TPM Vol. 32, No. S5, 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

EFFECTIVENESS OF VIRTUAL REALITY IN ENHANCING PROSPECTIVE TEACHER'S MOTIVATION AT UNDERGRADUATE LEVEL

SIDRA LATEEF
MPHIL SCHOLAR OF EDUCATION, AIR UNIVERSITY, ISLAMABAD, EMAIL: 232593@students.au.edu.pk

DR. SADAF ZAMIR AHMED
ASSOCIATE PROFESSOR OF EDUCATION, DEPARTMENT OF HUMANITIES AND EDUCATION, AIR UNIVERSITY, ISLAMABAD, EMAIL: chair.he@au.edu.pk

DR. SOHAIB SULTAN
ASSISTANT PROFESSOR OF EDUCATION, AIR UNIVERSITY ISLAMABAD. sohaib.sultan@au.edu.pk

ABSTRACT
This research "The effectiveness of Virtual Reality in enhancing prospective teacher's motivation at undergraduate level (Associate degree in education) was conducted at Government Girls college Jinnah Town Quetta. It was targeted to assess the effectiveness of Virtual Reality within classroom settings. As Virtual Reality becomes progressively implemented into educational frameworks, it increases understanding the impacts on learning experiences and Prospective teacher's motivation. This research identifies Virtual Reality used at undergraduate program, where it highlights the importance of using Virtual Reality, evaluates its effectiveness on motivation and compare the effectiveness with lecture method. Utilizing a quantitative method approach, data was gathered through questionnaire using ARCS model stoned by Keller for motivation. The data was further analyzed through SPSS test for comparison of traditional method (lecture method) with Virtual Reality. Recommendations include addition of more games and applications containing data aligned with curriculum, providing funds for integrating modern technologies and raising the chances of more dynamic, inclusive and effective learning environment.
Keywords: Virtual Reality, Motivation, Undergraduate level

INTRODUCTION

1.1 Background of Virtual Reality

A technology famous as Virtual Reality is computer-produced, three-dimensional modeling of a position incorporated in an evidently actual or bodily Manner. Immersion Virtual Reality types of teaching instruments incandescently made for screen or portable gadgets have step by step modified and currently require the need of head-sets motions. (Makransky et al., 2020)

1.1.2 Virtual Reality as an advanced tool

Few Researchers promise that Virtual Reality is among the advanced technologies and pattern prospering being most fascinating, "easy" teaching tool in the knowledge acquisition procedure. Generally, Virtual Reality is incorporated with portable devices, headsets, information technology, particular goggles, and different gears into the pedagogical procedure. (Tilhou et al., 2020).

1.1.3 Virtual Reality in Education

Different abilities in learners are enhanced through some activities with technologies such as websites, quizzes, roles and android applications. The combination of Virtual Reality applications into teaching travel the much widely adoption of application within preparation in manufacture, field work and critical thinking. The change undoubtedly is partly explained by Virtual Reality itself in latest advancements. (Jensen and Konradsen 2018; Radianti et al. 2020)

1.1.4 Virtual Reality for motivation of Prospective teachers

Virtual Reality has provided chances to respective upgraded knowledge in classroom settings, modifying the environment with actual and free acquisition of learning approaches. Students gain high command on their abilities while practicing with high speed and better techniques. Thus, Virtual Reality may develop to be likely technology, best for pedagogical purposes at all levels. (Tilhou et al., 2020).

1.1.5 Experiential Learning through Virtual Reality

Virtual Reality proves to be purposeful as it helps pupil in hand on practice providing opportunity to know by practicing, guessing with double education encouraging the concept of communicative device flexor comprehensiveness of complex topics (Ryan et al.,2022).

1.2 Problem of the statement

The existing teaching methods still lack in effectiveness and learning motivation of prospective teachers, there are gaps that need to be filled. There are many resources available to improve teaching and learning process through technology but Virtual Reality is one of the strong method.

1.3 Research Objective

Following are the objective:

1. To compare the effectiveness of Virtual Reality with lecture method at undergraduate level

1.4 Research question

1. Which method is more effective in teaching prospective teachers at the undergraduate level: Virtual Reality or the traditional lecture method?

1.5 Research hypothesis

It is a directional hypothesis highlighting the effectiveness of Virtual Reality.

H1: The Virtual Reality is more effective than lecture method in enhancing motivation of prospective teachers at undergraduate level.

1.6 Significance of the Study

Significance for Prospective teachers

This research focuses the importance of Virtual Reality to make education more available and comprehensive, hence benefiting prospective teachers. In general, this research will help to increase educational technology use in enhancing teaching and learning process. It emphasizes the need of Virtual Reality to make education more inclusive and advanced, therefore helping prospective teachers to fulfill their diverse needs.

Significance for Instructors

This study holds significant importance for instructors as it transforms traditional teaching methods into immersive, interactive learning experiences. VR enhances engagement and helps make abstract or complex concepts more understandable. Instructors can use VR to facilitate experiential learning, enabling students to "learn by doing".

