be further being concluded that both are agreed 'future animation projects will require students to understand both traditional animation and interaction design' expert are agreed more than the faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps'

[$\mu_1 = \mu_2$]

Alternative hypothesis Faculty& Expert differ in perception of 'Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps'

[$\mu_1 \neq \mu_2$]

Level of significance $\alpha = 0.05$.

Table 4.28: Group statistics of the Interaction design skills open job opportunities in gaming, and animation mobile apps.

Group	N	Mean	Std. Deviation	Std. Error Mean
Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.	170	3.882	1.0760	.0825
	163	3.785	1.3321	.1043

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.	Equal variances assumed	19.102	.000	.733
	Equal variances not assumed			.730

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.	Equal variances assumed	331	.464	.0971
	Equal variances not assumed	311.295	.466	.0971

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.	Equal variances assumed .1324	-.1635
	Equal variances not assumed .1330	-.1647

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.	Equal variances assumed .3576	
	Equal variances not assumed .3588	

Interpretation

Faculty mean =3.882,

Expert mean =3.785,

T = .733,

P = (.464 and .466) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of ‘Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps’

And from the mean values it can be further being concluded that both are agreed ‘students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps’

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘In the future, interaction design will be crucial for creating immersive and engaging animation experiences’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘In the future, interaction design will be crucial for creating immersive and engaging animation experiences’

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of ‘In the future, interaction design will be crucial for creating immersive and engaging animation experiences’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.29: Group statistics of the Interaction design will be key to immersive animation experiences.

Group	N	Mean	Std. Deviation	Std. Error Mean
In the future, interaction design will be crucial for creating immersive and engaging animation experiences. Faculty	170	3.753	1.3046	.1001
Expert	162	3.895	1.2738	.1001

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
In the future, interaction design will be crucial for creating immersive and engaging animation experiences.	.001	.980	-1.004
			-1.004

Independent Samples Test

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
In the future, interaction design will be crucial for creating immersive and engaging animation experiences.	330	.316	-.1421
	329.803	.316	-.1421

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference Lower
In the future, interaction design will be crucial for creating immersive and engaging animation experiences.	.1416	-.4207
	.1415	-.4205

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
In the future, interaction design will be crucial for creating immersive and engaging animation experiences.	Equal variances assumed .1364 Equal variances not assumed .1363

Interpretation

Faculty mean =3.753,

Expert mean =3.895,

T = -1.004,

P = (.316 and .346) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of ‘In the future, interaction design will be crucial for creating immersive and engaging animation experiences’

And from the mean values it can be further being concluded that both are agreed ‘In the future, interaction design will be crucial for creating immersive and engaging animation experiences’

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of ‘The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment’

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of ‘The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment’

[$\mu_1 = \mu_2$]

Alternative hypothesis Faculty& Expert differ in perception of ‘The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment’

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.30: Group statistics of the Demand for interaction design in animation is growing.

Group	N	Mean	Std. Deviation	Std. Error Mean
The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment. Faculty	169	3.769	1.3002	.1000
Expert	163	4.025	1.1965	.0937

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means
	F	Sig.	t
The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment. Equal variances assumed	.456	.500	-1.860
Equal variances not assumed			-1.863

	t-test for Equality of Means		
	df	Sig. (2-tailed)	Mean Difference
The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.	Equal variances assumed 330	.064	-.2553
	Equal variances not assumed 329.279	.063	-.2553

Independent Samples Test

	t-test for Equality of Means	
	Std. Error Difference	95% Confidence Interval of the Difference
		Lower
The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.	Equal variances assumed .1373	-.5253
	Equal variances not assumed .1371	-.5249

Independent Samples Test

	t-test for Equality of Means
	95% Confidence Interval of the Difference
	Upper
29.The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.	Equal variances assumed .0147
	Equal variances not assumed .0143

Interpretation

Faculty mean =3.769,

Expert mean =4.025,

T = -1.860,

P = (.064 and .063) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment'

And from the mean values it can be further being concluded that both are agreed 'The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment' expert are more agreed then faculty.

Group Statistics Faculty and Expert

Faculty & Expert: differ in perception of 'Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry'

Statistical Test –independent sample T Test

Null hypothesis (H0) –Faculty& Expert do not differ in perception of 'Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry'

$$[\mu_1 = \mu_2]$$

Alternative hypothesis Faculty& Expert differ in perception of 'Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry'

$$[\mu_1 \neq \mu_2]$$

Level of significance $\alpha = 0.05$.

Table 4.32: Interaction design skills expand animators' careers beyond studios.

Group	N	Mean	Std. Deviation	Std. Error Mean
Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	Faculty 170	3.900	1.1597	.0889
	Expert 163	4.117	1.1353	.0889

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	Equal variances assumed	.384	.536	-1.721
	Equal variances not assumed			-1.722

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	Equal variances assumed	331	.086	-.2166
	Equal variances not assumed	330.856	.086	-.2166

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
	Std. Error Difference	Lower
Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	Equal variances assumed .1258	-.4641
	Equal variances not assumed .1258	-.4640

Independent Samples Test

	t-test for Equality of Means	
		95% Confidence Interval of the Difference
		Upper
Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.	Equal variances assumed .0310	
	Equal variances not assumed .0308	

Interpretation

Faculty mean =3.900,

Expert mean =4.117,

T = -1.721,

P = (.086 and .086) Since the P value is more than α (0.05) the null hypothesis is accepted and hence it is concluded that Faculty & Expert do not differ in perception of 'Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry'

And from the mean values it can be further being concluded that both are agreed ‘Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry’ expert are more agreed then faculty.

4.4 Descriptive Statistical Test Students Faculty and Expert

Students Faculty and Expert: differ in perception of ‘Interaction Design is essential for the future of animation’

Statistical Test –ANOVA

Null hypothesis (H0) – Students, Faculty and Expert do not differ in perception of ‘Interaction Design is essential for the future of animation’

$$[\mu_1 = \mu_2 = \mu_3]$$

Alternative hypothesis (H1) Students, Faculty and Expert differs in perception of ‘Interaction Design is essential for the future of animation’

$$[\mu_1 \neq \mu_2 \neq \mu_3]$$

Level of significance $\alpha = 0.05$.

Table 4.33: Descriptive statistics Interaction Design is essential for the future of animation.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Student	285	4.119	.9999	.0592	4.003	4.236
Faculty	170	3.953	1.1295	.0866	3.782	4.124
Expert	163	3.865	1.2248	.0959	3.676	4.054
Total	618	4.006	1.1025	.0443	3.919	4.094

Descriptive

Interaction Design is essential for the future of animation

	Minimum	Maximum
Student	1.0	5.0
Faculty	1.0	5.0
Expert	1.0	5.0
Total	1.0	5.0

ANOVA

Interaction Design is essential for the future of animation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.376	2	3.688	3.054	.048
Within Groups	742.598	615	1.207		
Total	749.974	617			

Means Plots

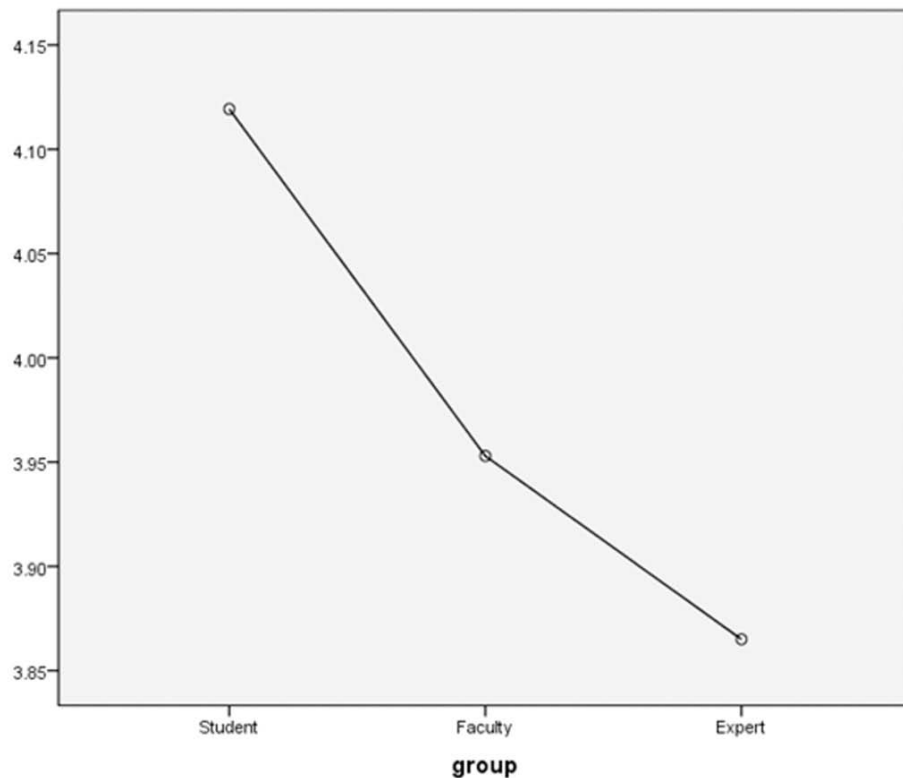


Figure 4.8: Interaction Design is essential for the future of animation

Interpretation

Since the P value (.048) is here the α (0.05) the null hypothesis is rejected hence it is concluded that Students faculty & Expert differ in perception of 'Interaction Design is essential for the future of animation'

Further from the mean values it can be concluded there are a gap in Student, faculty & Expert 'Interaction Design is essential for the future of animation'

Student's mean = 4.119

Faculty mean = 3.953

Expert mean = 3.865

Students give more weightage than the faculty and expert to 'Interaction Design is essential for the future of animation'

Descriptive Statistical Test Students Faculty and Expert

Students Faculty and Expert: differ in perception of ‘the curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry’

Statistical Test –ANOVA

Null hypothesis (H0) – Students Faculty & Expert do not differ in perception of ‘the curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry’

$$[\mu_1 = \mu_2 = \mu_3]$$

Alternative hypothesis (H1) Students Faculty & Expert differ in perception of ‘the curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry’

$$[\mu_1 \neq \mu_2 \neq \mu_3]$$

Level of significance $\alpha = 0.05$.

Table 4.33: Animation programs should include interaction design for skilled animators.

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Student	285	4.196	.9912	.0587	4.081	4.312
Faculty	170	3.994	1.2138	.0931	3.810	4.178
Expert	163	4.166	1.1454	.0897	3.988	4.343
Total	618	4.133	1.0989	.0442	4.046	4.219

Descriptive

The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry.

	Minimum	Maximum
Student	1.0	5.0
Faculty	1.0	5.0
Expert	1.0	5.0
Total	1.0	5.0

ANOVA

The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.602	2	2.301	1.911	.149
Within Groups	740.518	615	1.204		
Total	745.120	617			

Means Plots

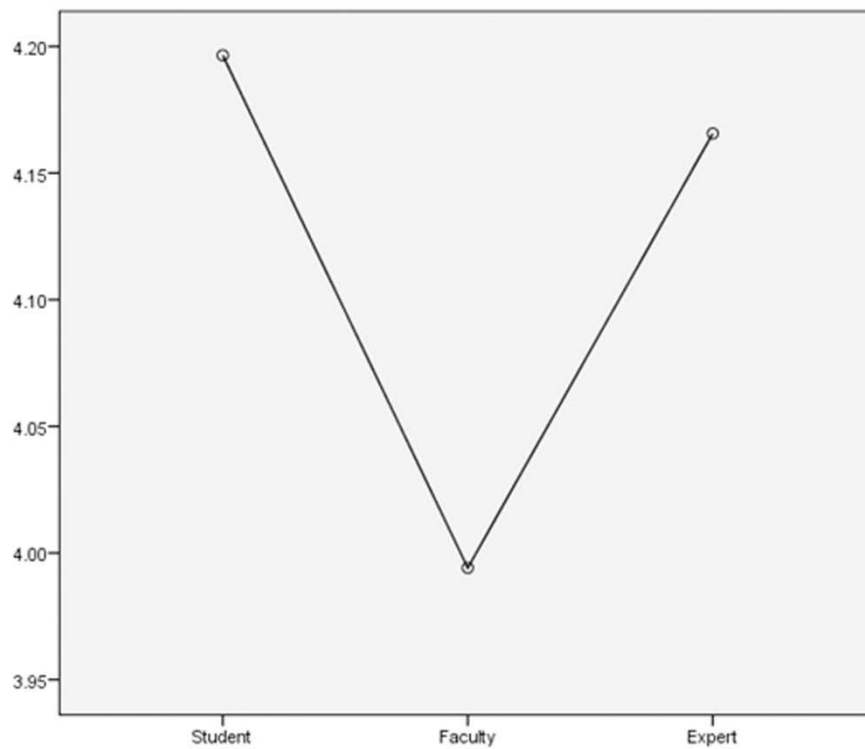


Figure 4.9: The curriculum of Animation programs.

Interpretation

Since the P value (0.149) is here the α (0.05) the null hypothesis is accepted hence there is no gap Students faculty & Expert perception of 'the curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry'

Student's mean = 4.199

Faculty mean = 3.994

Expert mean = 4.166

Faculty gives more weightage to 'the curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry'

4.4.1 Following features are Interaction design please rate them in the order of importance's

Student, Faculty & expert were asked to rank the following features of Interaction Design in the order of importance.

