# The Impact of Virtual Reality Applications on Employee Training

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## Abstract

This study aims to explore the influence of Virtual Reality (VR) Applications on Employee Training within university libraries in Saudi Arabia. The objectives include assessing the strength of VR Applications, determining interest levels in Employee Training, uncovering the impact of VR Applications on Employee Training, and presenting recommendations to university library officials based on the study's outcomes. Employing a data collection and analysis approach, the study involved a sample of 338 university library workers in Saudi Arabia, drawn from an exhaustive sampling framework. Findings indicate high availability and agreement regarding dimensions of both VR Applications and Employee Training. Notably, Applicability significantly influences Employee Training dimensions, particularly Service Improvement, Knowledge, and Technical Skills. Interaction and Instant Responses also exhibit significant impacts on Employee Training across various dimensions. Furthermore, Content Relevance significantly influences Technical Skills, Employee Training, Service Improvement, and Knowledge. These findings underscore the multifaceted benefits of integrating VR technology into employee training programs within university library settings, emphasizing its potential to enhance service quality, expand knowledge, and improve technical competencies.

**Keywords:** Virtual Reality Applications, Employee Training, University Libraries, Saudi Arabia, Applicability, Interaction, Instant Responses, Content Relevance, Service Improvement, Knowledge, Technical Skills.

## 1. Introduction

With the rapid advancement in technology, virtual reality applications have increasingly become crucial across various fields, especially in training and education. Recent studies have shown that virtual reality applications have immense potential to enhance the learning experience and improve employee performance. The topic of "The Impact of Virtual Reality Applications on Employee Training" is of particular interest as it involves studying the effect of using virtual reality technology in enhancing the quality of training and the efficiency of skill development for employees (Jensen & Konradsen, 2018).

Virtual reality applications provide interactive experiences closely resembling real-life scenarios, allowing trainees to interact with a virtual environment representing situations and realistic work-related scenarios. Employees can immerse themselves in these experiences and effectively confront challenges and issues related to their work in a safe environment. Additionally, virtual reality applications enable training to be repeated frequently without the need to risk resources or face material losses that may occur in a real work environment (Sherman & Craig, 2018).

Moreover, virtual reality applications can customize training to meet the needs of everyone, allowing the adjustment of challenge levels and difficulty according to the current skill level of each trainee. This helps motivate employees and increase their engagement in the learning process, ultimately leading to improvements in their performance in their respective fields of work. However, the use of virtual reality applications is not without its challenges, including the high costs associated with developing these applications and providing necessary equipment. Trainers and employees may also encounter difficulties in adapting to new technologies and effectively dealing with them (Zhang, et al., 2017).

Therefore, exploring the impact of virtual reality applications on employee training is an important topic worthy of in-depth study, as it can contribute to the development of training strategies and the improvement of employee performance across various industries and sectors (Bell & Fogler, 2004).

Contemporary discussions increasingly highlight the prominence of modern industrial systems and the advent of Industry 4.0. Consequently, attention must be directed towards acknowledging the indispensable role played by the human element in production processes. In this regard, the insights of Peter F. Drucker, notably his assertion that "The most valuable assets of a 20th-century company were its production equipment. The most valuable assets of a 21st-century institution, whether business or non-business, will be its knowledge workers and their productivity," resonate deeply. Drucker's concepts possess enduring relevance, transcending temporal confines to offer timeless guidance even in the context of 2023. This enduring relevance is attributable to various factors, including the transition towards an economy centered around knowledge workers, the imperative for perpetual innovation and adaptability, the challenges posed by the digital era, and the significance of ethical leadership. Consequently, Drucker's writings continue to hold value, representing a pertinent resource for individuals interested in effective management and organizational success in the contemporary landscape (Bell & Fogler, 2004).

The retention of company employees hinges not solely on their motivation or the efforts of their managers but also on the environment in which they operate, particularly its safety. To attain the company's objectives, managers must prioritize the establishment of a secure working environment. Safety is not solely contingent upon the dependability of technical equipment and utilized technologies but also on the proficiency of workers in managing and utilizing said equipment. Hence, the competence of workers not only enhances productivity but also mitigates numerous risks, consequently bolstering the reliability of technological equipment and processes (Qureshi et al., 2023).Virtual Reality (VR) constitutes a computer-generated simulation that plunges users into a three-dimensional environment, enabling them to engage and navigate

through sensory input. Typically facilitated via head-mounted displays and interactive devices, this immersive encounter allows individuals to interact with and explore the simulated environment. In the context of the mentioned review, the objective is to enhance comprehension regarding the utilization of head-mounted displays (HMDs) within educational and training domains. Technically, VR amalgamates computer graphics, sophisticated sensing mechanisms, and principles of human-computer interaction to fabricate a realistic and interactive virtual realm. By stimulating multiple senses such as sight, sound, and occasionally touch, VR deceives the brain into perceiving the digital landscape as authentic, fostering a sense of complete immersion within the virtual environment. This technology finds versatile applications across various sectors, including entertainment, education, training, therapy, and scientific inquiry.

## 2. Literature Review

2.1- The Concept of virtual reality.

One of the most prominent and widely used modern technologies is Virtual Reality (VR), which is defined as creating an environment in which users can experience and explore a separate virtual world from reality (Villegas et al., 2016). However, this technology requires high costs in terms of hardware, accessibility, significant effort, and time in creating virtual content and high-level modeling to create an effective environment for virtual interaction, among other factors that limit its widespread use in education (Villegas et al., 2016; Yuen, Yaoyune & Johnson, 2011).

Navigation in virtual worlds has become accessible to all individuals nowadays, allowing the visualization of the world through different dimensions and enabling the experience of things that cannot be accessed in the real world or even those that have not yet been invented (Ludlow, 2015). Furthermore, the world of three-dimensional graphics has no boundaries or restrictions and can be created and embodied according to various aspirations and desires through the technology that has become familiar and widely circulated under the name of Virtual Reality.

Virtual Reality (VR) technology began to emerge in the 1950s, but it evolved and became more prevalent in the late 1980s and 1990s. Virtual Reality (VR) environments predominantly leverage visual experiences, which are typically presented on a computer screen or through specialized displays. However, they may also incorporate auditory stimulation via speakers or headphones. Users can interact with the virtual environment using diverse devices such as keyboards, mice, or other input mechanisms. Thus, Virtual Reality can be delineated as an electronic realm that replicates aspects of the real or imagined world, capable of simulating senses such as sight and sound while the individual remains situated within the physical realm. It utilizes computer-generated graphics through video, audio, and images to create entirely different environments from those present in the real world. (Johnston, Olivas, Steele, Smith, and Bailey, 2017)

When reviewing the history of Virtual Reality technology, various aspects of the technology have been experimented with since the 1920s. Virtual Reality was previously used as a military training tool, providing users with accurate simulation of real events in a safe environment,

leading to a reduction in the costly training expenses. Additionally, Virtual Reality allows for more effective, less expensive, and less risky training. In 1929, Virtual Reality began to be translated into English.

Despite attempts by Link to provide training for pilots, it wasn't until 1930 that the company designed the first flight simulation device, which saw significant evolution in the subsequent years. However, despite the significant resources provided by the technology, the images were of low quality, and the equipment was heavy and unreliable (Brownridge, 2020). During the 1950s, there was a massive advancement in virtual reality technology with the invention of the Sensoria device, capable of stimulating the user's five senses and enhancing immersion during film viewing (Virtual Reality Association, 2017). Then, in 1987, the term "virtual reality" was coined by Jaron Lanier with the sale of the first version of virtual reality glasses for nine thousand four hundred dollars, sparking enthusiasm for future developments. Subsequently, in 1991, there was a significant development in video game design, making them accessible and attractive to individuals, thus contributing to the advancement of virtual reality technologies. In 2014, products introduced by companies like Google and Samsung, such as headsets and new software, allowed virtual reality to become one of the prominent technologies in most three-dimensional worlds (Virtual Reality Association, 2017).

