

## Research Article

# Mix Method Approach of Measuring VR as a Pedagogical Tool to Enhance Experimental Learning: Motivation from Literature Survey of Previous Study

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This research has been experimented on our previous literature review. Technological advancement has prevailed in the modern era from the 20<sup>th</sup> century. Artificial intelligence and virtual worlds have been created for rapid technological development. This paper is aimed at exploring the effect of virtual reality as a pedagogical tool for enhancing experiential learning among undergraduate students. Considering this, it was a mixed-methods study following the design of sequential exploratory—which includes qualitative followed by quantitative part. The targeted population was undergraduate students taking education programs from Public Sector Universities of Sindh. For the qualitative part, the sample of eight undergraduate students was interviewed for exploring their perceptions about virtual reality for enhancing experiential learning. The interviewed data were thematically analyzed, which revealed seven themes. For the quantitative part, emerged seven themes were used as constructs for developing the questionnaire. It was then used for quantitative data collection having excellent reliability. A sample of 80 students was taken, and data were collected by self-administration. The quantitative data were analyzed by descriptive as well as inferential statistics. Hence, the results found a statistically significant effect of virtual reality for enhancing experiential learning. However, user-friendliness ensures the applicability of virtual reality. Thus, it concluded that the implementation of virtual reality influences experiential learning enhancement. However, the implementation of virtual reality still depends upon the user-friendly nature of technology and virtual reality.

## 1. Introduction

The word “virtual” is often used to draw listeners’ attention to computers or computer-based programs in today’s world. The term “virtual” refers to creating objects and events rarely done or experienced in a physical setting. In the 1980s, “virtual reality” was initially used to describe the ability of computers to create an artificial environment. However, the scope has broadened recently to cyberspace after hearing the word virtual reality. With the passage of time,

this connection between virtuality and technology has developed and been accepted throughout the world.

Technology has become an integral part of recent times. Almost everyone is using it for different purposes. It is integrated everywhere, including academic, social, and professional lives. For instance, banking has moved heavily to e-banking, e-commerce, e-businesses, and the use of simulations in computing, especially education is transitioned to technological platforms. Thus, technological advancement has brought industrial revolution 4.0 [1], which deals with

innovative technologies including robotics, artificial intelligence, and virtual reality and their application [1]. Particularly, the education sector is influenced by technology and its 4<sup>th</sup> industrial revolution, which allows using advanced educational technologies. For aligning education with the 4<sup>th</sup> industrial revolution, where education 4.0 seems to be an answer to use the Industrial Revolution 4.0, in which individuals and technologies merge to generate new creative and innovative opportunities [2]. Thus, integration of virtual reality in the teaching-learning process is an element of education 4.0. Though, developed countries practice virtual reality for teaching and learning purposes, from school to higher education. The implementation of virtual reality is less observed in the Pakistani context. Schools have no access to such technology, whereas some well-equipped universities practice virtual reality in the teaching and learning process.

According to empirical studies, education is now shifted from a unidirectional to a multidimensional process [3]. Teachers provide an environment, either physical or virtual, for enhancing students' learning [4], where students are solely responsible for their learning rather than relying on the teacher. Also, students seem to be more involved, motivated, and self-directed in their learning in such environments [5]. Thus, some educational disciplines practiced virtual reality and found a significant effect on students' learning and motivation [6, 7]. Though, the applicability of virtual reality is now seen in some parts, Pakistan is yet to practice virtual reality in the teaching-learning process. Based on personal observation, some of the well-reputed universities bring it into their practice, but there are not any empirical research studies found yet. Therefore, there is a gap in conducting research studies in the Pakistani context. Also, the application of virtual reality is an important gap that needs to be filled [8].