A: User Control and Freedom

B: Feedback

C: Consistency and Standards

D: Simplicity and Minimalism

E: Flexibility and Efficiency of User

Students Mean Rank: For students, the most important future of interaction design is consistency and standard, followed by feedback, use controller freedom, flexibility, efficiency of user simplicity, and minimalism.

First rank -Consistency and Standards 3.10

Second rank – Feedback 3.09

Third rank - User Control and Freedom 3.06

Forth rank - Flexibility and Efficiency of User 2.88

Fifth rank - Simplicity and Minimalism 2.86

Faculty Mean Rank: For faculty, the most important future of interaction design is consistency and standard, followed by feedback, use controller freedom, flexibility, efficiency of user simplicity, and minimalism.

First rank - Flexibility and Efficiency of User **3.14**

Second rank – User Control and Freedom **3.13**

Third rank - Simplicity and Minimalism **3.12**

Forth rank - Feedback 2.99

Fifth rank - Consistency and Standards 2.63

Since the rank order for faculty is consistency and standard

Expert Mean Rank: For expert, the most important future of interaction design is consistency and standard, followed by feedback, use controller freedom, flexibility, efficiency of user simplicity, and minimalism.

First rank - Flexibility and Efficiency of User **3.59**

Second rank – Simplicity and Minimalism **3.59**

Third rank - Consistency and Standards **2.76**

Forth rank - Feedback **2.58**

Fifth rank - Flexibility and Efficiency of User **2.57**

Table 4.34: Expert Mean Rank:

Group		Mean Rank
Student	A: User Control and Freedom	3.06
	B: Feedback	3.09
	C: Consistency and Standards	3.10
	D: Simplicity and Minimalism	2.86
	E: Flexibility and Efficiency of User	2.88
Faculty	A: User Control and Freedom	3.13
	B: Feedback	2.99
	C: Consistency and Standards	2.63
	D: Simplicity and Minimalism	3.12
	E: Flexibility and Efficiency of Use	3.14
Expert	A: User Control and Freedom	2.57
	B: Feedback	2.58
	C: Consistency and Standards	2.76
	D: Simplicity and Minimalism	3.49
	E: Flexibility and Efficiency of Use	3.59

4.4.2 Following features are career opportunities for Interaction design

Table 4.35: Career opportunities and I'll select the appropriate ones for interaction design.

Group			Frequency	Percent	Valid Percent	Cumulative Percent
Student	Valid	Animation	44	15.4	15.4	15.4
		Web design	21	7.4	7.4	22.8
		Graphic design	63	22.1	22.1	44.9
		UI design	66	23.2	23.2	68.1
		Interaction design	91	31.9	31.9	100.0
		Total	285	100.0	100.0	
Faculty	Valid	Animation	24	14.1	14.1	14.1
		Web design	22	12.9	12.9	27.1
		Graphic design	26	15.3	15.3	42.4
		UI design	45	26.5	26.5	68.8
		Interaction design	53	31.2	31.2	100.0
		Total	170	100.0	100.0	
Expert	Valid	Animation	26	16.0	16.0	16.0
		Web design	12	7.4	7.4	23.3
		Graphic design	13	8.0	8.0	31.3
		UI design	53	32.5	32.5	63.8
		Interaction design	59	36.2	36.2	100.0
		Total	163	100.0	100.0	

Student Bar Chart

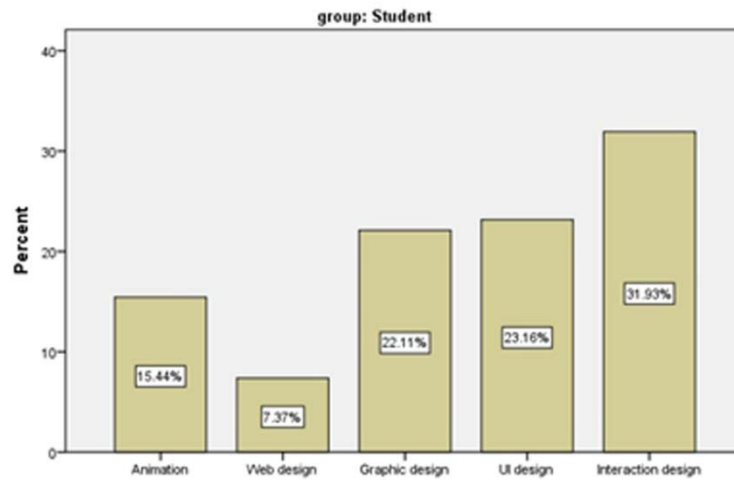


Figure 4.10: Student Bar Chart career opportunities for Interaction design Student.

From above table since that 31.93 percent of the students have opinion that interaction design has more career opportunities other than UI design, Graphic Design, Web Design and Animation.

Faculty Bar Chart

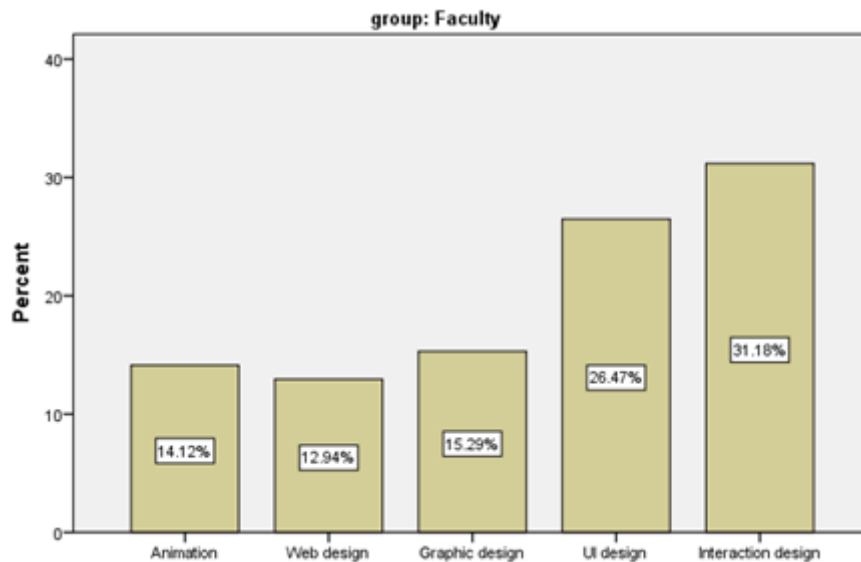


Figure 4.11: Faculty bar Chart is the career opportunities for Interaction design faculty.

On above table since that 31.18 percent of the faculty has opinion that interaction design has more career opportunities other than UI design, Graphic Design, Web Design and Animation.

Expert Bar Chart

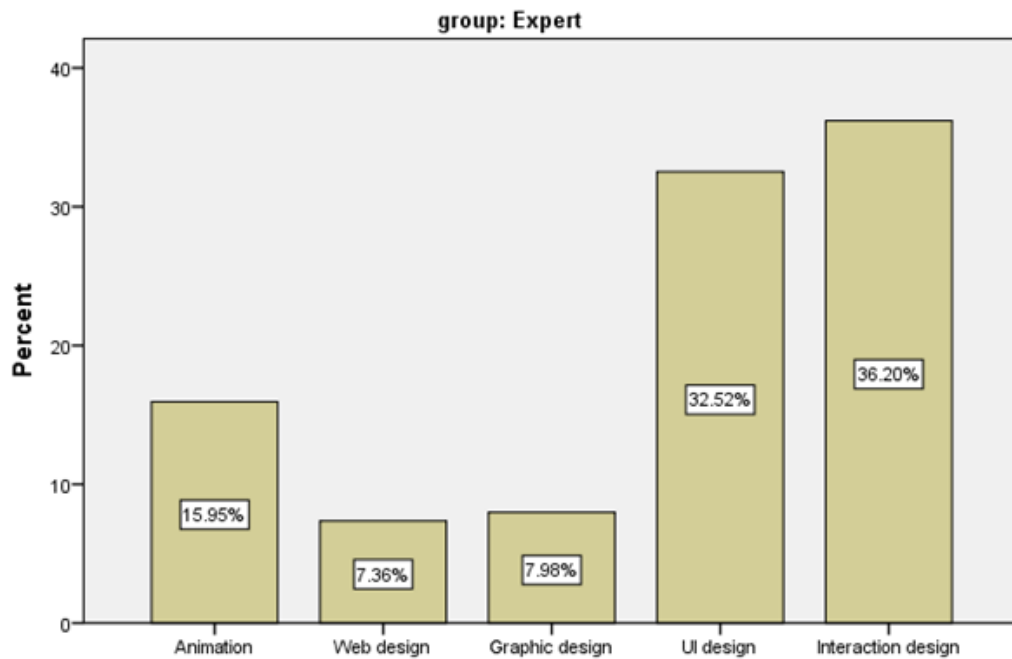


Figure 4.12: Expert bar carat is the career opportunities for Interaction design expert.

From above table since that 36.20 percent of the expert has opinion that interaction design has more career opportunities other than UI design, Graphic Design, Web Design and Animation.

Frequency distribution and descriptive statistics Data analysis

Frequency distribution and descriptive statistics for 'Interaction design will be a core component of animation production in the next five years' experts were asked to comment on whether 'Interaction design will be a core component of animation production in the next five years'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.36: Interaction design will be vital in animation production within five years.

		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly disagree	11	6.7	3.9506	1.30361
	Disagree	22	13.5		
	Neither agree or disagree	9	5.5		
	Agree	42	25.8		
	Strongly agree	78	47.9		
	Total	162	99.4		
Missing	System	1	.6		
Total		163	100.0		

From the above frequency distribution it can be seen that 6.7 percent expert strongly disagree,

That 'Interaction design will be a core component of animation production in the next five years'

13.5 percent disagree,

5.5 percent neither agrees nor disagree,

And 47.9 percent strongly agree

73.7 percent of that responds are in agreement that

'Interaction design will be a core component of animation production in the next five years'

Mean = 3.95

Std. Deviation = 1.303

From the mean value, it can be interpreted that most experts AGREE

‘Interaction design will be a core component of animation production in the next five years’

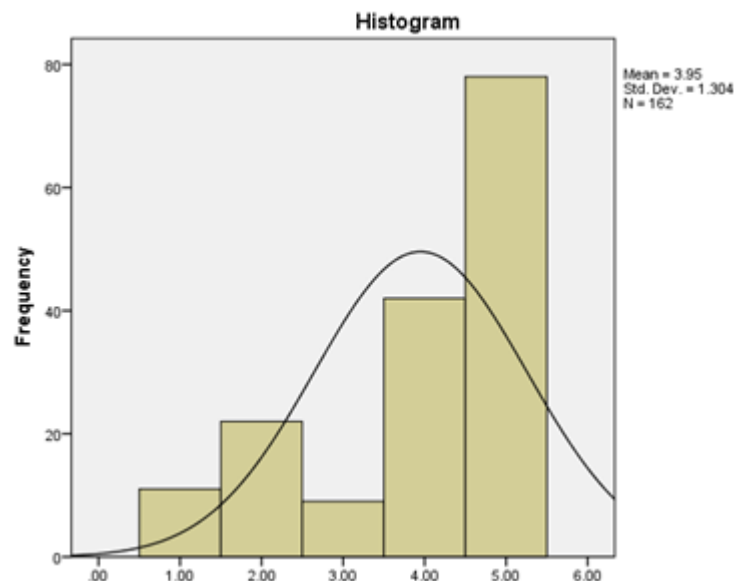


Figure 4.13: Interaction design will be essential in animation production soon.

Frequency distribution and descriptive statistics Data analysis

Frequency distribution and descriptive statistics for ‘The demand for animators with interaction design skills will increase in near future’ experts were asked to comment on whether ‘Interaction design will be a core component of animation production in the next five years’

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.37: Demand for animators with interaction design skills will rise soon.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	11	6.7		
Disagree	19	11.7		
Neither agree or disagree	11	6.7	4.0000	1.28620
Agree	40	24.5		
Strongly agree	82	50.3		
Total	163	100.0		

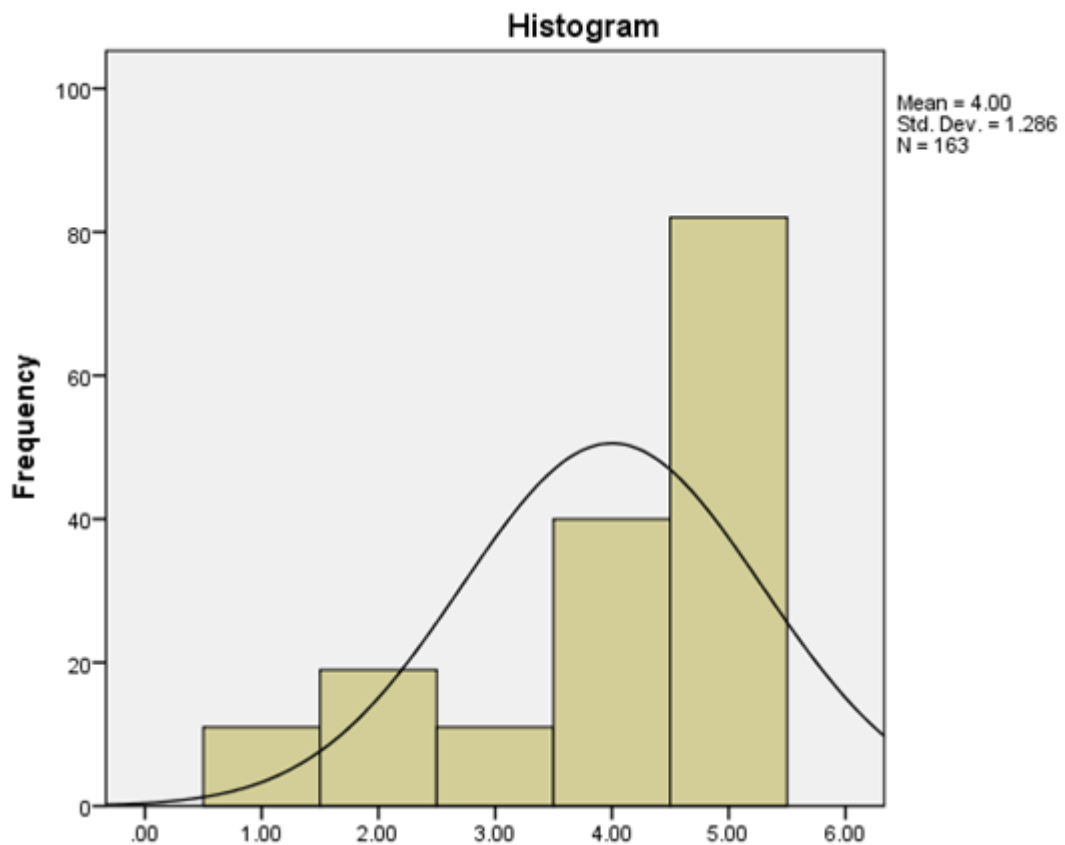


Figure 4.14: The demand for animators with interaction design skills will increase in near future.