Virtual reality offers simulation, which refers to mimicking a situation or process (Baek, 2010), by providing programs that rely on responsive simulation of individuals' movements and locations, tracking their gaze directions to allow users to view new environments and use interactive realistic scenarios that users can compare with traditional environments. This may contribute to a better understanding of abstract concepts and facilitate visits to places hundreds or even thousands of miles away, visiting the past, present, or future, as well as engaging in unsafe activities such as visiting a volcano or standing in a battlefield, conducting risky chemical experiments, and more (Micallef, & Newton, 2024).

When discussing the structure of virtual reality technology, we find that these virtual systems link numerous visual displays together, which must be synchronized, in addition to computational power, which is another important factor in virtual reality systems. The computational component of virtual reality systems receives input from input devices, processes this input in the virtual reality application, and then flows the output to all output devices. Therefore, many virtual reality systems use a set of computers that are synchronized with software and devices to run the virtual reality application. Moreover, virtual reality environments utilize common computer interaction devices such as keyboards, mice, touch-sensitive devices, and gaming peripherals, as well as tracking devices and microphones for audio processing (Kabala, 2011).

2.2- The Difference Between Virtual Reality (VR) And Augmented Reality (AR)

Augmented Reality (AR) technology emerged as a contrast to Virtual Reality (VR), as it does not completely simulate a separate virtual reality from the real world but rather relies on overlaying contextual data without altering reality (Villegas et al., 2016). AR is defined as a technology that allows users to see the real world with virtual objects, which are computer-

generated graphics, existing in the real world and can be interacted with by the user (Villegas et al., 2016).

While AR and VR technologies are not entirely new, they have been widely adopted in the past. However, recent studies and research have begun to explore the potential of AR technology when used in real-life activities. Most AR applications still focus on simple visualization of virtual objects in limited spatial scenes (Villegas et al., 2016). Additionally, there are numerous aspects of AR technology that require further exploration, and many future research investigations are still needed in this field (Hsu & Huang, 2011).

In summary, AR technology differs from VR in that it overlays virtual elements onto the real world rather than creating a separate virtual environment. While AR has been increasingly adopted, there is still much to be explored and researched, particularly in its applications in real-world activities and its potential for further development.

Despite the existence of viable Virtual Reality (VR) technologies and some promising research outcomes, numerous industrial companies continue to rely on conventional training methods, notably on-the-job training accompanied by a tutor. From a scientific perspective, comparing traditional methods with emerging learning approaches is a compelling endeavor (Pratikoo & Lamberti, 2021).

Pratikoo and Lamberti (2021) conducted a study comparing immersive VR training for industrial robot operators with classroom-based training practices. Their findings indicated that the effectiveness of VR-based training could rival that of traditional methods concerning participants' task completion abilities. However, areas for enhancement were identified, particularly in facilitating interactions with tools and physical equipment, as well as in simulating and enriching social dynamics between instructors and trainees.

In a similar investigation, Saunders et al. (2019) discovered that VR-based training, either independently or in conjunction with traditional hands-on training, could be as effective as resource-intensive traditional training sessions. Furthermore, Winter et al. (2020) presented a case study comparing VR simulation training for pump maintenance tasks with conventional training methods, including dual training and video training. Their analysis, covering metrics such as time per step, error frequency, and procedural evaluations, revealed that while VR training proved adept at facilitating task learning, traditional methods led to notable reductions in time and errors. The authors attributed these outcomes to VR's limitations in accurately simulating interaction with physical objects and the cognitive challenge level associated with VR training.

In a study by Carlsson et al. (2015), participants were assigned to either virtual or physical training and tasked with assembling a wooden puzzle. Subsequent testing using the physical puzzle and a follow-up assessment two weeks later revealed that despite the initial superiority of physical training over virtual training, participants who underwent virtual training demonstrated improved assembly times after two weeks.

These studies collectively emphasize the potential of VR-supported training in industrial settings but also underscore the need for further research to optimize its effectiveness and address its

limitations. (Pratikoo & Lamberti, 2021; Saunders et al., 2019; Winter et al., 2020; Carlsson et al., 2015).

2.3- The Role of Virtual Reality in Training:

The concept of training needs encompasses the essential aspects and requirements necessary to achieve specific organizational goals through training processes. It involves assessing the educational and training needs of individuals or groups, including their knowledge, skills, attitudes, and orientations required for optimal performance in the workplace (Mandato, 2022). Virtual Reality (VR) is perceived as a complex media system comprising technological components and unique media content, offering multisensory interaction and three-dimensional representation (Mikropoulos & Natsis, 2011; Dlgarno & Lee, 2010). Organizations should carefully consider how VR technology can meet their specific needs rather than merely following technological trends (Salas et al., 2009). VR presents benefits such as immersive storytelling and three-dimensional representation, aligning with training objectives (Dlgarno & Lee, 2010; Kratky, 2016). For example, immersive VR can enhance understanding of complex structures and facilitate learning in research and development processes, crucial for training goals (Makransky & Petersen, 2021). Therefore, an immersive, interactive VR system should integrate practical training aspects within organizational settings (Farrell, 2018).

2.4- Assessing Cognitive Skills Development through Virtual Reality Training:

Virtual Reality (VR) training is increasingly acknowledged as a promising avenue for fostering cognitive skills. Numerous studies have delved into assessing the efficacy of VR training on cognitive skills development, yielding predominantly positive outcomes.

Angel-Urdinola, Castillo-Castro, and Hoyos (2021) conducted a meta-analysis examining the impact of VR training on student learning and skills enhancement. Their analysis, encompassing 31 primary studies and over 90 experiments, revealed that VR training, on average, surpasses traditional training in cultivating technical, practical, and socio-emotional skills. Particularly encouraging results were observed in fields associated with health and safety, engineering, and technical education. Furthermore, students exposed to VR training exhibited greater efficiency in resource utilization and error avoidance compared to those undergoing traditional training.

In another study, Li et al. (2023) explored the effects of a virtual reality cognitive-motor training intervention (VRCMTI) on enhancing cognitive and physical functions in older adults with cognitive impairment. The VRCMTI comprised three virtual cognitive tasks and three upper limb movement tasks aimed at enhancing working memory, spatial cognition, attention shifting, executive control, joint flexibility, and coordination. Results indicated significant improvements in global cognitive ability scores among the VR group, particularly in attention and verbal cognition. Additionally, older adults in the VR group demonstrated notable enhancements in upper limb motor skills, primarily attributed to movement quality and processing speed.

Furthermore, Sokołowska et al. (2023) presented intriguing recent findings pertaining to training/exercise in virtual environments and its impact on cognitive and motor functions. These findings underscore the immense future potential of rapidly evolving innovative technologies.

In summary, VR training exhibits promise in augmenting cognitive skills development. Nonetheless, further research is warranted to delve deeper into the specific mechanisms underlying the influence of VR training on cognitive skills and to refine the design and implementation of VR training programs.