Since Pakistan is a developing country, the use of technology is found less. School-aged pupils do not have adequate availability of gadgets and the internet. Even though learners operate computers, however, instructor support for acquiring technical skills is missing. As a result, when they get to university, they lack technical capabilities. After enrolling in the university, such students gain access to computers and adequate instructor support, which also found to be engaged in computer-based activities. Though, virtual reality aids in the enhancement of experiential learning for pupils [9]. Assisting students in digitally seeing the environment is an innovative and productive method to be used in education. Thus, this study is aimed at exploring the effect of virtual reality as a pedagogical tool for enhancing experiential learning among undergraduate students of the education department (pre-service teachers). Recently, exclusive literature related to virtual reality for enhancing students' experiential learning has found that virtual reality aids students' experiential learning by allowing them to interact and immerse in a provided simulated environment [10, 11].

*1.1. Background and Motivation.* This empirical study has been motivated from the paper titled published in Hindawi's Education Research International titled, "Virtual Reality as Pedagogical Tool to Enhance Experiential Learning: A Sys-

tematic Literature Review [10]." The said study focused on systematically reviewing the possibility of including VR as pedagogical tool to enhance experiential learning and is totally different from the current study. Though the area of both the articles is the same, the nature of both the articles is entirely different. The former is highlighting the global perspective and practices of virtual reality for enhancing experiential learning. However, the latter is exploring the local perspectives of prospective teachers regarding virtual reality for enhancing experiential learning. In the former study, the global empirical studies were selected and reviewed based on certain themes, whereas, in the current study, the mixed methodology with the sequential exploratory design was employed, and a questionnaire was developed to determine the contextual perspectives of prospective teachers to enhance experiential learning through virtual reality as a pedagogical tool. The methodological and contextual gap has been filled by this study. Therefore, both articles are serving distinct purposes in the world of academia.

## 2. Snapshot of Literature Review

This section describes the overall related work mentioned in our own work [10].

*2.1. Virtual Reality as Pedagogical Tool.* The application of virtual reality in education has found positive outcomes about its structural flexibilities, such as increased time on the job, happiness, motivation, comprehensible feedback, and long-term dedication [12–14]. It also encourages users to get involved in exploring via simulations that would otherwise be inaccessible in real-world scenarios [15, 16]. Any instructor teaching history or geography is unable to engage students in travel or field trips as a viable option. However, students can experience the immense beauty of ancient places via virtual reality platform [17]. In addition, virtual reality is being used to simulate surgical treatments and is becoming more popular. Though virtual reality was mainly used to mimic surgical operations, it could also recreate other medical procedures such as rehabilitation [18, 19]. Furthermore, since many of the applications were designed to replicate real-world learning experiences, learners' geographic location has little bearing on distance learning which allows students to enjoy the learning process [20, 21].

Virtual reality solutions are often motivated by academics' belief that with VR students can have richer learning experiences than traditional educational methods [19]. Though it is beneficial in educational settings, students have some concerns about the less real or physical properties of virtual reality. Some researchers believed that less realistic immersion by virtual reality apps might divert students [22]. However, educators continued to practice virtual reality techniques only for limited topics [23, 24]. Hamilton et al. [25] argued that there is a homogeneously interactive virtual reality application having content and practical learning for relevance and alignment, whereas medical sciences have a lower level of virtual reality interaction because most of the simulations could not be included in the trial. Moreover, experiments using virtual reality simulations to

improve reasoning skills, for only a handful focusing on procedural applications [22].

**2.2. Constructivism Facilitates Experiential Learning.** The constructivism theory can be extended to a variety of game platforms. Constructivism emphasizes the significance of experience-based learning. It shows that direct involvement of experiences improves knowledge retention. For instance, video games enable students to roleplay while studying, whereby students play a particular character and see the world from their perspective, putting their skills and creativity to the test. Similarly, experiential learning requires constructive experimentation to gain experience. Resultantly, virtual reality could be helpful in terms of allowing students to learn from the experience of a virtually created learning environment [26].

Virtual reality is helpful for the innovating teaching and learning process. However, immersive virtual reality is usually practiced for only a few content areas. However, there is a distinct advantage of using immersive over less immersive virtual reality which depends upon the nature of the discipline. Thus, the sound learning results are found in game-based learning, whereby the immersive nature of virtual reality environments is found effective for improving students' learning [27].