From the above frequency distribution it can be seen that 6.7 percent expert strongly disagree,

That 'The demand for animators with interaction design skills will increase in near future'

11.7 percent disagree,

6.7 percent neither agrees nor disagree,

And 50.3 strongly agree

74.8 percent of that responds are in agreement that

'The demand for animators with interaction design skills will increase in near future'

Mean = 4.0

Std. Deviation = 1.286

From the mean value, it can be interpreted that most experts AGREE

'The demand for animators with interaction design skills will increase shortly'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'In the future, a collaboration between animators and interaction designers will be a standard practice with context to industry' expert to comment on wither 'In the future, the collaboration between animators and interaction designers will be a standard practice with context to industry'

5= strongly agree

4= Agree were asked

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.38: Statistics of the Future animation will standardize collaboration with interaction designers.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	9	5.5	4.0429	1.23403
Disagree	19	11.7		
Neither agree or disagree	9	5.5		
Agree	45	27.6		
Strongly agree	81	49.7		
Total	163	100.0		

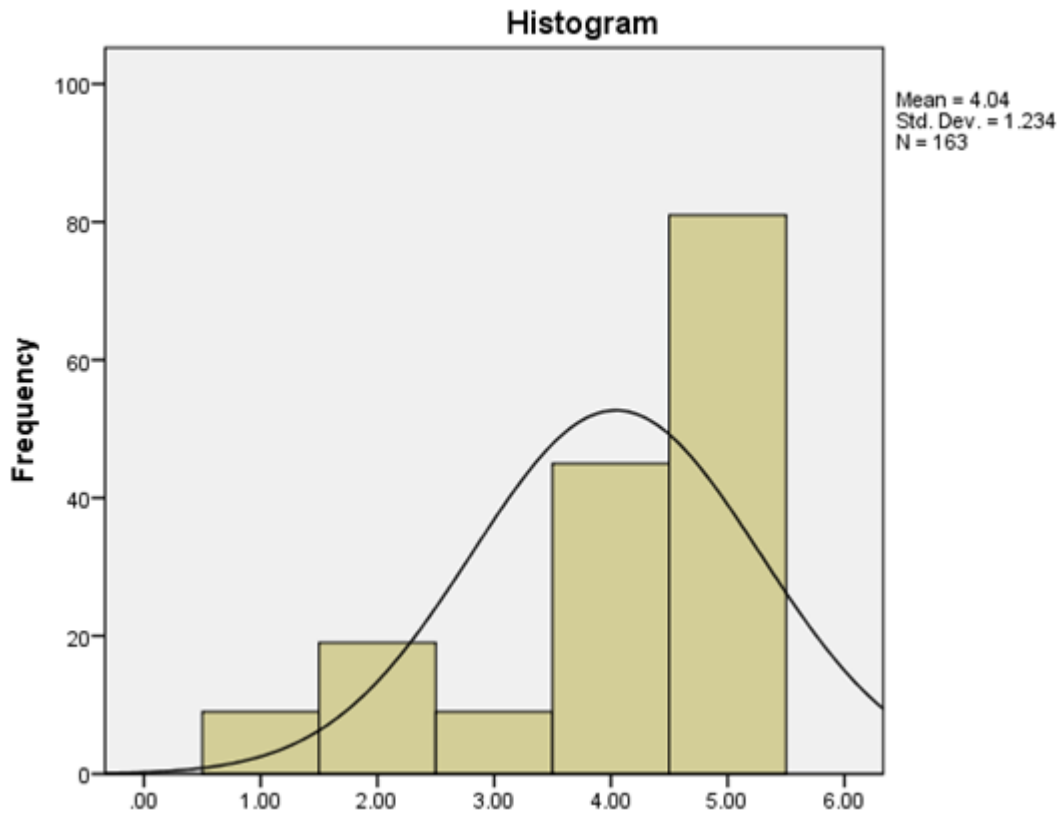


Figure 4.15: Future industry standards will require animators to collaborate with interaction designers.

From the above frequency distribution it can be seen that 5.5 percent expert strongly disagree,

That 'In the future, collaboration between animators and interaction designers will be a standard practice with context to industry'

11.7 percent disagree,

5.5 percent neither agree nor disagree,

And 49.7 strongly agree

83.6 percent of that responds are in agreement that

'In the future, collaboration between animators and interaction designers will be a standard practice with context to industry'

Mean = 4.04

Std. Deviation = 1.234

From the mean value, it can be interpreted that most experts AGREE

'In the future, collaboration between animators and interaction designers will be a standard practice with context to industry'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices' experts were asked to comment on whether 'The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.39: Statistics of the animation industry must adopt interaction design to keep up with technology.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	9	5.5		
Disagree	19	11.7		
Neither agree or disagree	11	6.7		
Agree	48	29.4	3.9938	1.22853
Strongly agree	75	46.0		
Total	162	99.4		
Missin System	1	.6		
Total	163	100.0		

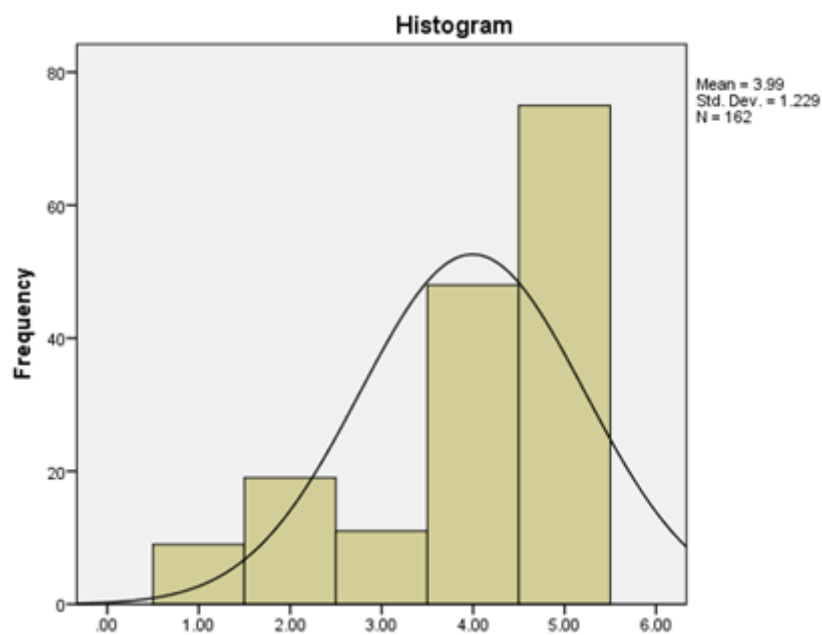


Figure 4.16: The animation industry must adopt interaction design to stay competitive.

From the above frequency distribution it can be seen that 5.5 percent expert strongly disagree
That 'The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices'

11.7 percent disagree,

6.7 percent neither agree nor disagree,

And 46.0 strongly agree

75.4 percent of that responds are in agreement that

'The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices'

Mean = 3.99

Std. Deviation = 1.228

From the mean value, it can be interpreted that most experts AGREE

'The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'Interaction design will become equally important as traditional animation program for students entering the animation industry' experts were asked to comment on whether 'Interaction design will become equally important as traditional animation program for students entering the animation industry'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.40: Statistics of the Interaction design will be as important as traditional animation for students.

		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly disagree	12	7.4	3.8457	1.29773
	Disagree	22	13.5		
	Neither agree or disagree	12	7.4		
	Agree	49	30.1		
	Strongly agree	67	41.1		
	Total	162	99.4		
Missing	System	1	.6		
Total		163	100.0		

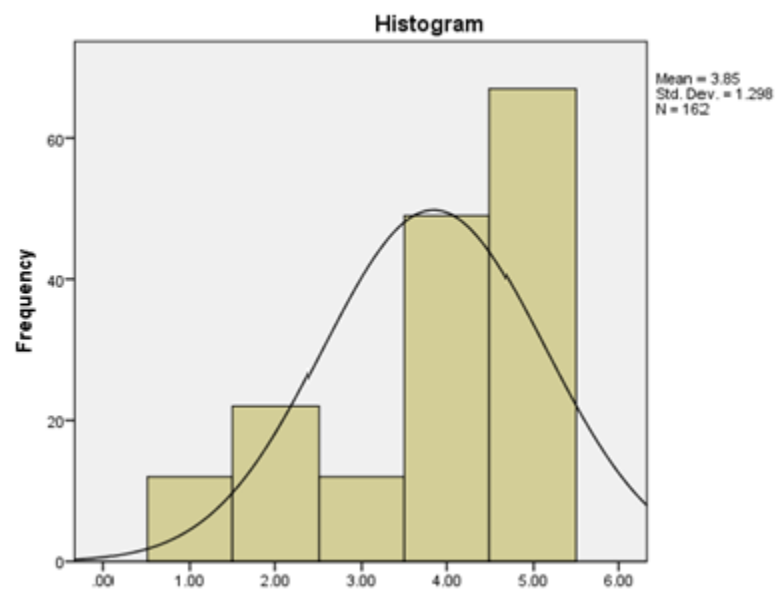


Figure 4.17: Interaction design will be as vital as traditional animation for students.

From the above frequency distribution it can be seen that 7.4 percent expert strongly disagree,

That 'Interaction design will become equally important as traditional animation program for students entering the animation industry'

13.5 percent disagree,

7.4 percent neither agree nor disagree,

And 41.1 strongly agree

71.2 percent of that responds are in agreement that

'Interaction design will become equally important as traditional animation program for students entering the animation industry'

Mean = 3.84

Std. Deviation = 1.297

From the mean value, it can be further interpreted that most of the expert AGREE

'Interaction design will become equally important as traditional animation program for students entering the animation industry'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry' experts were asked to comment on whether 'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.41: Teaching interaction design with animation enhances career opportunities.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	6	3.7	3.9939	1.17325
Disagree	21	12.9		
Neither agree nor disagree	13	8.0		
Agree	51	31.3		
Strongly agree	72	44.2		
Total	163	100.0		

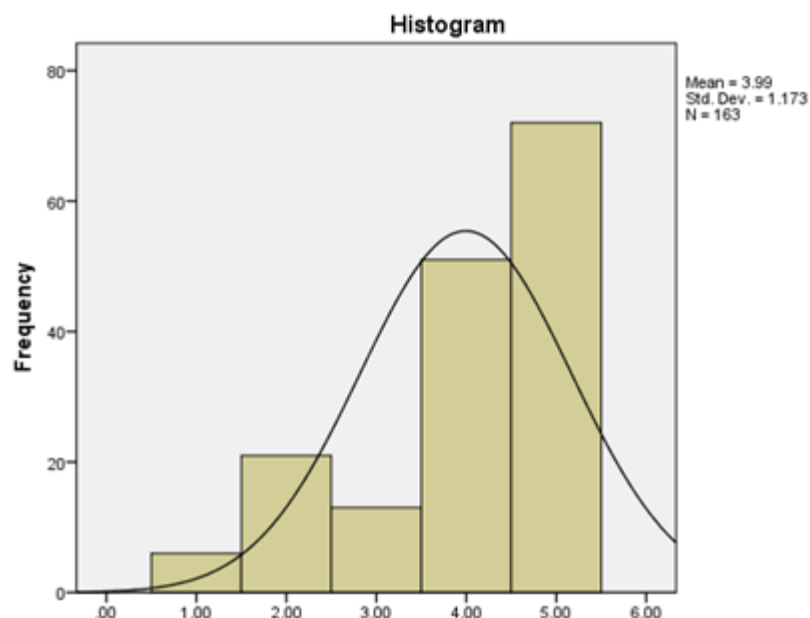


Figure 4.18: Integrating interaction design with animation boosts students' career prospects.