2.5- Previous Studies

Several research studies have investigated the impact of technological advancements, including simulation and virtual reality (VR), across various domains, each offering insights into distinct aspects of their applications. For example, Ruiz de la Torre Acha et al. (2024) conducted a study comparing the effectiveness of digital tools with traditional teaching methods among engineering students, emphasizing the importance of adaptable teaching strategies and the enriching role of VR in comprehending real-world problems. Mou et al. (2024) explored how VR interventions enhance customers' perception of authenticity in virtual tourism, emphasizing the significance of social interaction and cross-sensory compensation strategies. Pessot et al. (2023) delved into the innovation pathways in small and medium-sized enterprises (SMEs) stemming from the adoption of Augmented Reality (AR) and VR technologies, highlighting organizational factors as pivotal drivers of successful implementation. Holuša et al. (2023) investigated the potential of VR in training employees in the raw material industry, revealing its benefits in enhancing efficiency and work habits despite challenges such as high costs and technological requirements. Furthermore, Wolfartsberger et al. (2023) examined the learning outcomes of VR-supported training compared to traditional methods, stressing the importance of tailored instructional design for optimal learning effectiveness. Additionally, Smith et al. (2022) explored the feasibility of VR Job Interview Training for former inmates, demonstrating its efficacy in improving interview skills and subsequent employment rates. Lastly, Chang and Huang (2023) evaluated the effectiveness of VR-based experiential learning in enhancing problem-solving efficiency among nursing staff, showcasing its potential to enhance learning achievement and attitudes towards learning compared to conventional training approaches. These studies collectively highlight the diverse applications and promising outcomes of VR across different sectors, while also underscoring the necessity for further research to optimize its implementation and effectiveness.

Upon thorough examination of existing research, the investigators have concluded several key points:

- Firstly, technology is pivotal in enhancing training quality, particularly concerning virtual reality (VR) applications within university library employee training.
- Secondly, prior studies affirm the significant role of modern technology, including VR, in augmenting training effectiveness and improving employee experiences in university libraries.
- Thirdly, there is a growing expectation for heightened technology integration in education, prompting the need to explore VR's impact on skill and knowledge development among library staff. However, a research gap exists regarding the specific influence of VR applications on university library staff training, warranting further investigation.

- Lastly, challenges identified in previous studies hinder the adoption of VR applications in university training, emphasizing the necessity for additional research to address these obstacles and optimize the technology's benefits.

## 3. Research problem

In light of rapid technological advancements, virtual reality (VR) applications have become an effective means to enhance training processes and develop employees' skills. Among the sectors that can greatly benefit from these applications are university libraries. University libraries are vital centers for learning and research within universities, where students and researchers rely on these facilities to access information and develop their research and academic skills.

With the expanding use and continuous development of virtual reality technology, its application in employee training within university libraries is a subject worthy of study and analysis. However, this field faces several challenges and issues that may hinder the effectiveness and efficiency of using virtual reality applications in training library staff.

One of the main challenges facing virtual reality applications in training library staff at universities is the high cost of developing and implementing these applications. Despite virtual reality technology being effective in delivering realistic and engaging educational experiences, the costs of creating virtual content, developing programs, and providing suitable hardware and technology can be significantly high, which may impede the adoption of this technology at times.

Additionally, there are technical challenges related to the infrastructure required to efficiently use virtual reality applications in university libraries. For example, university libraries may need to upgrade their infrastructure to meet the requirements for running virtual reality applications, which may require substantial financial investments and intensive technical efforts.

These challenges slow down the adoption and implementation process of virtual reality technology in training library staff at universities, hindering the realization of the expected full benefits of this technology. Therefore, addressing this problem requires directing attention towards providing effective and sustainable solutions to overcome these challenges and enable university libraries to fully benefit from virtual reality applications in training their staff The central research issue can be encapsulated in the following question:

What is the extent of interest in Virtual Reality Applications in university libraries in Saudi Arabia?

What is the extent of interest in the Employee Training in university libraries in Saudi Arabia?

What is the Impact of Virtual Reality Applications on the Employee Training in university libraries in Saudi Arabia?

## 4. Hypotheses

"There is a statistically significant impact of virtual reality applications on employee training in university libraries in Saudi Arabia." Several hypotheses emerge from this hypothesis:

- H1: There is a statistically significant impact of applicability as one dimension of virtual reality applications on employee training in university libraries in Saudi Arabia.

- H2: There is a statistically significant impact of interaction as one dimension of virtual reality applications on employee training in university libraries in Saudi Arabia.

- H3: There is a statistically significant impact of Instant responses as one dimension of virtual reality applications on employee training in university libraries in Saudi Arabia.

- H4: There is a statistically significant impact of content relevance as one dimension of virtual reality applications on employee training in university libraries in Saudi Arabia.

## 5. Study Significances

The paragraph highlights the importance of using virtual reality applications in training university library staff. This topic is theoretically significant to fill the gap in research and studies on this subject, as well as to understand the impact of these applications on skill development and enhancing the learning process in academic environments. The importance of the current study is due to its scientific and practical additions as follows:

A- Scientific Significance

❖ The topic of the impact of virtual reality applications on employee training in university libraries is theoretically important due to the lack of research in this field and the necessity to understand the effect of these applications on skill development and learning in academic institutions.

❖ The significance of the study lies in exploring the effectiveness of virtual reality applications in training employees in university libraries and identifying the potential benefits and challenges of adopting this technology in the academic learning environment.

B- Practical Significance:

❖ The study can assist library administrators in universities in understanding how to use virtual reality applications to develop and enhance the training of library staff, potentially improving the quality of services provided.

❖ Additionally, the study may provide practical guidance for teachers and trainers in academic institutions to integrate virtual reality applications into training and educational programs, aiming to enhance the learning experience and develop the skills of students and employees in university libraries.

## 6. Research model

The following figure (1) shows the general framework for the study variables, as follows:

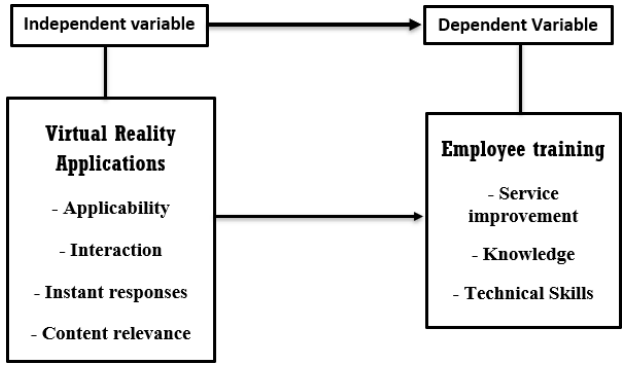


Figure No. (1): Study Framework.

## 7. Research Objectives:

The study aims to achieve the following objectives:

- Standing on the strength of the Virtual Reality Applications in university libraries in Saudi Arabia.

- Determining the extent of interest in the Employee Training in university libraries in Saudi Arabia.

- Uncovering the Impact of Virtual Reality Applications on the Employee Training in university libraries in Saudi Arabia.

- Presenting several recommendations and proposals to Officials in university libraries in Saudi Arabia based on the study's results, which can be generalized and used in practical application.

## 8. Study Design:

The present study adopted a descriptive analytical approach to investigate the impact of Virtual Reality Applications as an independent variable on Employee Training, the dependent variable. This approach involves describing and measuring the phenomenon under study by collecting, classifying, and analyzing relevant data. A descriptive study design was employed, which entails interrogating members of the study community or a sample thereof to describe the nature and extent of the phenomenon being studied. According to Sekaran and Bougie (2016), a descriptive study design is non-experimental, focusing on the relationships between non-manipulated variables in a natural setting rather than a controlled laboratory environment. Conditions and events have already occurred, allowing researchers to select the most relevant variables for analyzing existing relationships.

The data relied upon in the current research is divided into secondary data and primary data. The following clarifies these types of data and some of the sources relied upon in obtaining this data:

A- Secondary Data: This refers to data obtained to construct the theoretical framework from books, articles, and previous Arabic and foreign studies that addressed topics related to Virtual Reality Applications and Employee Training.

B- Primary Data: This refers to data collected in the field through a relevant survey questionnaire from a sample of employees at university libraries in Saudi Arabia. The survey was distributed electronically using a Google Forms template with the assistance of some employees of the company who uploaded the survey to their groups in the libraries under study. 338 valid questionnaires were obtained for statistical analysis after the sorting process and deletion of invalid questionnaires. The axes of the survey questionnaire are as follows:

Axis One: Virtual Reality Applications: This includes identifying the level of interest in Virtual Reality Applications in university libraries in Saudi Arabia, measured through 12 statements.