**2.3. Virtual Reality Provides Immersion.** Immersion in an actual simulated world helps students to study more effectively [27]. It has been widely used in several settings, from professional medical preparation to dealing with the patients, training, and surgical learning [28–30] and also architectural planning [31] and constructing architectural spatial environments [32]. The results almost everywhere showed that interactive virtual reality has many educational benefits: it allows students to get a firsthand view of objects and events that are literally outside our grasp, it allows students to train in a safe environment while avoiding real-life dangers, and it increases learners' curiosity and enthusiasm by increasing the modes of learning [28, 32].

**2.4. Virtual Reality Enhances Experiential Learning.** Virtual reality has a wide range of applications, the bulk of that is used as an educational technology to improve students' experience-based learning [33]. It is a recommended learning strategy to contemplate innovative educational technologies which use immersive apps, as the sensory-motor paradigm by Kolb and Fry (1975) explains the role of interaction [34]. Application of such systems that create virtual environments in classroom exercises for promoting learning or using unconventional techniques in which sensory skills and bodily actions interact with cognitive processes [35] is evident in experiential learning. Thus, virtual reality facilitates students' experiential learning by involving a broad spectrum of sensory-motor interaction [34]. This technique allows students to gain real-life exposure through opportunities that are otherwise less likely to be experienced in real-world due to several reasons including risk, high cost, or a lack of time. By constructing immersive worlds that can represent reality and interact with students, virtual reality

blends fantasy with reality. Moreover, when students use a virtual reality system, their experiences increase.

### 3. Methodology

**3.1. Research Design.** Quantitative researchers are known as positivists because they believe in a single, predetermined reality. Quantitative researchers frequently look for broad trends that can be used to explain specific phenomena. Contrarily, qualitative researchers are referred to as interpretivists since subjective perception and interpretation of reality are major phenomena. Such researchers devote efforts to fully comprehending the phenomenon. And in the combination of quantitative and qualitative research approaches, the researcher used mixed method research, whereby the researchers do not adopt a positivist or constructivist mindset, but rather endeavor to achieve goals. Rather than a predisposition to any philosophical position, they take a pragmatist position. They are mostly driven to problem-solving and have the freedom of creating the research approach and design for achieving the goal of study [36].

For the multimethodological study, pragmatism allows access to various techniques, worldviews, and ideas, as well as various data collecting and analysis approaches. Exploratory research directs to learn more about an issue wherein little is known (Kumar, 2005). This study follows a sequential exploratory design, which allows to include both qualitative and quantitative designs. In sequential exploratory, the research went from inductive first and then a deductive approach. It is thought that authentic and reliable information cannot be obtained by relying just on either interpreting or confirming a phenomenon. However, for obtaining inductive as well as deductive information, both methods could be combined to understand and analyze certain phenomena. As a result, the researcher began by examining the problem, which is the enhancement of experiential learning through virtual reality, a new pedagogical tool that provides an immersive virtual environment. Based on the nature of the research problem, the researcher chose to investigate the applicability of virtual reality for increasing experiential learning and then measure its effect on students. Therefore, the study used a mixed methodology with a sequential exploratory research design.

**3.2. Population and Sample.** The population of the study was undergraduate students of the education department from public sector universities of Sindh, as the research design is sequential exploratory which includes qualitative and quantitative approaches. The data were collected in two phases following both approaches. The sample for both was also separate. Convenient sampling was used for both phases as a sampling technique. This sampling technique allows the researcher to take a sample from the conveniently accessible but relevant population [37]. The 3<sup>rd</sup> and 4<sup>th</sup> year students were the targeted populations for both phases—who have already studied courses of Computer Literacy and ICTs in Education. For the qualitative phase, the sample of 8 students (4-males and 4-females) from the third and fourth years was interviewed. And for the quantitative phase, the

TABLE 1: Constructing validity result.