From the above frequency distribution it can be seen that 3.7 percent expert strongly disagree

That 'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

12.9 percent disagree,

8.0 percent neither agrees nor disagree,

And 44.2 strongly agree

75.5 percent of that responds are in agreement that

'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

Mean = 3.99

Std. Deviation = 1.173

From the mean value, it can be further interpreted that most of the expert AGREE

'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects' experts were asked to comment on whether 'Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects'

5= strongly agree

4= Agree

3= neither agree nor disagree

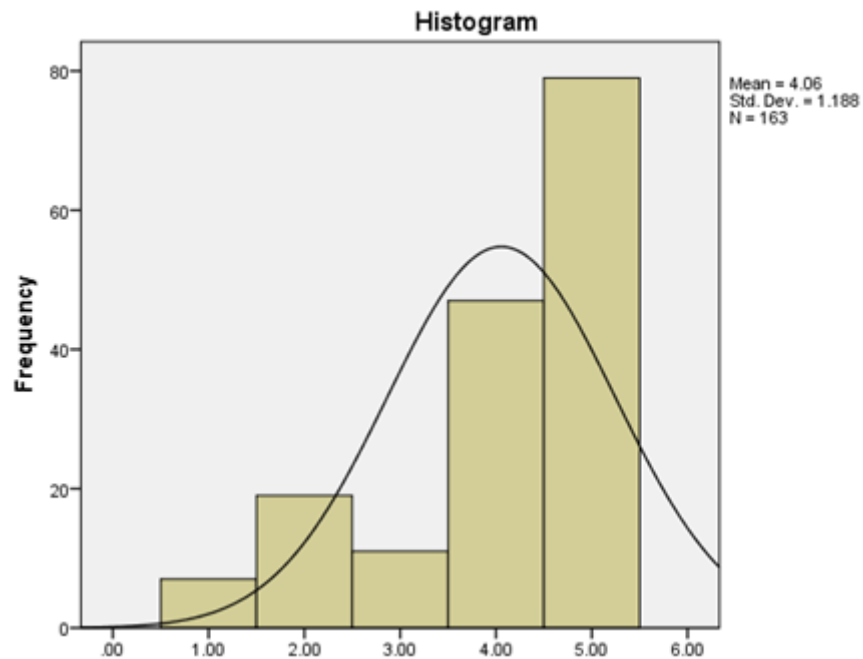
2= Disagree

1= strongly disagree

Statistics

Table 4.42: Animators with interaction design skills will access top projects.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	7	4.3	4.0552	1.18765
Disagree	19	11.7		
Neither agree or disagree	11	6.7		
Agree	47	28.8		
Strongly agree	79	48.5		
Total	163	100.0		


Figure 4.19: Animators with creative and technical interaction design skills secure top projects.

From the above frequency distribution it can be seen that 4.3 percent expert strongly disagree,

That ‘Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects’

11.7 percent disagree,

6.7 percent neither agrees nor disagree,

And 48.5 strongly agree

77.3 percent of that responds are in agreement that

‘Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects’

Mean = 4.05

Std. Deviation = 1.187

From the mean value it can be further be interpreted that most of the expert AGREE

‘Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects’

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for ‘Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design’ experts were asked to comment on whether ‘Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design’

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Table 4.43: Statistics of the Animation employers will expect UI/UX design experience from animators.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	6	3.7	4.0675	1.15539
Disagree	18	11.0		
Neither agree or disagree	13	8.0		
Agree	48	29.4		
Strongly agree	78	47.9		
Total	163	100.0		

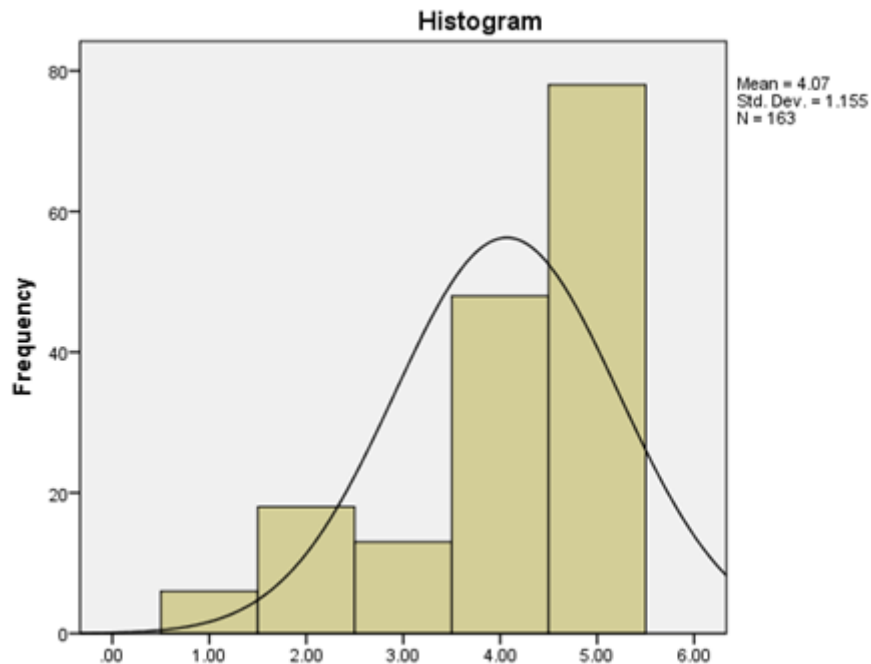


Figure 4.20: Animation employers will soon expect UI/UX experience.

From the above frequency distribution it can be seen that 3.7 percent expert strongly disagree,

That 'Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design'

11.0 percent disagree,

8.0 percent neither agrees nor disagree,

And 47.9 strongly agree

77.3 percent of that responds are in agreement that

'Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design'

Mean = 4.06

Std. Deviation = 1.155

From the mean value it can be further be interpreted that most of the expert AGREE

'Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design'

Frequency distribution and descriptive statistics Data analysis for experts

Frequency distribution and descriptive statistics for 'Interaction design skills will allow animators to take on leadership roles in interactive media projects' experts were asked to comment on whether 'Interaction design skills will allow animators to take on leadership roles in interactive media projects'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.44: Statistics of the Interaction design skills enable animators to lead interactive media projects.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	10	6.1	3.8589	1.27113
Disagree	22	13.5		
Neither agree or disagree	18	11.0		
Agree	44	27.0		
Strongly agree	69	42.3		
Total	163	100.0		

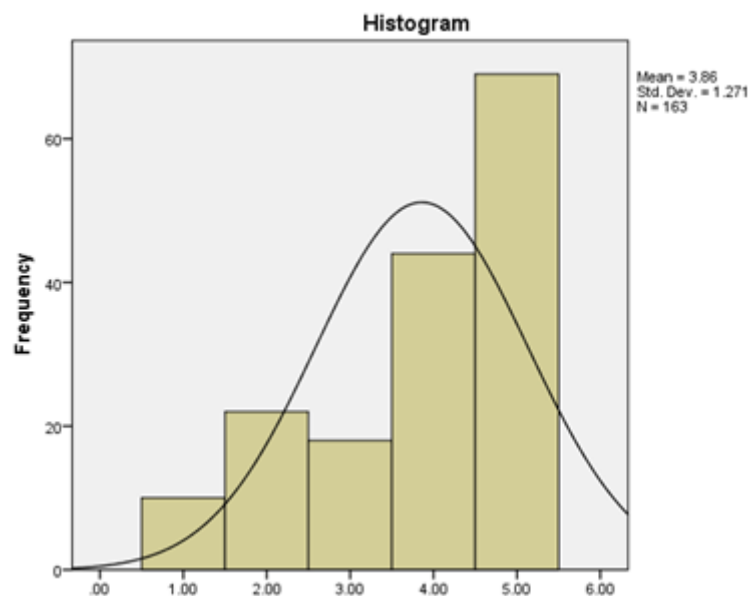


Figure 4.21: Interaction design skills help animator's lead interactive projects.

From the above frequency distribution it can be seen that 6.1 percent expert strongly disagree,

That 'Interaction design skills will allow animators to take on leadership roles in interactive media projects'

13.5 percent disagree,

11.0 percent neither agrees nor disagree,

And 42.3 strongly agree

69.3 percent of that responds are in agreement that

'Interaction design skills will allow animators to take on leadership roles in interactive media projects'

Mean = 3.85

Std. Deviation = 1.175

From the mean value it can be further be interpreted that most of the expert AGREE

'Interaction design skills will allow animators to take on leadership roles in interactive media projects'

Frequency distribution and descriptive statistics Data analysis for Faculty

Frequency distribution and descriptive statistics for 'the curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry' faculty were asked to comment on whether the curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry

5= strongly agree

4= Agree

3= neither agree nor disagree

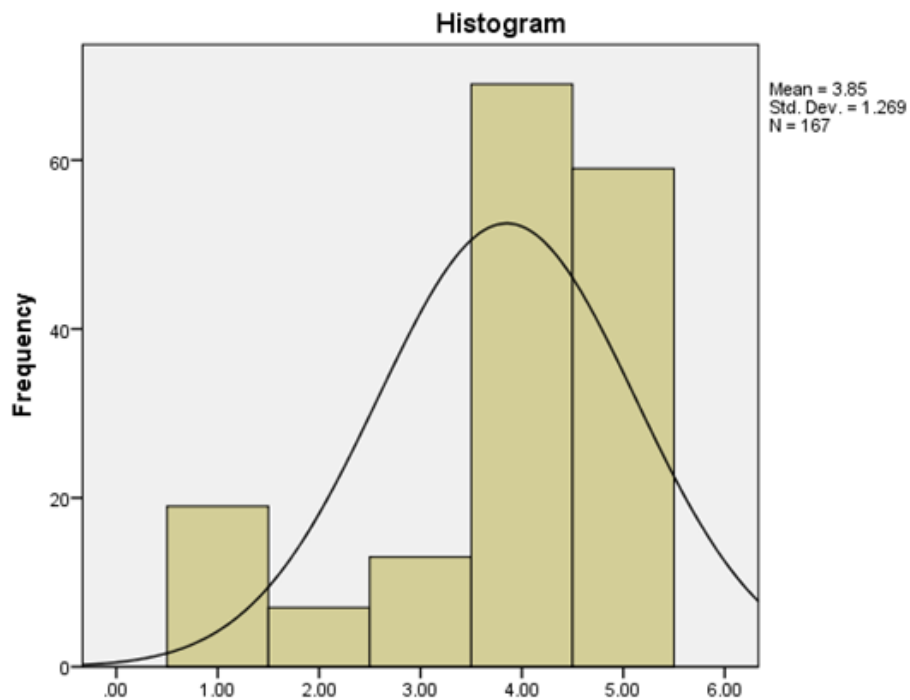
2= Disagree

1= strongly disagree

Statistics

Table 4.45: Statistics of The curriculum covers essential skills for an animation career.

		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly disagree	19	11.2	3.8503	1.26885
	Disagree	7	4.1		
	Neither agree or disagree	13	7.6		
	Agree	69	40.6		
	Strongly agree	59	34.7		
	Total	167	98.2		
Missing	System	3	1.8		
Total		170	100.0		


Figure 4.22: The curriculum covers key animation industry skills.

From the above frequency distribution it can be seen that 11.2 percent expert strongly disagree,

That 'the curriculums adequately cover the essential skills and knowledge needed for a career in the animation industry'

4.1 percent disagree,

7.6 percent neither agree nor disagree,

And 34.7 strongly agree

75.1 percent of that responds are in agreement that

'The curriculums adequately cover the essential skills and knowledge needed for a career in the animation industry'

Mean = 3.85

Std. Deviation = 1.268

From the mean value it can be further be interpreted that most of the faculty AGREE

'The curriculums adequately cover the essential skills and knowledge needed for a career in the animation industry'

Frequency distribution and descriptive statistics Data analysis for Faculty

Frequency distribution and descriptive statistics for 'Students need to pursue additional training or education in interaction design based on the perceived industry demand' faculty were asked to comment on whether the 'Students need to pursue additional training or education in interaction design based on the perceived industry demand'

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

1= strongly disagree

Statistics

Table 4.46: Students should train in interaction design to meet industry demand.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	16	9.4	3.8412	1.23248
Disagree	13	7.6		
Neither agree nor disagree	9	5.3		
Agree	76	44.7		
Strongly agree	56	32.9		
Total	170	100.0		

Table: 00

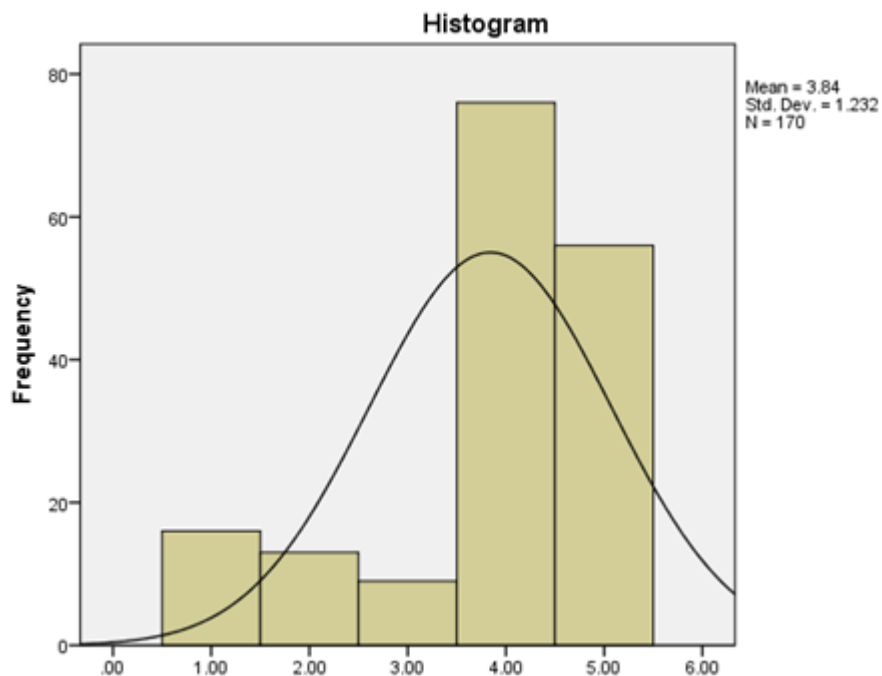


Figure 4.23: Students should pursue extra training in interaction design.