Axis Two: Employee Training: This involves identifying the level of interest in Employee Training in university libraries in Saudi Arabia, measured through 9 statements.

## 9. Population and Sample Design:

Given that the aim of this investigation is to examine the influence of Virtual Reality Applications on Employee Training within University libraries in Saudi Arabia, the study's target population comprises approximately 3500 individuals, as of June 2023. The sampling framework, as defined by Mugenda, & Mugenda, (2012), encompasses a comprehensive list of all potential sampling units, from which a representative sample can be drawn. In this study, the sampling framework was established based on Employees in University libraries across Saudi Arabia. Employing a simple random sampling method, a sample size of 338 university library workers in Saudi Arabia was determined using readily available tables accessible online.

Some descriptive statistics were made for some data and information related to the study sample from university libraries in Saudi Arabia employees that were collected through the questionnaire. It can be made clear that the correct sample included in the study is (n=338) while they are working in the mentioned companies.

The following table shows descriptive statistics of frequency and proportion of demographic variables for the study sample according to (type - qualification -Years of Experience- Career Level) as follows:

Table No. (1): Descriptive statistics of demographic variables for the study sample (n = 338)

| Demographic variables | | % | No. |
|---|---|---|---|
| Gender | Male | 59.8 | 202 |
| | Female | 40.2 | 136 |

| | | | |
|---|---|---|---|
| Qualification | Bachelor | 55.6 | 188 |
| | Masters | 37.3 | 126 |
| | PHD | 7.1 | 24 |
| Years of Experience | less than 10 years. | 20.1 | 68 |
| | From 10 years to less than 20 years. | 47.3 | 160 |
| | From 20 years and over. | 32.5 | 110 |
| Career Level | Supervisor | 27.2 | 92 |
| | Middle management | 48.5 | 164 |
| | Senior management | 24.3 | 82 |

From the previous Table No. (1). we find the following:

- Gender: More than half of the respondents (59.8%) were male and the rest (40.02%) were female.
- Qualification: It is evident from the previous table that the largest percentage of the study sample according to the academic qualification is that 55.6% of the total study sample with a Bachelor, followed in order by 37.3% of the total sample have masters.
- Years of Experience: It is evident from the previous table that the largest percentage of the study sample according to years of Years of Experience, is that approximately 79.8% of the total study sample have years of Duration (From 10 years and over), and that 20.1% of the total sample have years of Years of Experience of less than 10 years.
- Career Level: This study divided the Career Level into 3 levels: Supervisor, Middle management, Senior management most of the respondents were the Middle management (48.5%)

Reliability:

To make sure that the degree of reliability and validity of the questionnaire used in the study of the Measuring the relationship between Virtual Reality Applications and Employee Training, the researcher used the method factor (alpha Cronbach) to measure the reliability and validity tool used in the study is as follows.

Table No. (2): Results of Validity and Reliability

| Dimension | No | Cronbach's Alpha | Composite reliability* |
|---|---|---|---|
| Applicability. | 6 | 0.800 | 0.894 |
| Interaction. | 8 | 0.763 | 0.873 |
| Instant responses. | 6 | 0.758 | 0.871 |
| Content relevance. | 6 | 0.772 | 0.879 |
| Virtual Reality Applications | 26 | 0.917 | 0.958 |
| Service improvement. | 6 | 0.801 | 0.895 |
| Knowledge. | 6 | 0.796 | 0.892 |
| Technical Skills. | 7 | 0.778 | 0.882 |
| Employee Training. | 19 | 0.910 | 0.954 |

* Composite reliability= The positive square root of Cronbach's alpha coefficient

The table presents the results of validity and reliability assessments for various dimensions related to virtual reality applications and employee training. Cronbach's alpha coefficient and composite reliability measures are used to evaluate internal consistency and reliability. Generally, the dimensions exhibit satisfactory levels of internal consistency, with Cronbach's

alpha coefficients ranging from 0.758 to 0.917. These values indicate a high degree of reliability in the measurements. Moreover, the composite reliability values, which are the positive square roots of Cronbach's alpha coefficients, further confirm the reliability of the dimensions, ranging from 0.871 to 0.958. The high composite reliability scores suggest that the constructs are accurately measured and consistent across items.

**10. Descriptive Statistics to Measure the Variables.**

The researcher measured the availability of the study variables for Virtual Reality Applications and for Employee Training from the point of view of the sample as follows:

10.1- Descriptive Statistics for Virtual Reality Applications.

Virtual Reality Applications in its dimensions is the independent variable, and it has four basic dimensions and includes 12 questions. Availability of independent variable (Virtual Reality Applications), point of view of the study sample was determined. The results were as follows:

Table No. (3): Descriptive Statistics to Applicability in Virtual Reality Applications.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Virtual reality applications are relevant to enhancing employee training in university libraries. | 3.75 | 75% | 1.07 | 2 |
| 2- | Virtual reality technology aligns well with the learning needs and objectives of library staff. | 3.63 | 72.6% | 1.09 | 3 |
| 3- | There are clear opportunities for integrating virtual reality applications into various aspects of library operations. | 3.76 | 75.2% | 1.19 | 1 |
| | Total | 3.71 | 74.2% | 0.80 | |

From the previous Table No. (3). we find that the total average dimension of (Applicability is (3.71) and with an agreement rate of (74.2%), and this indicates that the Applicability in the Virtual Reality Applications was a neutral degree in university libraries in Saudi Arabia, and that opinions tend towards neutral on the expressions of this dimension.

Table No. (4): Descriptive Statistics to Interaction in Virtual Reality Applications.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Virtual reality applications in university libraries provide engaging and interactive learning experiences. | 3.64 | 72.8% | 1.10 | 2 |
| 2- | Users find it easy to navigate and interact with virtual reality simulations or scenarios in library training programs. | 3.59 | 71.8% | 1.08 | 3 |
| 3- | Virtual reality technology fosters collaboration and communication among library staff during training sessions. | 3.71 | 74.2% | 1.03 | 1 |
| | Total | 3.64 | 72.8% | 0.69 | |

From the previous Table No. (4). we find that the total average dimension of (Interaction is (3.64) and with an agreement rate of (72.8%), and this indicates that the Interaction in the Virtual

Reality Applications was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension.

Table No. (5): Descriptive Statistics to Instant responses in Virtual Reality Applications.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Virtual reality applications in university libraries provide immediate feedback to users, enhancing the learning process. | 3.69 | 73.8% | 1.11 | 3 |
| 2- | Users can quickly adjust their actions based on real-time responses within virtual reality training environments. | 3.80 | 76% | 1.11 | 2 |
| 3- | Instant feedback from Virtual reality applications helps improve user performance and skill acquisition in library training sessions. | 3.92 | 78.4% | 1.12 | 1 |
| | Total | 3.80 | 76.0% | 0.76 | |

From the previous Table No. (5). we find that the total average dimension of (Instant responses is (3.80) and with an agreement rate of (76%), and this indicates that the Instant responses in the Virtual Reality Applications was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agreement on the expressions of this dimension.

Table No. (6): Descriptive Statistics to Content relevance in Virtual Reality Applications.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | The content offered through virtual reality applications is closely aligned with the specific training needs of library staff. | 3.75 | 75.0% | 1.11 | 2 |
| 2- | Virtual reality simulations or scenarios effectively convey relevant information and skills required for library operations. | 3.68 | 73.6% | 1.22 | 3 |
| 3- | The virtual reality training content addresses the specific challenges and scenarios encountered by library staff, enhancing their job-related skills and knowledge. | 3.76 | 75.2% | 1.15 | 1 |
| | Total | 3.73 | 74.6% | 0.80 | |

From the previous Table No. (6). we find that the total average dimension of (Content relevance is (3.73) and with an agreement rate of (74.6%), and this indicates that the Content relevance in the Virtual Reality Applications was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agreement on the expressions of this dimension.