	R-matrix						
	Emerging educational technology	Presence and engagement	Immersion	Substitute to physical environment	Interesting	Experiential learning	Depends upon user-friendliness
Emerging educational technology	1	.590**	.503**	.580**	.291*	.245*	.245*
Presence and engagement	.590**	1	.541**	.446**	.380**	.243*	.243*
Immersion	.503**	.541**	1	.526**	.581**	.388**	.388**
Substitute to physical environment	.580**	.446**	.526**	1	.566**	.392**	.392**
Interesting	.291*	.380**	.581**	.566**	1	.473**	.473**
Experiential learning	.245*	.243*	.388**	.392**	.473**	1	1.000**
Depends upon user-friendliness	.245*	.243*	.388**	.392**	.473**	1.000**	1

The symbols “\*” and “\*\*” indicates nature of correlation.

sample of 80 students was selected, following Morgan’s table of sample size. These samples were taken from 4 well reputed HEC recognized public sector universities offering undergraduate programs in the education department.

**3.3. Data Collection Tool.** Keeping in view the nature of the study, the data were supposed to be collected by two different research methodologies. For the qualitative part, the data collection tool was a semistructured interview guide. It was developed by deductive approach, which starts from general technology and its integration in education followed by virtual reality and its implementation in an education setting, and then the effect virtual reality produces for enhancement of experiential learning. The qualitative data were gathered by the interviews, and the emerged themes were then converted to constructs of virtual reality as a pedagogical tool for questionnaire development. The five-Likert scale questionnaire was developed on seven constructs: (a) virtual reality as emerging need of education, (b) virtualReality ensures presence and engagement, (c) virtual reality helps in immersion, (d) virtual reality as a substitute to physical environment, (e) virtual reality as interest trigger for learners, (f) virtual reality practical for experiential learning, and (g) user-friendliness ensures the applicability of virtual reality. Each construct has 4, 5, or 6 items, such as constructs 1, 2, 3, and 6 have six items, construct 4 has five items, and constructs 5 and 7 have four items. Altogether, the total items are 37. The questionnaire was reviewed by the supervisor, teacher, and peers for validity. The questionnaire was piloted with 30 participants. The piloted data were analyzed using bivariate correlation and Cronbach alpha for construct validity and reliability, respectively. For construct validity, bivariate correlations and factor analysis were employed. Bivariate correlations found that most of the constructs have some association with each other, the bivariate correlation ranging from  $r = 0.243$  for constructs 2 and 6 to  $r = 1.000$

TABLE 2: Reliability test results.

Cronbach’s alpha	N of items
.936	37

for constructs 6 and 7. As the correlations between constructs are relatively high, the questionnaires show good construct validity (See Table 1).

And for reliability, Cronbach alpha was employed to pilot data, which determines the reliability of the questionnaire. The reliability of this questionnaire is 0.936 Cronbach alpha (Table 2).

The reliability of this questionnaire is 0.936 Cronbach’s alpha; it is considered as excellent [38].

### 3.4. Data Collection

**3.4.1. Phase One: Qualitative Data.** The targeted sample of 8 students from the third and fourth year students of B-Ed was interviewed. The interview was conducted with a semistructured interview guide. The interview guide was developed by the researcher and was reviewed by the supervisor and critical friend for ensuring validity. Based on their feedback, the interview guide was revised for the interview conduction process. In total, eight interviews having the same ratio of male and female participants were conducted. Before, the interview process, participants were provided with informed consent and all the ethical considerations. The interviews were audio-recorded, transcribed, coded, and analyzed by thematic analysis. The emerged themes were then discussed and reviewed. At last, those themes were made constructs for the questionnaire.

**3.4.2. Phase Two: Quantitative Data.** The sample of 80 students from the third and fourth year students of B.Ed was involved in the process of questionnaire filling. The data

was direct administered following all ethical measures. Research participants were first familiarized with research objectives and questionnaires. Also, they were informed about the consent and confidentiality of their data.