From the above frequency distribution it can be seen that 9.4 percent of experts strongly disagree,

That ‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

7.6 percent disagree,

5.3 percent neither agrees nor disagree,

And 32.9 strongly agree

77.6 percent of that responds are in agreement that

‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

Mean = 3.84

Std. Deviation = 1.232

From the mean value it can be further be interpreted that most of the faculty AGREE

‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

Frequency distribution and descriptive statistics Data analysis for Faculty

Frequency distribution and descriptive statistics for ‘interaction design is important in shaping the success of animations and user experiences in the animation industry’ faculty were asked to comment on whether the ‘interaction design is important in shaping the success of animations and user experiences in the animation industry’

5= strongly agree

4= Agree

3= neither agree nor disagree

2= Disagree

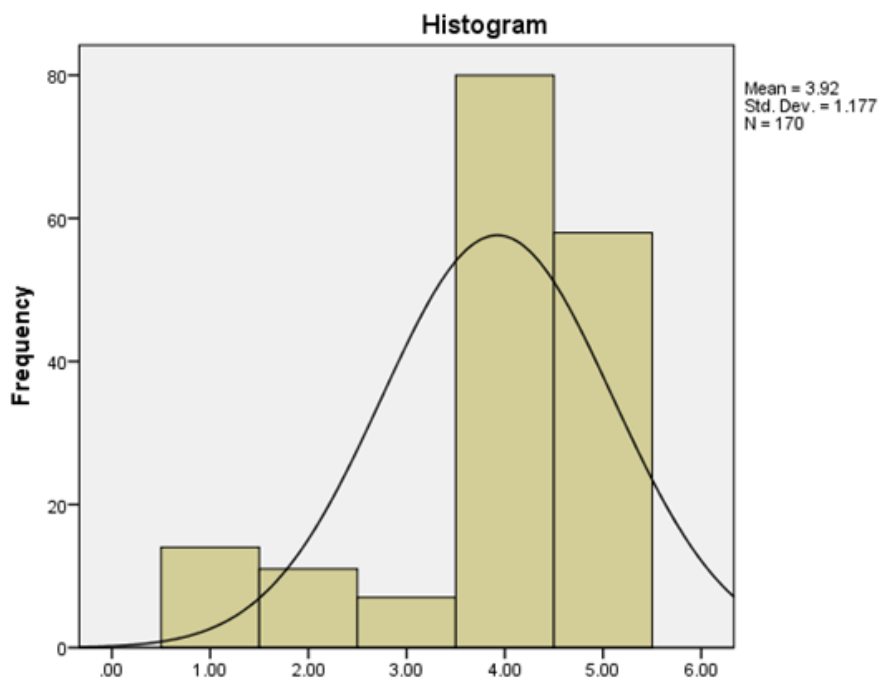
1= strongly disagree

Statistics

Table 4.47: Interaction design is crucial for animations and UX.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	14	8.2	3.9235	1.17671
Disagree	11	6.5		
Neither agree nor disagree	7	4.1		
Agree	80	47.1		
Strongly agree	58	34.1		
Total	170	100.0		

Table: 00

**Figure 4.24: Interaction design shapes animation and UX success.**

From the above frequency distribution it can be seen that 8.2 percent expert strongly disagree,

That ‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

6.5 percent disagree,

4.1 percent neither agrees nor disagree,

And 34.1 strongly agree

81.2 percent of that responds are in agreement that

‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

Mean = 3.92

Std. Deviation = 1.176

From the mean value it can be further be interpreted that most of the faculty AGREE

‘Students need to pursue additional training or education in interaction design based on the perceived industry demand’

Frequency distribution and descriptive statistics data analysis for faculty

Frequency distribution and descriptive statistics for ‘Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry’ faculty were asked to comment on whether the ‘Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry’ 5= strongly agree

4= Agree

3= neither agree nor disagree

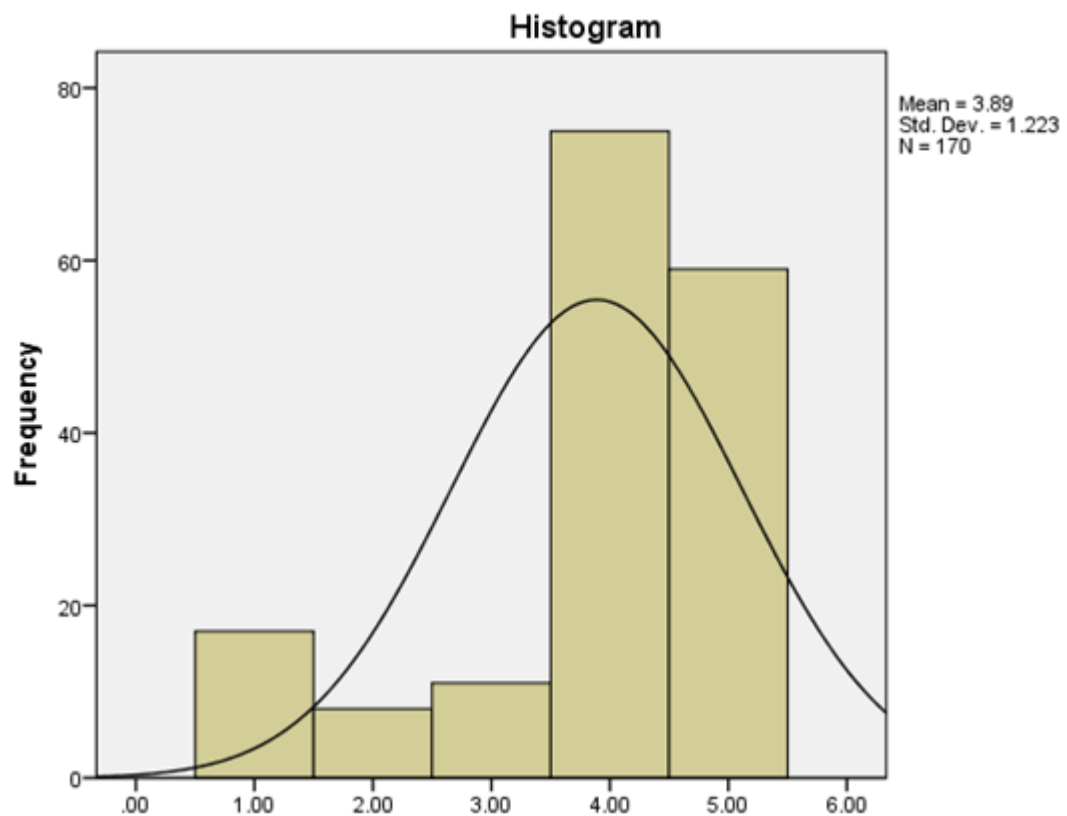
2= Disagree

1= strongly disagree

Statistics

Table 4.48: Teaching interaction design with animation boosts careers.

	Frequency	Percent	Mean	Std. Deviation
Valid Strongly disagree	17	10.0	3.8882	1.22324
Disagree	8	4.7		
Neither agree nor disagree	11	6.5		
Agree	75	44.1		
Strongly agree	59	34.7		
Total	170	100.0		


Figure 4.25: Teaching interaction design with animation expands career opportunities.

From the above frequency distribution it can be seen that 10.0 percent expert strongly disagree,

That 'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

4.7 percent disagree,

6.5 percent neither agrees nor disagree,

And 34.7 strongly agree

78.8 percent of that responds are in agreement that

'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

Mean = 3.88

Std. Deviation = 1.223

From the mean value it can be further be interpreted that most of the faculty AGREE

'Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry'

Frequency distribution and descriptive statistics data analysis for faculty

Frequency distribution and descriptive statistics for 'Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover' faculty were asked to comment on whether the 'Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover'

5= strongly agree

4= Agree

3= neither agree nor disagree

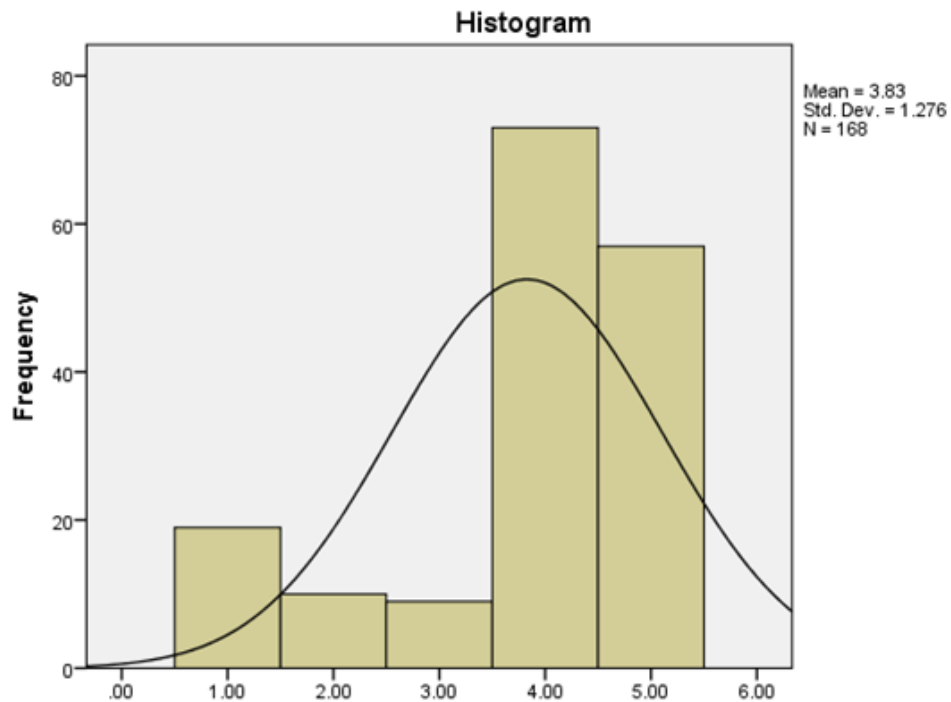
2= Disagree

1= strongly disagree

Statistics

Table 4.49: Industry collaboration with interaction designers drives animation growth.

		Frequency	Percent	Mean	Std. Deviation
Valid	Strongly disagree	19	11.2	3.8274	1.27621
	Disagree	10	5.9		
	Neither agree nor disagree	9	5.3		
	Agree	73	42.9		
	Strongly agree	57	33.5		
	Total	168	98.8		
Missing	System	2	1.2		
Total		170	100.0		


Figure 4.26: Collaboration with interaction designers fuels animation innovation and growth.

From the above frequency distribution it can be seen that 11.2 percent expert strongly disagree,

That 'Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover'

5.9 percent disagree,

5.3 percent neither agree nor disagree,

And 33.5 strongly agree

76.4 percent of that responds are in agreement that

'Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover'

Mean = 3.82

Std. Deviation = 1.276

From the mean value it can be further be interpreted that most of the faculty AGREE

'Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in company's turnover'

4.5: Statistical Test Path Analysis

A statistical method to examine and test relationships between a set of variables it focuses on understanding causal relationships between variables.

It's a way to visualize and quantify these relationships.

Path analysis is a minor version of structural equation modeling (seam and an extension of multiple regression analysis).

Path analysis is a statistical method for studying the relationships between multiple variables simultaneously. It can examine both direct and indirect relationships. It is often estimated using ordinary least squares (OLS) regression or maximum likelihood techniques.

4.5.1 Assessing the model fit includes three steps

- a) Comparing the hypothetical model with sample data (absolute fit)
- b) Comparing the actual model with null model (comparative fit)
- c) Country for interrelated fit (parsimonious fit)

Table 4.50: Five fit indices (CMIN/DF, CFI, GFI, PNFI, and RMSEA)

Fit indices	Observed	Criteria of acceptable fit	Result
CMIN/DF (Minimum discrepancy as indexed chi-square) Wheaton et al, 1997	3.676	Less than 5	Good fit
CFI (Comparative fit index) Bentler, 1990	0.941	More than 0.9 for good fit, between 0.9 to 0.8 for borderline fit	Good fit
GFI (Goodness of fit index)	0.963	More than 0.9	Good fit
PNFI (Parsimonious Normal fit) Mulaik et al 1989	0.359	More than 0.5	Marginally missed
RMSEA (Root Mean Square error of approximation) Browne and Cudeck, 1993	0.092	Less than 0.08 for adequate fit, between 0.08 and less than 0.1 for borderline fit	Good fit

CMIN/DF (Minimum Discrepancy as Indexed by Degrees of Freedom)

The **CMIN/DF** (Minimum Discrepancy as Indexed by Degrees of Freedom), also known as the **chi-square goodness-of-fit index**, is a model fit statistic used in structural equation modeling (SEM). It was discussed by Wheaton et al. (1997) as a way to assess how well a model fits the data.