The level of interest in Virtual Reality Applications within university libraries in Saudi Arabia has been assessed, and the study sample's perspective on these dimensions has been organized accordingly. The findings are as follows:

Table No. (7): Descriptive Statistics for the Virtual Reality Applications Variable.

| N | Dimensions | Mean | Percentage % | Std. | Arrang. |
|---|---|---|---|---|---|
| 1- | Applicability. | 3.71 | 74.2% | 0.80 | 3 |
| 2- | Interaction. | 3.64 | 72.8% | 0.69 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 3- | Instant responses. | 3.80 | 76.0% | 0.76 | 1 |
| 4- | Content relevance. | 3.73 | 74.6% | 0.80 | 2 |
| | Total (Virtual Reality Applications) | 3.72 | 74.4% | 0.65 | |

This table displays descriptive statistics for Virtual Reality Applications, encompassing dimensions such as Applicability, Interaction, Instant responses, and Content relevance, along with a total score. Notably, Applicability and Content relevance received mean scores of 3.71 and 3.73, respectively, indicating high levels of agreement among respondents regarding their relevance within university libraries in Saudi Arabia, with percentages of 74.2% and 74.6%. Instant responses garnered the highest mean score of 3.80, suggesting strong agreement (76.0%) and highlighting its perceived effectiveness. Interaction, while slightly lower with a mean score of 3.64 and 72.8% agreement, still reflects positive sentiment. Standard deviations are relatively low across all dimensions, indicating consistency in responses.

10.2- Descriptive Statistics for Employee Training.

Employee Training in its dimensions is the independent variable, and it has three basic dimensions and includes 9 questions. Availability of independent variable (Employee Training), point of view of the study sample was determined. The results were as follows:

Table No. (8): Descriptive Statistics to Service improvement in Employee Training.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Employee training programs in university libraries effectively contribute to improving the quality of service provided to library users. | 3.73 | 74.56% | 1.09 | 1 |
| 2- | Training initiatives lead to noticeable enhancements in customer satisfaction levels within university library settings. | 3.59 | 71.83% | 1.15 | 2 |
| 3- | Training opportunities are valuable for employees to refine their service delivery skills and effectively meet the needs of users. | 3.51 | 70.30% | 1.12 | 3 |
| | Total | 3.61 | 72.2% | 0.81 | |

From the previous Table. we find that the total average dimension of (Service improvement) is (3.61) and with an agreement rate of (72.2%), and this indicates that the Service improvement in the Employee Training was a neutral degree in university libraries in Saudi Arabia, and that opinions tend towards neutral on the expressions of this dimension.

Table No. (9): Descriptive Statistics to Knowledge in Employee Training.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Employee training programs in university libraries significantly enhance participants' knowledge of library resources, services, and policies. | 3.65 | 73.02% | 1.13 | 1 |
| 2- | Training sessions provide employees with comprehensive and up-to-date information on relevant topics related to library operations and management. | 3.61 | 72.19% | 1.08 | 3 |
| 3- | Participants demonstrate increased confidence and competence in their roles following completion of training programs in university libraries. | 3.62 | 72.43% | 1.07 | 2 |
| | Total | 3.62 | 72.4% | 0.76 | |

From the previous Table. (9). we find that the total average dimension of (Knowledge) is (3.62) and with an agreement rate of (72.4%), and this indicates that the Knowledge in the Employee Training was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension.

Table No. (10): Descriptive Statistics to Technical Skills in Employee Training.

| N | Statement | Mean | agreement rate | Std deviation | Arrang. |
|---|---|---|---|---|---|
| 1- | Training initiatives effectively develop employees' technical skills required for utilizing library management systems, databases, and other technological tools. | 3.60 | 72.0% | 1.10 | 3 |
| 2- | Participants acquire proficiency in using specialized software and equipment through hands-on training sessions conducted in university libraries. | 3.69 | 73.8% | 1.04 | 2 |
| 3- | Employees demonstrate improved efficiency and effectiveness in performing technical tasks and troubleshooting issues after participating in training programs. | 3.74 | 74.8% | 1.14 | 1 |
| | Total | 3.67 | 73.4% | 0.72 | |

From the previous Table. (10). we find that the total average dimension of (Technical Skills) is (3.67) and with an agreement rate of (73.4%), and this indicates that the Technical Skills in the Employee Training was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agreement on the expressions of this dimension.

The level of interest in Employee Training was assessed within university libraries in Saudi Arabia, and the study sample provided their perspectives on these dimensions. The findings are outlined below:

Table No. (11): Descriptive Statistics for the Employee Training Variable.

| N | Dimensions | Mean | Percentage % | Std. | Arrang. |
|---|---|---|---|---|---|
| 1- | Service improvement. | 3.61 | 72.2% | 0.81 | 3 |
| 2- | Knowledge. | 3.62 | 72.4% | 0.76 | 2 |
| 3- | Technical Skills. | 3.67 | 73.4% | 0.72 | 1 |
| | Total (Employee Training) | 3.63 | 72.6% | 0.69 | |

This table illustrates the descriptive statistics for the Employee Training variable across three dimensions—Service improvement, Knowledge, and Technical Skills—in university libraries in Saudi Arabia. Each dimension is assessed based on its mean score, percentage, and standard deviation. The results indicate a generally positive perception of Employee Training, with mean scores ranging from 3.61 to 3.67. Specifically, Technical Skills received the highest rating, with 73.4% of respondents rating it positively, followed closely by Knowledge (72.4%) and Service improvement (72.2%). Despite overall positive ratings, there is some variability in responses, as evidenced by the standard deviations ranging from 0.72 to 0.81. Overall, the findings suggest a strong interest in Employee Training among university library staff in Saudi Arabia, particularly in the development of technical skills, albeit with some variability in perceived importance across dimensions.

## 11. Test the Hypotheses of the Study:

The second section delves into testing hypotheses using statistical methods to determine their validity. Structural Equation Modeling (SEM) is employed to examine the effect of an independent variable on the dependent variable, while evaluating the model's quality through various criteria. Normed Chi-Square, or the relative chi-square, divides the chi-square index by the degrees of freedom, with no consensus on an acceptable ratio. The Goodness-of-Fit statistic (GFI) calculates the proportion of variance accounted for by the estimated population covariance, with values ranging from 0 to 1. The Adjusted Goodness of Fit Index (AGFI) tends to increase with sample size, with values of 0.90 or higher indicating well-fitting models. The Normed Fit Index (NFI) compares the model's chi-square value to that of the null model, with values above 0.90 suggesting good fit. The Comparative Fit Index (CFI), like the NFI, considers sample size and values closer to 1.0 indicating good fit. Incremental fit indices (IFI) compare the chi-square value to a baseline model, with values ranging from 0 to 1. Root Mean Square Residual (RMR) and Standardized Root Mean Square Residual (SRMR) indicate the difference between the residuals of the sample covariance matrix and the hypothesized covariance model. Finally, the Root Mean Square Error of Approximation (RMSEA) in the range of 0.05 to 0.10 suggests fair fit, while below 0.08 indicates good fit.

11.1- The First hypothesis:

"There is a Statistically Significant impact of Applicability on Employee Training in University libraries in Saudi Arabia".

To verify the quality of the model and determine the validity of the hypothesis, this was tested through a set of criteria for judging the quality of the model shown in the following table.