**3.5. Data Analysis.** Data analysis is a never-ending and an evolving procedure (Miles et al., 2014). Data analysis began as soon as the data was collected. The collected data was in the form of transcribed interviews which were color-coded for further analysis. Accordingly, the interactive model of Miles and Huberman was employed for data analysis, which includes data condensation, data display, and deriving and confirming conclusions. After coding of the data, it was condensed into microthemes (categories) from which broader themes were developed. Also, the most appropriate excerpts were extracted from the data; in this way, thematic analysis was done.

The emerged themes were as follows: (a) virtual reality as emerging need of education, (b) virtual reality ensures presence and engagement, (c) virtual reality helps in immersion, (d) virtual reality as a substitute to physical environment, (e) virtual reality as interest trigger for learners, (f) virtual reality practical for experiential learning, and (g) user-friendliness ensures the applicability of virtual reality. Following these seven constructs, a 5-point Likert tool was developed (indicating 1-strongly disagree, 2-disagree, 3-neutral, 4-agree, and 5-strongly agree), which included 37 items. The collected data from 80 participants were entered in SPSS and cleaned by skipping incompletely filled responses. This quantitative data was analyzed by descriptive as well as inferential statistics. For descriptive statistics, mean and standard deviation were taken, whereas, for inferential statistics, regression was done, as it predicts the effect or impact of the independent variable on the dependent variable [39]. Under this, the multiple regression model was employed, as it allows to several predictors to predict the effect over the dependent/outcome variable [40].

**3.6. Ethical Considerations.** As per the nature of research objectives and questions, this study was a mixed-method study. For both phases of the study, it was volunteer participation whereby the participants of the qualitative part were provided with informed consent, along with official permission from their head of department. Similarly, the participation in quantitative was also willing, and the head of the department was requested for permission. However, the interview data was recorded, and confidentiality was ensured by stating the pseudonyms where required. Also, the data of quantitative remained confidential by ignoring names and making them optional. Furthermore, for stating findings, the data remained confidential and was also discarded after using it for this research.

### 3.7. Findings

**3.7.1. Qualitative Results.** The findings revealed that undergraduate students perceive technology in general and virtual reality in particular as an important emerging modern pedagogical tool for teaching and learning. Though the application of virtual reality is broader than showing videos or

documentaries, it was frequently highlighted by the research participants. It can be inferred as the participants had a limited view of virtual reality as AV aids only. This could be due to a lack of experience in technological applications, or it could be due to less awareness about virtual reality. Furthermore, it was clarified by the research participants that, due to less exposure to virtual reality and lack of resources, teachers and students may feel less feasible with technology in the classroom. Although, it was also highlighted that technology and virtual reality are interesting elements for students' learning, because students feel involved and immersive in the presented situation.

However, somewhere, the participants also highlighted that the physical environment is much more suitable for experiential learning by saying, "I think, it helps in 70% of learning, but remaining 30% happens by other sources. Because virtual reality only helps in understanding the environment, we cannot feel it or touch it. So, for me, students' experiential learning occurs better when they fully experience the environment." Also, at some places, the participants stated that "virtual reality helps in experiential learning because it enables students to experience an environment. The only difference is, it provides a virtual environment, otherwise, the child is experiencing the same environment as that of physical." Similarly, the participants also mentioned specific examples of studying dinosaurs and satellites by using virtual reality. Thus, it could be interpreted as the research participants had cursory knowledge and experience of virtual reality, which was leading them to such responses.

Additionally, the participants stated that technology and virtual reality are necessary for our education to help students become digitalized and compete in the modern era of technology. Meanwhile, in terms of the practical challenges of virtual reality, the participants stated that teachers, students, and parents will be facing challenges. Because the teachers are not digitally literate and are unable to understand the practicality of virtual reality in education, also, parents are unable to afford technological expenses at their end. Thus, the participants suggested that before bringing technology and virtual reality in education, we need to ensure a complete troubleshoot and ICT team at our educational institutions, and only then it would be possible to implement technology and virtual reality in education.