Key Points of CMIN/DF:

Chi-Square Statistic (CMIN): Measures the discrepancy between the observed data and the model's predicted values. A smaller chi-square value indicates a better fit.

Degrees of Freedom (DF): Represents the number of independent pieces of information available to estimate parameters in the model. It is calculated as the difference between the number of observed variables and the number of estimated parameters.

CMIN/DF Ratio: The ratio of the chi-square statistic (CMIN) to the degrees of freedom (DF) is used to evaluate model fit.

A **lower CMIN/DF** ratio indicates better model fit.

The generally accepted threshold for a good fit is a ratio ≤ 3 (some suggest a value of ≤ 5 may still be acceptable depending on the context).

Interpretation: The CMIN/DF is used as an indicator of whether the model adequately fits the data. The smaller the ratio, the better the model is said to fit the observed data relative to its complexity (degrees of freedom).

In short, the **CMIN/DF** is a critical index to evaluate how well a structural model fits the data while considering the model's complexity.

CFI (Comparative fit index)

The **CFI (Comparative Fit Index)** is a widely used **fit index** in **Structural Equation Modeling (SEM)** that evaluates how well a model fits the data compared to a baseline model, typically the null model (which assumes no relationships between variables).

Key Points of CFI:

Range: The CFI value ranges from **0 to 1**, with **1 indicating perfect fit**.

Values ≥ 0.90 are generally considered acceptable, with values ≥ 0.95 indicating a good fit.

Interpretation: It compares the **fit of the target model** with the fit of a **null model** (no relationships between variables).

A **higher CFI** means the model explains the data better than the null model.

The CFI accounts for model complexity, so it penalizes overly complex models to avoid over fitting.

Strengths: Unlike the chi-square-based measures, CFI is not sensitive to sample size, making it reliable even with large datasets.

In short, the **CFI** measures the relative improvement in fit of a model compared to a baseline model, with higher values indicating better model fit.

GFI (Goodness of fit index)

The GFI (Goodness of Fit Index) is a model fit statistic used in Structural Equation Modeling (SEM) to assess how well the proposed model fits the observed data.

Key Points of GFI:

Range: The GFI value ranges from **0 to 1**, with **1 indicating perfect fit**. Higher values indicate better fit.

Values ≥ 0.90 are typically considered acceptable, and **values ≥ 0.95** are considered good.

Interpretation: The GFI compares the **variance-covariance structure** of the observed data with the predicted structure from the model. It essentially represents how much of the variance in the data is accounted for by the model.

Strengths: It is a **global fit measure**, meaning it considers the overall fit of the model rather than specific aspects. However, it can be sensitive to sample size and model complexity.

In short, the **GFI** is a goodness-of-fit measure that assesses how well a model reproduces the observed data, with higher values indicating a better fit.

PNFI (Parsimonious Normal Fit Index)

The PNFI (Parsimonious Normal Fit Index), introduced by Mulaik et al. (1989), is a fit index used in Structural Equation Modeling (SEM) that adjusts the Normal Fit Index (NFI) to account for model complexity.

Key Points of PNFI:

Purpose: The PNFI penalizes models that are overly complex by taking into account the **degrees of freedom** (DF) in the model. It is designed to reward parsimonious models that explain the data well while minimizing the number of parameters.

Range: The PNFI typically ranges from **0 to 1**, with higher values indicating a better, more parsimonious fit.

Values closer to 1 suggest a good fit with an efficient, less complex model.

Interpretation: The PNFI is used to assess how well a model balances goodness of fit and complexity. It helps avoid over fitting by penalizing models with too many parameters.

In short, the **PNFI** is a fit index that rewards parsimonious models by adjusting the **NFI** for model complexity, ensuring that the model is both a good fit and not unnecessarily complex.

RMSEA (Root Mean Square error of approximation)

The RMSEA (Root Mean Square Error of Approximation), introduced by Browne and Cudeck (1993), is a widely used fit index in Structural Equation Modeling (SEM) that measures how well a model approximates the population's covariance matrix.

Key Points of RMSEA:

Purpose: RMSEA assesses the **goodness of fit** of a model while penalizing for model complexity. It specifically evaluates how well the model fits the data when considering the degrees of freedom.

Range: RMSEA values range from **0 to 1**, with **lower values indicating better fit**.

RMSEA ≤ 0.05 is considered **close fit** (excellent fit).

RMSEA ≤ 0.08 is generally considered **acceptable**.

RMSEA > 0.10 suggests **poor fit**.

Interpretation:

Lower RMSEA values indicate better model fit.

RMSEA also comes with a **confidence interval**; if this interval contains values near zero, the fit is typically considered good.

Strengths: Unlike other indices, RMSEA accounts for both model fit and model complexity (degrees of freedom). It is particularly useful for larger models with many parameters.

In short, the **RMSEA** measures the approximate error of a model's fit to the data, with smaller values indicating better fitting models and values ≤ 0.08 generally considered acceptable.

Model Fit Summary

Table 4.51: Five fit indices (CMIN/DF, CFI, GFI, PNFI, and RMSEA) Explanation.

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	31	51.464	14	.000	3.676
Saturated model	45	.000	0		
Independence model	9	669.159	36	.000	18.588

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.077	.963	.880	.299
Saturated model	.000	1.000		
Independence model	.412	.515	.394	.412

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.923	.802	.943	.848	.941
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.389	.359	.366
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	37.464	19.203	63.301
Saturated model	.000	.000	.000
Independence model	633.159	552.885	720.857

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.181	.132	.068	.223
Saturated model	.000	.000	.000	.000
Independence model	2.356	2.229	1.947	2.538

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.097	.069	.126	.003
Independence model	.249	.233	.266	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	113.464	115.727	226.691	257.691
Saturated model	90.000	93.285	254.362	299.362
Independence model	687.159	687.816	720.032	729.032

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.400	.335	.490	.407
Saturated model	.317	.317	.317	.328
Independence model	2.420	2.137	2.728	2.422

HOELTER

Model	HOELTER	HOELTER
	.05	.01
Default model	131	161
Independence model	22	25

All fit indices suggest a good fit between the hypothetical model and sample data and also conform to absolute fit, compressive fit, and Parsimonious fit.

4.6: Hypothesis testing model

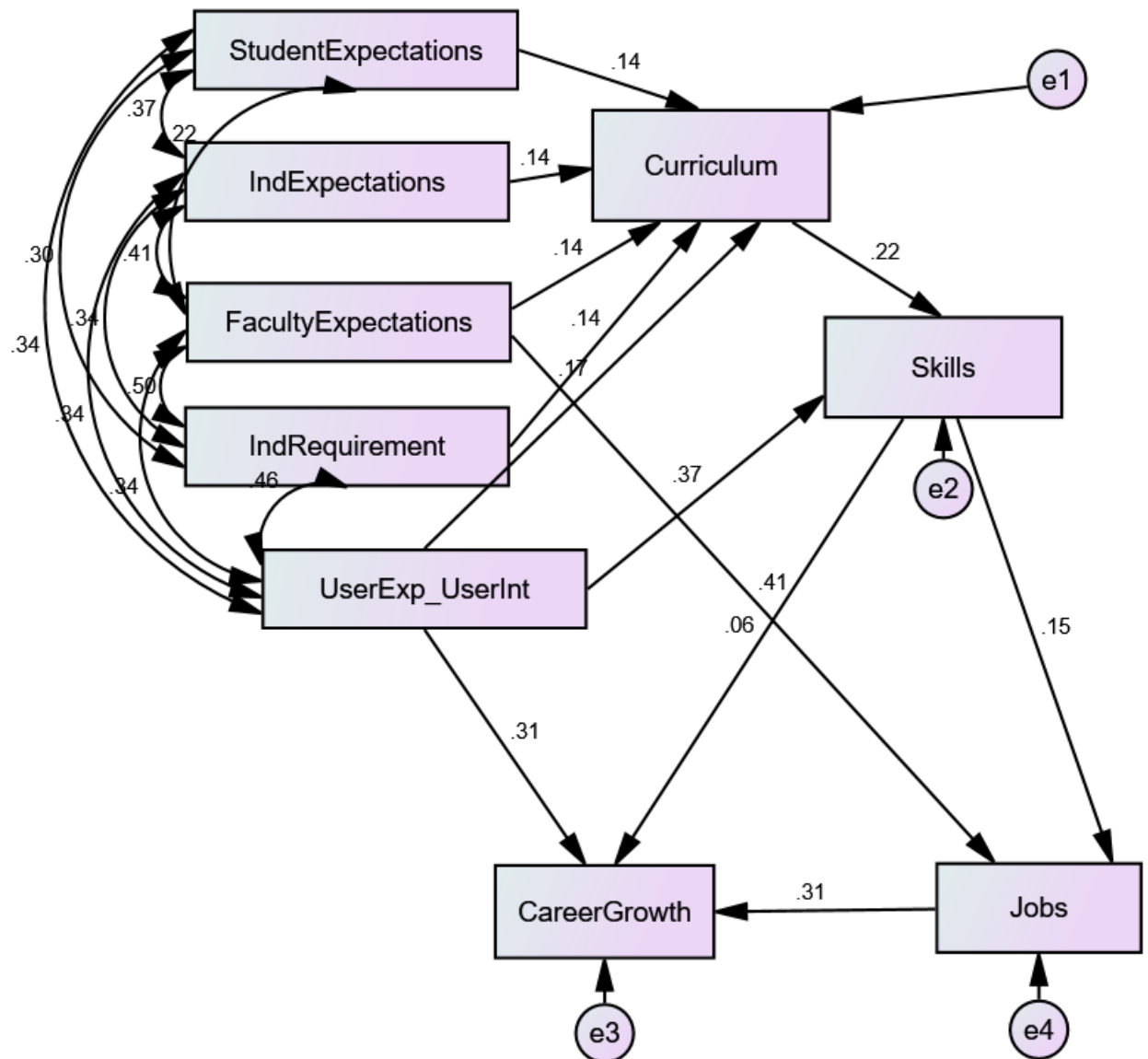


Figure: 4.27 Hypothesis Testing model

Table 4.52: Independent variable path towards Dependent variable

Dependent variable	Path	Independent variable	regression weights (b)	standardized regression weights (B)	S.E.	C.R.	P	result
1.Curriculum	<---	StudentExpectations	0.151	0.139	0.062	2.432	0.015	sig.
2.Curriculum	<---	IndustryExpectations	0.153	0.143	0.064	2.396	0.017	sig.
3.Curriculum	<---	FacultyExpectations	0.148	0.144	0.063	2.344	0.019	sig.
4.Curriculum	<---	IndustryRequirement	0.144	0.142	0.065	2.224	0.026	sig.
5.Curriculum	<---	UI UserInterface / UX UserExp. Design	0.159	0.169	0.057	2.809	0.005	sig.
6.Skills	<---	Curriculum	0.233	0.216	0.06	3.87	***	very high sig.
7.Jobs	<---	Skills	0.128	0.147	0.047	2.737	0.006	sig.
8.CareerGrowth	<---	Skills	0.052	0.062	0.048	1.076	0.282	NS
9.CareerGrowth	<---	Jobs	0.293	0.308	0.05	5.821	***	very high sig.

*** = significant 0.1% level of significance

SE = Standard Error

CR = Critical ratio

P = probability of committing a type I error

V H Sig= very high significance

4.7 Hypothesis testing

Hypothesis 1: student expectation will impact interaction design curriculum.

Ho. null hypothesis: student expectation will do not impact interaction design curriculum.

($b=0$)

H1. Alternative hypothesis: student expectation will impact interaction design curriculum.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.151$

$p = 0.015$

Since the P value (0.015) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that Students Expectation will impact the Interaction Design curriculum, in other words interaction design curriculum will depend upon the expectations of students, further since $b = 0.151$ it can also be concluded that if student expectation is increased by one unit interaction design curriculum will go up by 0.151.

Hypothesis 2: industry expectation will impact interaction design curriculum.

Ho. null hypothesis: industry expectation will do not impact interaction design curriculum.

($b=0$)

H1. Alternative hypothesis: industry expectation will impact interaction design curriculum.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.153$

$p = 0.017$

Since the P value (0.017) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that industry expectation will impact the Interaction Design curriculum, in other word interaction design curriculum will depend upon the expectation of industry, further since $b = 0.153$ it can also be concluded that if industry expectation is increased by one unit interaction design curriculum will go up 0.153.

Hypothesis 3: faculty expectation will impact interaction design curriculum.

Ho. null hypothesis: faculty expectation will do not impact interaction design curriculum.

($b=0$)

H1. Alternative hypothesis: faculty expectation will impact interaction design curriculum.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b=0.148$

$p=0.019$

Since the P value (0.019) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that faculty expectation will impact the Interaction Design curriculum, in other words interaction design curriculum will depend upon the expectation of faculty, further since $b=0.148$ it can also be concluded that if faculty expectation is increased by one unit interaction design curriculum will go up 0.148.

Hypothesis 4: industry requirement of student will impact interaction design curriculum.

Ho. null hypothesis: industry requirement will do not impact interaction design curriculum.