Table No. (12): Measurement Model Assessment (Applicability)

| Indicator | Value | Acceptance level |
|---|---|---|
| Normed Chi-Square | 3.456 | between (2,5) |
| The Goodness-of-Fit statistic (GFI) | 0.911 | between (0,1) |
| Adjusted Goodness of Fit Index (AGFI) | 0.920 | between (0,1) ≥ 0.90 |
| Normed Fit Index (NFI) | 0.967 | between (0,1) ≥ 0.95 |
| The Comparative Fit Index (CFI) | 0.959 | between (0,1) ≥ 0.95 |

| | | |
|---|---|---|
| RMSEA | 0.045 | between (0.01,0.08) |

This table presents the results of the measurement model assessment for the dimension of "Applicability." Each indicator's value is compared against predetermined acceptance levels to evaluate the model's goodness of fit. The Normed Chi-Square value of 3.456 exceeds the ideal range of (2,5), indicating potential issues with model fit. However, other fit indices suggest favorable results. The Goodness-of-Fit statistic (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) all surpass the recommended thresholds of 0.90 or 0.95, suggesting a good fit between the model and the data. Additionally, the Root Mean Square Error of Approximation (RMSEA) falls within the desired range of (0.01, 0.08), further supporting the model's adequacy. Overall, while the Normed Chi-Square value slightly deviates from the ideal range, the majority of fit indices indicate a satisfactory fit between the measurement model and the observed data.

Table No. (13): Structural path analysis result (Applicability)

| exogenous construct | Path | endogenous construct | Estimate B (path coefficient) | S. E | Z-Test | $R^2$ | p-value |
|---|---|---|---|---|---|---|---|
| Applicability | ⇨⇨ | Employee Training | 0.763 | 0.044 | 14.730 | 0.582 | *** |
| | ⇨⇨ | Service improvement. | 0.765 | 0.051 | 14.969 | 0.586 | *** |
| | ⇨⇨ | Knowledge. | 0.668 | 0.056 | 11.021 | 0.447 | *** |
| | ⇨⇨ | Technical Skills. | 0.628 | 0.055 | 10.124 | 0.395 | *** |

***p<.001, **p<.01*p<.05

This table presents the results of the structural path analysis for the dimension of "Applicability" in the context of the study. Each row corresponds to a specific path from the exogenous construct "Applicability" to various endogenous constructs, including Employee Training, Service Improvement, Knowledge, and Technical Skills. The "Estimate B" column indicates the path coefficient, which represents the strength and direction of the relationship between the constructs. The high values of the path coefficients (ranging from 0.628 to 0.765) suggest strong positive relationships between Applicability and each of the endogenous constructs. Additionally, the low standard errors and high Z-test values indicate the robustness and statistical significance of these relationships. The proportion of variance explained (R2) values ranging from 0.395 to 0.582 indicates that Applicability accounts for a substantial portion of the variability in Employee Training, Service Improvement, Knowledge, and Technical Skills. Overall, these results provide strong evidence supporting the hypothesis that Applicability significantly predicts and influences various dimensions of employee training in university libraries in Saudi Arabia.

11.2- The Second hypothesis:

"There is a Statistically Significant impact of Interaction on Employee Training in University libraries in Saudi Arabia".

To verify the quality of the model and determine the validity of the hypothesis, this was tested through a set of criteria for judging the quality of the model shown in the following table.

Table No. (14): Measurement Model Assessment (Interaction)

| Indicator | Value | Acceptance level |
|---|---|---|
| Normed Chi-Square | 3.115 | between (2,5) |
| The Goodness-of-Fit statistic (GFI) | 0.944 | between (0,1) |
| Adjusted Goodness of Fit Index (AGFI) | 0.932 | between (0,1) ≥ 0.90 |
| Normed Fit Index (NFI) | 0.978 | between (0,1) ≥ 0.95 |
| The Comparative Fit Index (CFI) | 0.980 | between (0,1) ≥ 0.95 |
| RMSEA | 0.066 | between (0.01,0.08) |

Table No. (14) presents the results of the measurement model assessment for the dimension of "Interaction." Each indicator's value is compared against predefined acceptance levels to evaluate the goodness of fit of the model. The Normed Chi-Square value slightly exceeds the ideal range of (2,5), indicating potential issues with model fit. However, other fit indices suggest favorable results. The Goodness-of-Fit statistic (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI) all surpass the recommended thresholds of 0.90 or 0.95, suggesting a good fit between the model and the data. Additionally, the Root Mean Square Error of Approximation (RMSEA) falls within the desired range of (0.01, 0.08), further supporting the adequacy of the model fit. Overall, while the Normed Chi-Square value indicates some deviation, most fit indices suggest a satisfactory fit between the measurement model and the observed data for the dimension of "Interaction."

Table No. (15): Structural path analysis result (Interaction)

| exogenous construct | Path | endogenous construct | Estimate B (path coefficient) | S. E | Z-Test | $R^2$ | p-value |
|---|---|---|---|---|---|---|---|
| Interaction | ⇨⇨ | Employee Training | 0.812 | 0.047 | 16.614 | 0.660 | *** |
| | ⇨⇨ | Service improvement. | 0.695 | 0.067 | 11.797 | 0.483 | *** |
| | ⇨⇨ | Knowledge. | 0.737 | 0.062 | 12.271 | 0.543 | *** |
| | ⇨⇨ | Technical Skills. | 0.709 | 0.051 | 15.855 | 0.502 | *** |

***p<.001, **p<.01*p<.05

Table No. (15) outlines the outcomes of the structural path analysis for the "Interaction" dimension. All path coefficients exhibit substantial positive values, ranging from 0.695 to 0.812, implying strong positive associations between Interaction and the endogenous constructs. Moreover, the low standard errors and high Z-test values further affirm the robustness and statistical significance of these relationships. The proportion of variance explained (R2) values, ranging from 0.483 to 0.660, signify that Interaction accounts for a considerable portion of the variability in Employee Training, Service Improvement, Knowledge, and Technical Skills. Additionally, the p-values indicate high significance levels (***p<.001), endorsing the strength of these relationships. In essence, these results underscore the significant and positive impact of Interaction on various dimensions of employee training within university libraries, as inferred from the structural path analysis.

11.3- The Third hypothesis:

"There is a Statistically Significant impact of Instant responses on Employee Training in University libraries in Saudi Arabia".

To verify the quality of the model and determine the validity of the hypothesis, this was tested through a set of criteria for judging the quality of the model shown in the following table.

Table No. (16): Measurement Model Assessment (Instant responses)

| Indicator | Value | Acceptance level |
|---|---|---|
| Normed Chi-Square | 2.998 | between (2,5) |
| The Goodness-of-Fit statistic (GFI) | 0.943 | between (0,1) |
| Adjusted Goodness of Fit Index (AGFI) | 0.968 | between (0,1) ≥ 0.90 |
| Normed Fit Index (NFI) | 0.959 | between (0,1) ≥ 0.95 |
| The Comparative Fit Index (CFI) | 0.977 | between (0,1) ≥ 0.95 |
| RMSEA | 0.073 | between (0.01,0.08) |

Table No. (16) provides an evaluation of the measurement model for the dimension of "Instant responses." The indicators' values are assessed against predetermined acceptance levels to gauge the model's goodness of fit. The Normed Chi-Square value falls within the acceptable range (2,5), indicating a satisfactory model fit. Moreover, other fit indices, including the Goodness-of-Fit statistic (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI), surpass the recommended thresholds of 0.90 or 0.95, indicating a strong fit between the model and the data. Although the Root Mean Square Error of Approximation (RMSEA) value slightly exceeds the desired range of (0.01, 0.08), it remains within an acceptable range, suggesting acceptable model fit. Overall, these findings suggest that the measurement model for "Instant responses" adequately captures the observed data with minor room for improvement.