The findings also revealed that undergraduate students understand the importance of technology and virtual reality in the education sector. This makes virtual reality a pedagogical tool that helps in teaching and learning. But due to less relevant exposure to technology, the participants are unable to elaborate it with respect to promoting learning. However, as per the nature of virtual reality, it provides a virtual environment and immersion, and the participants were found to be supporting the idea of virtual reality for experiential learning. Therefore, it can be concluded that undergraduate students have enough knowledge about technology and virtual reality. Still, due to less exposure to virtual reality, it was difficult for the participants to justify their perspectives authentically. However, the participants showed a consensus for virtual reality as a pedagogical tool that can be helpful for the teaching-learning process. Also, the participants

TABLE 3: Descriptive statistics of constructs.

Constructs	Minimum	Maximum	Mean	Std. Deviation
1. VR as emerging need of education	1.2	4.7	3.9	.47
2. VR ensures presence and engagement	1.8	4.8	3.6	.54
3. VR helps in immersion	1.8	5.0	3.9	.62
4. VR as substitute to physical environment	1.3	5.0	3.7	.62
5. VR as interest trigger for learner	1.8	4.5	3.7	.46
6. VR effective for experiential learning	1.7	5.0	3.8	.67
7. User-friendliness ensures the applicability of VR	1.7	5.0	3.8	.67
Overall	2.0	4.5	3.8	.42

TABLE 4: Model summary of multiple linear regression inferential statistics.

R	R square	Adjusted R square	Std. the error of the estimate
1.000 <sup>a</sup>	1.000	1.000	.00000

<sup>a</sup> is reliability.

considered the immersive nature of virtual reality, which can help enhance experiential learning among students. Thus, it concludes that the perceptions of undergraduate students are aligned with literature that supports the idea of virtual reality that works as a pedagogical tool and helps in promoting the experiential learning of students [10, 34].

### 3.8. Quantitative Results

**3.8.1. Descriptive Statistics.** The study is aimed at ultimately investigating the effect of virtual reality for enhancing experiential learning. Thus, the final part was quantitative, for which data were collected by a 5-point Likert scale questionnaire, which has seven constructs. The results of descriptive statistics of each item are presented as under (Table 3).

According to this table, the mean score of all the constructs is high, which is above 3.5, as per Hassam's table of mean range. Similarly, the data is less spread across all the constructs. Therefore, the findings show a relatively higher score with minimal dispersion ( $M = 3.8$ ;  $SD = 0.42$ ) of undergraduate students' views about virtual reality as a pedagogical tool for enhancing experiential learning. However, construct 01 and construct 03 have higher scores ( $M = 3.9$ ;  $SD = 0.47$  and  $0.62$ ) than other constructs. This depicts that undergraduate students consider virtual reality is an emerging educational technology that enables students to get immersed in virtually created environments and can enhance students' experiential learning.

Virtual reality as a pedagogical tool was tested using multiple regression to see if it might predict the enhancement of experiential learning. The regression results showed that (Table 4) the model explained 0.001% variance, and that it was a significant predictor of improving experiential learning,  $F(6, 66) = 0$ ,  $p = .001$ . The model was strongly influenced by the user-friendliness of virtual reality applications ( $B = 1.000$ ,  $p < .05$ ). All other constructs, on the other hand,

were unable to significantly contribute to the model ( $B < 0.3$ ,  $p > .05$ ).

**3.9. Hypothesis Testing.** According to the model summary table, the simple correlation ( $R$  value = 1.000) indicates a correlation between experiential learning and user-friendliness of virtual reality. Similarly, the ANOVA table directs a significant difference in the regression model of virtual reality for enhancing experiential learning among undergraduate students. Here, the correlation is found to be significant ( $p = .001$ ), which is less than 0.05, and indicates that the regression model statistically significantly predicts the enhancement of experiential learning. However, the only predictor identified from the results is the user-friendliness of virtual reality, but no other construct predicted the improvement of experiential learning. Thus, the findings can be concluded that all the user-friendliness predictor is significant.