($b=0$)

H1. Alternative hypothesis: industry requirement will impact interaction design curriculum.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b=0.144$

$p=0.026$

Since the P value (0.026) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that industry requirements impact the Interaction Design curriculum, in other word interaction design curriculum will depend upon the industry requirement, further since $b=0.144$ it can also be concluded that if faculty expectation is increased by one unit interaction design curriculum will go up by 0.144.

Hypothesis 5: User interface UI and User experience UX design will impact interaction design curriculum.

Ho. null hypothesis: User interface UI and User experience UX design will do not impact interaction design curriculum.

($b=0$)

H1. Alternative hypothesis: interface UI and User experience UX design will impact interaction design curriculum.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.159$

$p = 0.005$

Since the P value (0.005) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that interface UI and User experience UX design impact the Interaction Design curriculum, in other words, interaction design curriculum will depend upon the interface UI and User experience UX design,

Further, since $b = 0.159$ it can also be concluded that if interface UI and User experience UX designs increased by one unit interaction design curriculum will go up by 0.159.

Hypothesis 6: interaction design curriculum will impact skills.

Ho. null hypothesis: interaction design curriculum will do not impact skill.

($b=0$)

H1. Alternative hypothesis: interaction design curriculum will impact skill.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.233$

$p = 0.001$

Since the P value (0.001) is less than α (0.05) the null hypothesis is rejected.

Hence it is concluded interaction design curriculum will impact skill, in other words, the skill will depend upon the interaction design curriculum,

Furthermore, since $b = 0.233$, it can also be concluded that if the interaction design curriculum is increased by one unit interaction design skills will go up by 0.233.

Hypothesis 7: skills will impact job in animation industry.

Ho. null hypothesis: skill will do not impact job in animation industry.

($b=0$)

H1. Alternative hypothesis: skill will impact job in animation industry.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.128$

$p = 0.006$

Since the P value (0.006) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that skill will impact on animation industry, in other words, skill will depend upon the animation industry, further since $b = 0.128$ it can also be concluded that if skill is increased by one unit animation industry will go up by 0.128.

Hypothesis 8: skills will impact career growth in animation industry.

Ho. null hypothesis: skill will do not impact career growth in animation industry.

($b=0$)

H1. Alternative hypothesis: skill will impact career growth in animation industry.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b = 0.052$

$p = 0.282$

Since the P value (0.282) is more than α (0.05) the null hypothesis is accepted.

Hence it is concluded that skill will do not impact career growth, in other words animation industry will not depend upon the skills,

Hypothesis 9: job performance will impact growth in animation industry.

Ho. null hypothesis: job performance will do not impact growth in animation industry.

($b=0$)

H1. Alternative hypothesis: job performance will impact growth in animation industry.

($b \neq 0$)

Level of significance: $\alpha = 0.05$

$b=0.293$

$p=0.001$

Since the P value (0.001) is less than α (0.05) the null hypothesis is rejected.

hence it is concluded that job performance will impact growth in the animation industry, in other words animation industry will depend upon job performance, further since $b=0.128$ it can also be concluded that if job performance is increased by one unit growth in the animation industry will go up by 0.293.

Hypothesis 10: job performance will mediate relation between skill and career growth in animation industry.

Mediation effects of job between skill and growth one of the objectives of the study was to check whether the job can mediate the relationship between skill and growth mediation effects were examined using bootstrapping in ANOS 21 result of mediation analysis given in the table below

Table 4.53: Mediation effects of jobs

Path	Direct effect	Indirect effect	result
Skills	$b=0.062$	$b=0.045$	Full
Growth	$P=0.445$	$P=0.004$	Mediation

It is interesting to note that the

Direct effect is in significance ($b=0.062$, $P=0.445$) and

Indirect effect is significance ($b=0.045$, $P=0.004$)

Hence the hypotheses that job performance mediate relationship between skill and growth is proved.

Chapter 5

Conclusions, Recommendations and Future Scope

5.1 Conclusion

After analyzing data and finding the researcher concludes that

In the Frequency distribution for Age majority of students (98.9%) are between the ages of 18 and 28, according to the age distribution analysis, suggesting a younger demographic. While experts (58.9%) are primarily in the 28–38 age range, representing an experienced but relatively younger professional group, faculty members (53.5%) are primarily in the 38–48 age range, representing a mid-career group. This reveals clear age trends among the groups, with professionals in their field of specialty being somewhat younger, academics in the middle of their careers, and students being the youngest.

UI designers make up the largest category (17.6%) in the frequency distribution of expert designations, followed by UI/UX designers (14.3%). Other notable occupations like 3D Artist (12.6%), Graphic Designer (12.1%), and Animator (11.0%) demonstrate the high concentration of professionals with expertise in design and animation. The representation of game designers (3.3%) and web designers (4.4%) is lower. This indicates a concentration of expertise in the areas of interaction and creative design.

According to the faculty designation study assistant professors make up the majority of the faculty (39.0%), followed by fine art faculty (16.5%) and design faculty (9.9%) Other positions with moderate representation include Animation Faculty (8.8%) and Game Design Faculty (6.0%). Less often held leadership roles are Associate Professors (2.2%) and Heads of Departments (5.5%). This distribution demonstrates the faculty's significant concentration on teaching and creative disciplines.

Interaction Design in Curriculum emphasize the critical role interaction design plays in the animation curriculum in encouraging creativity and satisfying industry expectations, while students usually minimize its significance and focus more on traditional animation techniques.

Role of Interaction Design in Animation interface design as essential for enhancing storytelling and user engagement in animation, but students concentrate on technical and aesthetic aspects, neglecting its strategic importance.

Animation and Interaction Design in the Job Market the growing demand for animators with interaction design expertise for roles in gaming, Animation, and UX design. However, students are often unaware of these diverse job choices and choose to concentrate on traditional tasks.

Career Growth and Interaction Design interface design promotes long-term job progress and opens up a variety of opportunities, whereas students tend to consider it as a secondary talent, focusing on immediate employability.

Future of Animation and Interaction Design interface design will serve as the cornerstone of the future animation industry, fostering creativity and cross-sector applications. Faculty members share this ambition but point out challenges in integrating it into traditional courses, and students often lack vision about its revolutionary potential.

Animation Curriculum for Creative Skills since the interface design fosters flexibility and innovation; it should be incorporated into the curriculum as a core component. Faculty acknowledges this need but face implementation obstacles, while students are often unaware of its broader implications.

Awareness Gaps The importance of interaction design in animation is obviously not understood by faculty or students, which highlights the need for targeted educational interventions and industry exposure.

Alignment of Curriculum with Industry Needs The study highlights a gap between the existing animation curriculum and industry requirements. Experts and academics stress the value of using interface design to help students get ready for emerging issues and trends.

Multidisciplinary Collaboration Professional development in interface design requires a multidisciplinary approach, according to experts and faculty. However, students occasionally prioritize specific animation abilities over the necessity of broad competencies.

Bridging Perception Gaps Collaborative collaborations between students, industry workers, and academics are essential to bridging perception gaps. Through seminars, industry-led

sessions, and internships, students can be practically introduced to animation interaction design. These findings emphasize the need of a revised curriculum, increased awareness, and cooperative learning settings to guarantee students' overall growth and prepare them for the quickly changing animation sector.

5.2 Recommendations

Recommended to colleges Curriculum Integration To meet industry demands, make interface design a fundamental part of animation programs. Provide courses that highlight the theoretical and real-world uses of interaction design in animation.

Recommended to colleges Faculty Training and Development Train instructors in the latest developments in interaction design and how they are used in animation to improve teaching strategies; promote attendance at seminars and industry partnerships.

Awareness and Engagement for Students Plan industry-led meetings, guest lecturers, and awareness campaigns to emphasize the value of interaction design in the animation sector. Give students practical experience with interaction design by introducing them to real-world projects and internships.

Industry-Academia Collaboration Form alliances with professionals in the field to close the knowledge gap between academic instruction and real-world applications. Engage experts in mentoring programs, workshops, and curriculum development.

Focus on Multidisciplinary Skills To demonstrate the cross-industry significance of interaction design, encourage the integration of animation with fields such as virtual reality, gaming, and user experience (UX). Promote group projects that blend interaction design and

Future-Proofing Careers To educate students for changing jobs in the industry, place an emphasis on future-ready skills like interaction design, narrative, and user-centered design. Update the curriculum frequently to take advantage of new developments in technology and trends.

5.3 Future Scope

Longitudinal Analysis of Perceptions As interaction design is progressively incorporated into animation education and practice, conduct longitudinal studies to monitor shifts in the opinions of industry experts, instructors, and students over time.

Exploration of Regional and Institutional Variations Examine how institutional norms and geographical variations affect how interface design is viewed and used in animation courses and industrial applications.

Correlation with Career Outcomes Examine how interaction design education affects the employability, skill adaptability, and career progression of animation professionals across a range of positions and sectors.

Integration with Multidisciplinary Fields Analyze how animation's use of interaction design connects with other artistic disciplines including game design, UX/UI, and digital storytelling, as well as how it might promote creative cross-industry partnerships.

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Oregon State University¹, Microsoft Research² grigorev@eecs.oregonstate.edu;
{rfernand, kori, ggr}@microsoft.com
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Annexure -1

List of Colleges in Maharashtra

Place	College name	Government	Private
Pune	Bharati Vidyapeeth College of Fine Arts	Fine Arts	
Pune	Savitribai Phule Pune University (SPPU) Fergusson College	Animation	
Pune	Abhinav kala mahavidyalaya, pune	Fine Arts	
Mumbai	Sir J.J. School of Art	Fine Arts	
Mumbai	Sir J.J. Institute of Applied Art	Applied Art	
Mumbai	Rachana Sansad College of Applied Art and Craft	Applied Art	
Sangli	Shantiniketan Lalit Kala and Natya Tantra Shikshan Mahavidyalaya	Fine Arts	
Aurangabad	Government School of Art	Fine Arts	
Kolhapur	BS Bandekar Collage of Fine Art	Fine Arts	
Pune	Dr. D.Y. Patil College of Applied Arts & Crafts		Applied Arts
Pune	Vishwakarma University, Faculty of Art & Design		Design
Pune	P.A. Inamdar College of Visual Effects, Design & Arts (VEDA College)		Animatio n
Pune	Symbiosis Institute of Design (SID)		Design
Pune	Srajan College of Design		Desig n
Pune	Seamedu School of Pro-Expressionism		Animation
Pune	D Y Patil University's School of Design		Design
Pune	MIT School of Design (MITSD)		Design
Pune	Frameboxx Animation		Animation
Pune	TRON Education		Animation
Mumbai	Amity School of Fine Arts		Fine Arts
Mumbai	Mumbai University, Faculty of Fine Arts Aditya College of Design Studies		Design

Navi Mumbai,	Dr. D.Y. Patil College of Fine art		Fine art
Navi Mumbai,	ITM Institute of Design & Media		Design
Navi Mumbai,	International School of Design (INSD) Sanpada		Design
Navi Mumbai,	MAAC (Maya Academy of Advanced Cinematics), Navi Mumbai		Animation
Navi Mumbai,	Frameboxx Animation & Visual Effects, Navi Mumbai		Animation
Navi Mumbai,	Aptech Animation, Navi Mumbai		Animation
Navi Mumbai,	Arena Animation, Navi Mumbai (Vashi and Seawoods)		Animation
Kolhapur	Dalvi's Art Institute		Fine art
Sangli	Sangli's Art and Cultural Institutes		Fine art

Annexure -2

List of Animation and Design companies

R	Company Name	Work
1	Anibrain VFX Studio: Kalyani Nagar, Pune.	VFX
2	VR Interactive Solutions Alandi Road, Kalas, Pune, .	Animation
3	Virtual Element Studios Narayan Peth, Appa Balawant Chowk, Pune,	Animation
4	Animation Planet, Vyankateshwar Heights, Baner, Pune,.	Multimedia
5	Creative Splash, Prabhat Road, Lane no-4 Nachiket Apartment, Pune,.	Animation
6	SVFX Animation Studio Tathawade Park, Anurekha Society, Ganesh Nagar, Karve Nagar, Pune.	Animation
7	Toolbox Studio Banner, Pune.	VFX / Animation
8	Vedarth Animation Studio 3A , Vidya Laxmi, 67, Jedhe Nagar, Bibwewadi, Pune,.	Animation
9	Design Lab Lohia Jain Square, Bavdhan, Pune,.	Graphic Design
10	Art Owls 601, Lohia Jain Square, Bavdhan, Pune,	UI /UX
11	10XDigitals Kemse Vasti, Wakad, Pune, Pimpri-Chinchwad, Pune.	Graphic Design
12	Montek Services KK Market, Dhankawadi, Pune,.	UI /UX
13	Visionary Services Commercial Complex NIBM - Undri Road, Pune.	Graphic Design
14	Elephant Design Pashan Rd, Sagar Co-Operative Housing Society, Bavdhan, Pune.	Graphic Design
15	Baner Rd, Sadhu Vasvani Nagar, Aundh, Pune,	UI /UX
16	City Vista A, Fountain Road, Kharadi, Pune, SP infocity hadapsar, Pune	UI /UX
17	Nitrous Design, GO Square, B101, Kaspate Wasti, Wakad, Pune,	UI

18	One thing Design, SP infocity hadapsar, Pune	UI /UX
19	Gatitaa Design, SP infocity hadapsar, Pune	UI /UX
20	OriginUX Studio Kalyani nagar, Pune.	UI

Questionnaire for Students

1. The students who now opt for animation programs find the integration of features of interaction design as part of the college curriculum interesting.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

2. The integration of technology and software tools in the animation courses is satisfactory and beneficial.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

3. Interaction Design is essential for the future of animation.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

4. The curriculum of animation programs should focus more on Interaction Design.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

5. The rise of interactive platforms (e.g., mobile apps, video games) will

influence the relevance of interaction design in animation.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

6. The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

7. As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

8. Interaction design is reshaping traditional animation by enabling more interactive storytelling.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

9. The implementation of interaction design in animation will lead to a rise in demand by the audience and their satisfaction.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

10. Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

11. Graduates with skills in both animation and interaction design will be more successful in the job market.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

12. Faculty should encourage students in learning the combination of animation and interaction design to simulate real-world projects.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

13. Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral

- ☐ Disagree
- ☐ Strongly Disagree

14. The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

15. Learning interaction design can increase the chances of career growth and advancement in the animation industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

16. Following features are Interaction design; please rate them in the order of importance.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. Following are the career opportunities for Interaction design; please select the appropriate ones as per your understanding.