Table No. (17): Structural path analysis result (Instant responses)

| exogenous construct | Path | endogenous construct | Estimate B (path coefficient) | S. E | Z-Test | $R^2$ | p-value |
|---|---|---|---|---|---|---|---|
| Instant responses | ⇨⇨ | Employee Training | 0.762 | 0.048 | 14.088 | 0.581 | *** |
| | ⇨⇨ | Service improvement. | 0.604 | 0.067 | 9.452 | 0.365 | *** |
| | ⇨⇨ | Knowledge. | 0.622 | 0.062 | 9.720 | 0.387 | *** |
| | ⇨⇨ | Technical Skills. | 0.792 | 0.043 | 17.932 | 0.627 | *** |

***p<.001, **p<.01*p<.05

Table No. (17) presents the outcomes of the structural path analysis for the exogenous construct "Instant responses" and its associations with various endogenous constructs including Employee Training, Service Improvement, Knowledge, and Technical Skills. The path coefficients reflect the strength and direction of these relationships. The results indicate significant positive relationships between Instant responses and each of the endogenous constructs, with high path coefficients ranging from 0.604 to 0.792. This suggests that higher levels of Instant responses correspond to increased levels of Employee Training, Service Improvement, Knowledge, and Technical Skills. Additionally, the low standard errors and high Z-test values reinforce the robustness and statistical significance of these relationships. Overall, these findings underscore the importance of Instant responses in enhancing various dimensions of employee training within university libraries.

11.4- The Fourth hypothesis:

"There is a Statistically Significant impact of Content relevance on Employee Training in University libraries in Saudi Arabia".

To verify the quality of the model and determine the validity of the hypothesis, this was tested through a set of criteria for judging the quality of the model shown in the following table.

Table No. (18): Measurement Model Assessment (Content relevance)

| Indicator | Value | Acceptance Level |
|---|---|---|
| Normed Chi-Square | 4.024 | between (2,5) |
| The Goodness-of-Fit statistic (GFI) | 0.937 | between (0,1) |
| Adjusted Goodness of Fit Index (AGFI) | 0.969 | between (0,1) ≥ 0.90 |
| Normed Fit Index (NFI) | 0.958 | between (0,1) ≥ 0.95 |
| The Comparative Fit Index (CFI) | 0.960 | between (0,1) ≥ 0.95 |
| RMSEA | 0.059 | between (0.01,0.08) |

Table No. (18) provides an assessment of the measurement model for the dimension of "Content relevance." The Normed Chi-Square value, although slightly exceeding the ideal range of (2,5), still falls within an acceptable range, indicating reasonable model fit. Moreover, other fit indices, including the Goodness-of-Fit statistic (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI), exceed the recommended thresholds of 0.90 or 0.95, suggesting a good fit between the model and the data. The Root Mean Square Error of Approximation (RMSEA) value falls within the desired range of (0.01, 0.08), further supporting the adequacy of the model fit. Overall, these results suggest that the measurement model for "Content relevance" adequately represents the observed data.

Table No. (19): Structural path analysis result (Content relevance)

| exogenous construct | Path | endogenous construct | Estimate B (path coefficient) | S. E | Z-Test | $R^2$ | p-value |
|---|---|---|---|---|---|---|---|
| Interaction | ⇨⇨ | Employee Training | 0.804 | 0.041 | 16.415 | 0.646 | *** |
| | ⇨⇨ | Service improvement. | 0.696 | 0.057 | 12.340 | 0.484 | *** |
| | ⇨⇨ | Knowledge. | 0.618 | 0.058 | 9.978 | 0.382 | *** |
| | ⇨⇨ | Technical Skills. | 0.824 | 0.039 | 19.066 | 0.679 | *** |

***p<.001, **p<.01*p<.05

Table No. (19) shows the impact of "Content relevance" on Employee Training, Service Improvement, Knowledge, and Technical Skills. Path coefficients range from 0.618 to 0.824, indicating strong positive associations. Low standard errors and high Z-test values confirm the relationships' robustness. The R2 values (0.382 to 0.679) suggest Content relevance explains much variability in the constructs. High significance levels (***p<.001) underline the strength of these relationships. Overall, Content relevance significantly influences employee training in university libraries.

## 12. Results and Conclusions Study.

The study has yielded several results that hold the potential to address the research problem, respond to its inquiries, and assess its hypotheses. The researcher has organized the findings of the field study based on the variables established in the investigation, aimed at evaluating the influence of Virtual Reality Applications on Employee Training, so that the benefit is clearer, especially when formulating appropriate and applicable recommendations for each variable, as follows:

12.1- Results related to Virtual Reality Applications:

The current study concluded that is a high availability of Virtual Reality Applications dimensions, and opinions tend to agree. It was found that the most available dimensions of Virtual Reality Applications are respectively: The first (Instant responses) the Mean is (3.80), the second (Content relevance) the Mean is (3.73), the third (Applicability) the Mean is (3.71), the fourth (Interaction) the Mean is (3.64). The availability ratio for each dimension of Virtual Reality Applications was as follows:

The study concluded that interest in Applicability as one of Virtual Reality Applications Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The findings indicated clear prospects for incorporating virtual reality applications across different facets of library operations.

The study concluded that interest in Interaction as one of Virtual Reality Applications Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The findings underscored how virtual reality technology promotes collaboration and communication among library staff during training sessions.

The study concluded that interest in Instant responses as one of Virtual Reality Applications Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The results unveiled that immediate feedback from Virtual Reality applications aids in enhancing user performance and skill acquisition during library training sessions.

The study concluded that interest in Content relevance as one of Virtual Reality Applications Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The results suggested that the virtual reality training content effectively addresses the specific challenges and scenarios encountered by library staff, thereby enhancing their job-related skills and knowledge.

12.2- Results related to Employee Training:

The current study concluded that is a high availability of Employee Training dimensions, and opinions tend to agree. It was found that the most available dimensions of Employee Training are respectively: The first (Technical Skills) the Mean is (3.67), the second (Knowledge) the Mean is (3.62), the third (Service improvement) the Mean is (3.61). The availability ratio for each dimension of Employee Training was as follows:

The study concluded that interest in Service improvement as one of Employee Training Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The findings suggested that employee training programs in university libraries significantly contribute to enhancing the quality of service provided to library users.

The study concluded that interest in Knowledge as one of Employee Training Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The findings uncovered that employee training programs in university libraries substantially improve participants' understanding of library resources, services, and policies.

The study concluded that interest in Technical Skills as one of Employee Training Dimensions was a high degree in university libraries in Saudi Arabia, and that opinions tend towards agree on the expressions of this dimension. The findings suggested that employees exhibit enhanced efficiency and effectiveness in performing technical tasks and troubleshooting issues after participating in training programs.

12.3- Results related to impact Virtual Reality Applications on Employee Training:

Subsidiary hypotheses. Regarding the impact of each dimension individually, the breakdown was as follows:

- Impact of Applicability on Employee Training:

The study revealed that Applicability significantly influences all dimensions of Employee Training, namely Service Improvement, Knowledge, and Technical Skills. Among these dimensions, Service Improvement exhibits the strongest impact, with a path coefficient of 0.765 ($p < 0.001$), closely followed by Knowledge, with a coefficient of 0.668 ($p < 0.001$), and Technical Skills, with a coefficient of 0.628 ($p < 0.001$). This suggests that the perceived applicability of virtual reality applications in university library settings positively contributes to enhancing service quality, expanding knowledge among employees, and improving technical competencies. Such findings underscore the multifaceted benefits of integrating virtual reality technology into employee training programs within library contexts.