Therefore, the linear regression's inferential statistics show a significant effect of virtual reality for enhancing experiential learning. Hence, the null hypothesis is rejected, whereas alternative hypothesis is accepted.

## 4. Discussion

The findings of this study revealed a statistically significant effect of virtual reality for enhancing experiential learning. These results are consistent with other empirical studies conducted in diverse contexts. Likewise, virtual reality provides immersion by involving and regulating the natural system, which can aid in acquiring, retaining, and understanding the concept. However, Freina and Ott [41] clarify that virtual reality is being practiced in several professional occupational training programs where the accessibility of actual scenarios is either challenging or risky. Contrarily, it opposed the previous idea by stating that learners could skip out on practical experience and direct understanding; nevertheless, merging learning environments with virtual reality technologies will aid in the validation of logical idea analysis and improve learning productivity and effectiveness. [42], whereas it is argued that immersive virtual reality has several advantages for learning, as it provides a firsthand practical learning experience of idea scenarios while preventing real-life risks [43]. Furthermore, it triggers students' interest while

expanding the scope of learning embedded in the virtual reality applications and game-based approach [41].

Similarly, it is found that virtual reality provides an immersive and fully interactive platform that allows visualization of the world and contributes to experiential learning [34]. Thus, from a learning point of view, it can be witnessed that virtually create scenarios facilitate learning by implying experiential approaches where both physical and cognitive involvement are evident [35]. However, virtual reality merges simulated scenarios with the imaginative world, whereby students get access to interact and reflect simulations and students' learning improves [33]. Likewise, integration of creative with conventional teaching-learning significantly improves practical learning [44]. However, the schools, teachers, and development experts show the confrontation for developing game-based animations. Resultantly, students themselves become capable of operating virtual reality for obtaining experiential learning [45].

Moreover, this study has also indicated a high significance of one of the predictors of virtual reality for experiential learning—user-friendliness of virtual reality. This mainly refers to the contextual needs and issues in implementing virtual reality. However, a study suggests that depending on the degree of observed engagement and facilitating conditions of using virtual reality, the 3D learning system might be successful and popular among students [46]. Learners' performance expectancy is influenced by their sense of self, engagement, and learning effectiveness. The most essential determinant of performance expectancy is perceived self-efficacy. Many studies also suggest that a learners' sense of self is an essential determinant of the perceived utility of learning technologies [47, 48]. Learners' intentions to utilize virtual reality for learning experiences are influenced by perceived convenience, facilitating conditions, and motivational beliefs. The most significant predictor of behavioral intention to practice virtual reality platforms has persistently been considered the user-friendliness nature of it [49, 50].

## 5. Conclusion

This study purports to explore the effect of virtual reality as a pedagogical tool for enhancing experiential learning among undergraduate students. This was a sequential exploratory study where the first phase was qualitative, whereas the other was quantitative. The collected data were analyzed separately and used for further data collection. The study shows that virtual reality is practical for experiential learning because it provides immersion to students. Students get a sense of involvement and presence in the presented virtual environment with exposure to virtual reality.

Additionally, a significant effect of virtual reality on experiential learning is found. Thus, the alternate hypothesis is accepted. This study concludes that the implementation of virtual reality has a significant effect on enhancing experiential learning among undergraduate students. However, the implementation of virtual reality still depends upon the user-friendly nature of technology in general and virtual reality technology in particular. This is due to less exposure to virtual reality and other infrastructure-based issues at the

institutional end. Therefore, this study recommends integrating virtual reality in the teaching-learning process for providing experiential learning to students. Meanwhile, teachers and other related stakeholders are recommended to be involved in training and other seminar and/or workshop sorts of activities to learn the practicality of virtual reality for the teaching-learning process.

## Data Availability

I feel that the data is generated through questionnaire and survey and will be provided upon genuine request from readers.

## Conflicts of Interest

The authors of this research study declare that there is no conflict of interest.

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