- ☐ 5 -Very important
- ☐ 4- important
- ☐ 3- moderately important
- ☐ 2- less important
- ☐ 1- Not at all important

18. The students who now opt for animation programs find the integration of features of interaction design as part of the college curriculum interesting.

☐ A- Interaction design

☐ B-UI Design

☐ C-Graphic Design

☐ D-Web Design

☐ E- Animation

Questionnaire for Faculty

1. The students who now opt for animation programs find the integration of features of interaction design as part of the college curriculum interesting.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

2. The current industry demands professionals with skills in interaction design.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

3. Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

4. Nowadays, there are many job postings or internship opportunities that specifically mention the need for interaction design skills in the animation field.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

5. Students need to pursue additional training or education in interaction design based on the perceived industry demand.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

6. Incorporating interaction design skills into the curriculum will enhance the competitiveness of students in the job market.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

7. Interaction design is important in shaping the success of animations and user experiences in the animation industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

8. The curriculum adequately covers the essential skills and knowledge needed for a career in the animation industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

9. There is a balance between theoretical knowledge and practical, hands-on experience in animation courses in colleges.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

10. The curriculum prepares students for emerging trends and advancements in the animation industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

11. Interaction Design is essential for the future of animation.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

12. Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

13. The rise of interactive platforms (e.g., mobile apps, video games) will influence the relevance of interaction design in animation.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

14. The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

15. Future animation projects will require students to understand both traditional animation and interaction design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

16. As animation becomes more interactive, students need to develop skills in user experience (UX) and user interface (UI) design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. Students who are skilled with interaction design will gain more job

opportunities in industries like gaming, AR/VR, and mobile apps.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

18. In the future, interaction design will be crucial for creating immersive and engaging animation experiences.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

19. Interaction design is reshaping traditional animation by enabling more interactive storytelling.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

20. The implementation of interaction design in animation will lead to a rise in demand by the audience and their satisfaction.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

21. Industry professionals should collaborate more with interaction designers to create innovative animation projects to experience growth in the company's turnover.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

22. Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

23. Graduates with skills in both animation and interaction design will be more successful in the job market.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

24. Industry partnerships are essential to keep animation programs updated with the latest trends in interaction design and technology.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

25. The future of animation education will require a strong focus on user experience (UX) and user interface (UI) design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

26. Learning interaction design can increase the chances of career growth and advancement in the animation industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

27. The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

28. Following are the career opportunities for Interaction design; please select the appropriate ones as per your understanding.

- ☐ 5 -Very important
- ☐ 4- important
- ☐ 3- moderately important
- ☐ 2- less important
- ☐ 1- Not at all important

29. The students who now opt for animation programs find the integration of features of interaction design as part of the college curriculum interesting.

- ☐ A- Interaction design
- ☐ B-UI Design
- ☐ C-Graphic Design
- ☐ D-Web Design
- ☐ E- Animation

Questionnaire for Expert

1. The current industry demands for professionals with skills in interaction design.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
2. Learning and Implementation of Interaction design is crucial, which meets the demands of today's industries.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
3. Nowadays there are many job postings or internship opportunities that specifically mention the need for interaction design skills in animation field.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
4. Incorporating interaction design skills into the curriculum will enhance competitiveness of students in the job market

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
5. The curriculum adequately cover the essential skills and knowledge needed for a career in the animation industry

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
6. The integration of technology and software tools in the animation courses are satisfactory and beneficial.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
7. There is a balance between theoretical knowledge and practical, hands-on experience in animation courses of colleges.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree
8. The curriculum prepares students for emerging trends and advancements in the animation industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree

☐ Strongly Disagree

9. Interaction Design is essential for the future of animation.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

10. The curriculum of animation programs should focus more on Interaction Design.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

11. Interaction design will be a core component of animation production in the next five years.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

12. The demand for animators with interaction design skills will increase in near future.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

13. Emerging technologies like AR, VR, and AI will drive the growth of interaction design in the animation industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

14. In the future, collaboration between animators and interaction designers will be a standard practice with context to industry.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

15. The animation industry will struggle to sustain with technological advancements if it does not adopt interaction design practices.

☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

16. The curriculum of Animation programs in Universities/Institutes must adapt to include more interaction design modules to prepare skilled animators for the evolving industry.

☐ Strongly Agree

- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. Future animation projects will require students to understand both traditional animation and interaction design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

18. Students who are skilled with interaction design will gain more job opportunities in industries like gaming, AR/VR, and mobile apps.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

19. Interaction design will become equally important as traditional animation program for students entering the animation industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

20. In the future, interaction design will be crucial for creating immersive and engaging animation experiences.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

21. Future animation industry trends will prioritize user-centric experiences over traditional linear narratives.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

22. Teaching interaction design along with traditional animation skills will shape students for better career opportunities in the industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

23. Faculty should encourage students in learning of combination of animation and interaction design to simulate real-world projects.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

24. Animators who possess both creative and technical interaction design skills will have more opportunities to work on cutting-edge projects.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

25. The demand for interaction design specialists in animation will increase as interactive experiences become more common in entertainment.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

26. Interaction design skills will open new career paths for animators outside of traditional animation studios, such as in the tech industry.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

27. Employers in the animation industry will soon expect animators to have experience in user interface (UI) and user experience (UX) design.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

28. Following are the career opportunities for Interaction design; please select the appropriate ones as per your understanding.

- ☐ 5- Very important
- ☐ 4- important
- ☐ 3- moderately important
- ☐ 2- less important
- ☐ 1- Not at all important

29. The students who now opt for animation programs find the integration of features of interaction design as part of the college curriculum interesting.

- ☐ A- Interaction design
- ☐ B-UI Design
- ☐ C-Graphic Design
- ☐ D-Web Design
- ☐ E- Animation

**A STUDY ON NEED OF INTERACTION DESIGN AND ITS
RELEVANCE IN ANIMATION INDUSTRY**

A Thesis

**SUBMITTED TO THE
TILAK MAHARASHTRA VIDYAPEETH PUNE**

**FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY**

In subject - Journalism & Mass Communication

Under the Board of Modern Science and Professional Skills



BY

BHARAT SHIVAJI JADHAV

(PRN: 25621004416)

UNDER THE GUIDANCE OF

Dr. GEETALI D. TILAK & Dr. SANJAY BHARATI (CO-GUIDE)

DEPARTMENT OF JOURNALISM & MASS COMMUNICATION

March (2025)

80 _Recommendation

Conclusion

After analyzing data and finding the researcher concludes that

In the Frequency distribution for Age majority of students (98.9%) are between the ages of 18 and 28, according to the age distribution analysis, suggesting a younger demographic. While experts (58.9%) are primarily in the 28–38 age range, representing an experienced but relatively younger professional group, faculty members (53.5%) are primarily in the 38–48 age range, representing a mid-career group. This reveals clear age trends among the groups, with professionals in their field of specialty being somewhat younger, academics in the middle of their careers, and students being the youngest.

UI designers make up the largest category (17.6%) in the frequency distribution of expert designations, followed by UI/UX designers (14.3%). Other notable occupations like 3D Artist (12.6%), Graphic Designer (12.1%), and Animator (11.0%) demonstrate the high concentration of professionals with expertise in design and animation. The representation of game designers (3.3%) and web designers (4.4%) is lower. This indicates a concentration of expertise in the areas of interaction and creative design.

According to the faculty designation study assistant professors make up the majority of the faculty (39.0%), followed by fine art faculty (16.5%) and design faculty (9.9%). Other positions with moderate representation include Animation Faculty (8.8%) and Game Design Faculty (6.0%). Less often held leadership roles are Associate Professors (2.2%) and Heads of Departments (5.5%). This distribution demonstrates the faculty's significant concentration on teaching and creative disciplines.

Interaction Design in Curriculum emphasize the critical role interaction design plays in the animation curriculum in encouraging creativity and satisfying industry expectations, while students usually minimize its significance and focus more on traditional animation techniques.

Role of Interaction Design in Animation interface design as essential for enhancing storytelling and user engagement in animation, but students concentrate on technical and aesthetic aspects, neglecting its strategic importance.

Animation and Interaction Design in the Job Market the growing demand for animators with interaction design expertise for roles in gaming, Animation, and UX design. However, students are often unaware of these diverse job choices and choose to concentrate on traditional tasks.

Career Growth and Interaction Design interface design promotes long-term job progress and opens up a variety of opportunities, whereas students tend to consider it as a secondary talent, focusing on immediate employability.

Future of Animation and Interaction Design interface design will serve as the cornerstone of the future animation industry, fostering creativity and cross-sector applications. Faculty members share this ambition but point out challenges in integrating it into traditional courses, and students often lack vision about its revolutionary potential.

Animation Curriculum for Creative Skills since the interface design fosters flexibility and innovation; it should be incorporated into the curriculum as a core component. Faculty acknowledges this need but face implementation obstacles, while students are often unaware of its broader implications.

Awareness Gaps The importance of interaction design in animation is obviously not understood by faculty or students, which highlights the need for targeted educational interventions and industry exposure.

Alignment of Curriculum with Industry Needs The study highlights a gap between the existing animation curriculum and industry requirements. Experts and academics stress the value of using interface design to help students get ready for emerging issues and trends.

Multidisciplinary Collaboration Professional development in interface design requires a multidisciplinary approach, according to experts and faculty. However, students occasionally prioritize specific animation abilities over the necessity of broad competencies.

Bridging Perception Gaps Collaborative collaborations between students, industry workers, and academics are essential to bridging perception gaps. Through seminars, industry-led sessions, and internships, students can be practically introduced to animation interaction design. These findings emphasize the need of a revised curriculum, increased awareness, and cooperative learning settings to guarantee students' overall growth and prepare them for the quickly changing animation sector.

Recommendations

Recommended to colleges Curriculum Integration To meet industry demands, make interface design a fundamental part of animation programs. Provide courses that highlight the theoretical and real-world uses of interaction design in animation.

Recommended to colleges Faculty Training and Development Train instructors in the latest developments in interaction design and how they are used in animation. To improve teaching strategies; promote attendance at seminars and industry partnerships.

Awareness and Engagement for Students Plan industry-led meetings, guest lecturers, and awareness campaigns to emphasize the value of interaction design in the animation sector. Give students practical experience with interaction design by introducing them to real-world projects and internships.

Industry-Academia Collaboration Form alliances with professionals in the field to close the knowledge gap between academic instruction and real-world applications. Engage experts in mentoring programs, workshops, and curriculum development.

Focus on Multidisciplinary Skills To demonstrate the cross-industry significance of interaction design, encourage the integration of animation with fields such as virtual reality, gaming, and user experience (UX). Promote group projects that blend interaction design and

Future-Proofing Careers To educate students for changing jobs in the industry, place an emphasis on future-ready skills like interaction design, narrative, and user-centered design. Update the curriculum frequently to take advantage of new developments in technology and trends.

Future Scope

Longitudinal Analysis of Perceptions As interaction design is progressively incorporated into animation education and practice, conduct longitudinal studies to monitor shifts in the opinions of industry experts, instructors, and students over time.

Exploration of Regional and Institutional Variations Examine how institutional norms and geographical variations affect how interface design is viewed and used in animation courses and industrial applications.

Correlation with Career Outcomes Examine how interaction design education affects the employability, skill adaptability, and career progression of animation professionals across a range of positions and sectors.

Integration with Multidisciplinary Fields Analyze how animation's use of interaction design connects with other artistic disciplines including game design, UX/UI, and digital storytelling, as well as how it might promote creative cross-industry partnerships.



Tilak Maharashtra Vidyapeeth

Declared as a Deemed to be University Under Section 3 of UGC Act 1956
Reaccredited by NAAC with 'B++' Grade
ISO21001 : 2018 Certified



Plagiarism Report

Ph.D.

Date- 14/01/2025

Jadhav Bharat

Department – Journalism and Mass Communication

PRN.- 25621004416

Title – “ A Study On Needs Of Interaction Design And Its Relevance In Animation Industry ”

Chapter 1 INTRODUCTION	11%
Chapter 2 REVIEW OF LITERATURE	14%
Chapter 3 RESEARCH METHODOLOGY	11%
Chapter 4 ANALYSIS & INTERPRETATION	6%
Chapter 5 CONCLUSION/FINDINGS/RECOMMENDATIONS	3%

Head, Ph.D. Department