- Impact of Interaction on Employee Training:

The study revealed that Interaction significantly influences all dimensions of Employee Training, namely Employee Training itself, Knowledge, Technical Skills, and Service Improvement. Notably, Interaction exhibits the strongest impact on Employee Training, with a substantial path coefficient of 0.812 ($p < 0.001$), emphasizing its pivotal role in shaping overall training outcomes. Following closely, Knowledge is significantly influenced by Interaction, with a path coefficient of 0.737 ($p < 0.001$), highlighting its contribution to enriching participants' understanding and expertise. Similarly, Technical Skills and Service Improvement are significantly impacted by Interaction, with path coefficients of 0.709 ($p < 0.001$) and 0.695 ($p < 0.001$) respectively, emphasizing the comprehensive influence of Interaction across diverse aspects of employee training. These findings underscore the significance of interactive elements

in training programs within university library settings, affirming their effectiveness in enhancing various dimensions of employee performance and service quality.

- Impact of Instant responses on Employee Training:

The study revealed that Instant Responses significantly influence all dimensions of Employee Training, comprising Service Improvement, Knowledge, and Technical Skills. Notably, Instant Responses exert the strongest impact on Technical Skills, as evidenced by a substantial path coefficient of 0.792 ($p < 0.001$), underscoring their role in enhancing employees' technical competencies. Following closely, Instant Responses also significantly affect overall Employee Training, with a path coefficient of 0.762 ($p < 0.001$), emphasizing their substantial contribution to improving training outcomes. Additionally, Instant Responses positively influence Knowledge, with a path coefficient of 0.622 ($p < 0.001$), indicating their role in expanding employees' knowledge base. Similarly, Instant Responses impact Service Improvement, with a path coefficient of 0.604 ($p < 0.001$), signifying their importance in enhancing service quality within the organizational context. These findings underscore the multifaceted benefits of prompt feedback and responsiveness in facilitating comprehensive employee development and service enhancement initiatives within university library settings.

- Impact of Content relevance on Employee Training:

The study revealed that Content Relevance significantly impacts all dimensions of Employee Training, notably influencing Technical Skills with the strongest effect. The analysis reveals that Content Relevance plays a pivotal role in enhancing employees' technical competencies, as evidenced by a substantial path coefficient of 0.824 ($p < 0.001$). Following closely, Content Relevance also significantly contributes to overall Employee Training, reflecting its substantial impact on improving training outcomes, as indicated by a path coefficient of 0.804 ($p < 0.001$). Additionally, Content Relevance positively influences Service Improvement, emphasizing its meaningful role in enhancing service quality, with a path coefficient of 0.696 ($p < 0.001$). Moreover, Content Relevance affects Knowledge, highlighting its notable influence on expanding employees' knowledge base, with a path coefficient of 0.618 ($p < 0.001$). These findings underscore the multifaceted benefits of relevant content in shaping comprehensive employee development and service enhancement initiatives within university library settings.

## 13. Study Recommendations:

From the findings point of views in the study. The researcher proposed the following action plan to university libraries in Saudi Arabia:

13.1- Recommendations related to Virtual Reality Applications:

Table No. (20): The Proposed Action Plan of Virtual Reality Applications.

| Study Result | Recommendation | Tasks | Responsibility |
|---|---|---|---|
| There was High availability of (Applicability) | Organize workshops or training sessions specifically focused on demonstrating the practical applications and benefits of virtual reality (VR) technology in addressing the learning needs and objectives of library staff. | - Develop a comprehensive workshop agenda highlighting VR technology's applications in library operations, including presentations, demonstrations, and hands-on activities.<br>- Create informative materials such as brochures, case studies, and video testimonials showcasing successful VR implementations in libraries.<br>- Gather participant feedback through surveys or focus group discussions to evaluate their understanding of VR technology and its relevance to their learning objectives. | Human Resources Department<br>Training and Development Department<br>Information Technology (IT) Department |
| There was High interest of (Interaction) | Conduct user testing sessions to gather feedback on navigation and interaction within virtual reality simulations or scenarios. | - Recruit a diverse group of library staff volunteers to participate in user testing sessions conducted in controlled VR laboratory environments. Provide clear instructions and scenarios for participants to navigate through during the testing sessions.<br>- Develop a structured testing protocol that includes predefined tasks, observation guidelines, and post-test questionnaires to collect qualitative and quantitative feedback on the usability and user experience of the VR simulations or scenarios.<br>- Analyze the collected feedback and identify common pain points, usability issues, and areas for improvement within the VR simulations or scenarios. Prioritize actionable recommendations for enhancing navigation, interaction, and overall user experience based on the findings from the user testing sessions. | Research and Development Department<br>User Experience (UX) Design Team<br>Quality Assurance (QA) Department |
| There was High interest of (Instant responses) | Prioritize the implementation of real-time feedback mechanisms within VR training programs. | - Evaluate existing VR training programs to identify opportunities for integrating real-time feedback mechanisms, such as performance metrics, progress trackers, and interactive assessments, into the learning experiences. Collaborate with instructional designers and VR developers to design and implement these feedback mechanisms effectively.<br>- Conduct pilot tests of the updated VR training programs with a small group of library staff volunteers to assess the functionality and effectiveness of the real-time feedback mechanisms in providing timely and relevant feedback during training sessions.<br>- Gather feedback from pilot test participants through surveys or focus group discussions to evaluate their satisfaction with the real-time feedback mechanisms and their perceived impact on learning outcomes. Use this feedback to | Training and Development Department<br>Technology Innovation Team<br>User Experience (UX) Design Team |

| Study Result | Recommendation | Tasks | Responsibility |
|---|---|---|---|
| | | iteratively refine the implementation of real-time feedback within VR training programs. | |
| There was High interest of (Content relevance) | Conduct a comprehensive review and enhancement of the content and instructional design of the VR training programs. | - Review Existing Content: Begin by conducting a thorough review of the current content and instructional design of the VR training programs. Evaluate the alignment of content with learning objectives, clarity of instructions, level of interactivity, and overall effectiveness in conveying essential information and skills related to library operations.<br>- Stakeholder Consultation: Engage key stakeholders, including subject matter experts, instructional designers, VR developers, and library staff, in collaborative discussions to gather insights and feedback on the strengths and weaknesses of the existing VR training programs. Seek input on content relevance, instructional strategies, user engagement, and areas for improvement.<br>- Content Enhancement and Iterative Design: Based on the feedback received and insights gathered from stakeholder consultations, prioritize areas for content enhancement and instructional design refinement. Work closely with instructional designers and VR developers to iteratively enhance the content, incorporate interactive elements, update visual assets, and improve the overall user experience of the VR training programs. | Training and Development Department<br>Instructional Design Team<br>Quality Assurance (QA) Department |

13.2- Recommendations related to Employee Training:

Table No. (21): The Proposed Action Plan of Employee Training.

| Study Result | Recommendation | Tasks | Responsibility |
|---|---|---|---|
| There was High interest of (Service improvement) | Implement regular training sessions focused on refining service delivery skills tailored to the specific needs of employees within the university library. | - Survey employees for feedback on service delivery strengths and areas for improvement.<br>- Develop training sessions covering communication, conflict resolution, and customer service.<br>- Integrate interactive role-playing activities simulating service scenarios. | Human Resources Department<br>Training and Development Department<br>Library Management Team |
| There was High interest of (Knowledge) | Strengthen training sessions by ensuring they offer comprehensive and up-to-date information on various topics related to library operations and management. | - Update materials to reflect current best practices and trends.<br>- Work with experts to ensure training covers relevant topics.<br>- Design engaging activities like case studies and discussions. | Training and Development Department<br>Library Management Team |
| There was High interest of | Enhance training initiatives to effectively develop employees' technical skills | - Evaluate employees' technical proficiency. | IT Department |

| Study Result | Recommendation | Tasks | Responsibility |
|---|---|---|---|
| (Technical Skills) | required for utilizing library management systems, databases, and other technological tools by adopting a multifaceted approach. | - Create modules focusing on library systems and databases.<br>- Provide hands-on sessions and personalized coaching. | Training and Development Department |

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