Significance for Policy Makers

This study is important for policymakers to create innovative strategies that enhance learning motivation in teaching and learning process and will assist in bringing educational innovation.

1.7 Theoretical and Conceptual Framework of the Study

1.7.1 Theoretical framework

Learning motivation plays a crucial part of determining learning and motivation. Years in the latest, for enhancing individual's mental abilities, numerous pedagogical approaches are used and various situations are seen at teaching environments. Learners are able to find solutions to the issues through use of websites and applications. Outcomes of the work determines that the finding solutions to the issues circumstances of connecting the media and cooperative learning does increase prospective teacher's motivation and assist them to perform personal-directed learning.

1.7.2 Conceptual Framework

The prospective teacher's motivation evaluation also importantly forecasts the value of information that determines that individual's interests don't guarantee the pupil to completely finish the work, similarly adopt abilities or matter in the contents. In the field of education, it is very valued. ARCS model is based on Keller's systematic design model that motivates students to learn motivation. The design of this model is made on the learner's motivation, and the learner's motivation is the key of instructional plan. There are four elements of ARCS model, and includes Attention, Relevance, Confidence, and Satisfaction. Moreover, the study uses the ARCS model to determine and realize the design techniques of students' motivational requirements, and use the scale to know prospective teachers learning motivation.

ATTENTION	RELEVENCE
CONFIDENCE	SATISFACTION

1.8 Delimitations

Delimitations include 30 students selected from Jinnah town government college Quetta, consisting of female students. Moreover, only students of undergraduate were targeted for data collection. Furthermore, the study was also limited to Virtual Reality applications.

LITERATURE REVIEW

2.1 Introduction of Virtual Reality

Among the advanced activities in learning environment is the utilization of technology which is defined as skilled screen sequences that assume reality almost reliably generated by human beings utilizing information and communication technologies, being a supply for their utilization of specific hardware. Presently, the utilization of Virtual Reality in the pedagogic field is booming, since it is being designed in different curricula (Huttar & Brintzenhofeszoc, 2019).

2.2 Significance of Virtual Reality

Through recent technologies there can be great modification in the field of education bringing up the innovative technologies for educational purposes. This transformation can rectify preparatory programs, consciousness for health and pedagogical approaches. Correct and accurate direction can be identified by seeking depth evaluation of partners doing cooperation and discovering ways into the specific fields, as depicted through Virtual Reality.

2.3 Virtual Reality technologies

Head-mounted display (HMD) in use with modern Virtual Reality devices for instance Eye Opening, learners undergo huge range of "realness". Upon validating mode, work pointed out pupil considering Virtual Reality applications much prosperous part of remembering as well as implementing content (Krokos et al., 2019).

2.4 Development of Virtual Reality in Educational Settings

Virtual Reality improves instruction and advance person's accomplishment owed to written and experiential work. In particular, Virtual Reality incorporate subjects of creative person acquisition explanation as it aids pupil obtainment and creation cognition with aid from their instructors and mates, instead of placed inactive cognition consumers. Hence, while Virtual Reality is used, pupil concepts of cognition are supported to prior practices provided by instructors (Rababah, 2021).

2.5 Use of Virtual Reality by Undergraduate students

A survey performed on how undergraduate learners intends in utilizing Virtual Reality for acquisition are inspired by the cardinal concept of the integrated explanation of position and utilization of devices framework and the quarter manner of Kolb's acquisition types. The purpose was set up to enhance when learners perceived Virtual Reality Head wears are easy to use where they reached to aid opportunities like adequate assets, favorable facilities, and base (Shen et al., 2019).

2.6 Benefits of using Virtual Reality technology

The attitude and will of instructors using Virtual Reality application, more as the views profits for pedagogy and acquisition, show an important function in motivation and determinant of their conduct in following the creative application in practical instruction. Just as, few causes that individual viewed to determine how participants comprehend and evaluate distance learning and Virtual Reality devices consider their authority in using new devices. (Khukalenko et al., 2022)

2.7 Future technologies for enhancing Virtual Reality

Upcoming technologies to enhance Virtual Reality usage, organizations are operative on rising the firmness and field of prospects of Virtual Reality headsets. Efforts are made on enhancing Virtual Reality use from other views too, just like, using haptic to foster the awareness of existence. In present-day exercise, Virtual Reality experiences on haptic is often quite less. Most Virtual Reality settings use is fixed in shape using functions with a joystick. (Cai et al., 2020)

RESEARCH METHODOLOGY

Summary of the investigation methodology used to describe effectiveness Virtual Reality in enhancing learning at the undergraduate level.

3.1. Research Design

The research uses a quantitative methodology for better understand students' experiences with Virtual Reality. The study aims to obtain insights on how Virtual Reality effects learning, as well as the perceived benefits, hurdles, and ethical concerns related with these tools.

3.1.1. Quantitative research

It is a quantitative research methodological approach that aims to explore and comprehend facts using numbers.

3.2 Population of the Study

The targeted population was undergraduate students from Jinnah town college Quetta. The undergraduate students doing Associate Degree in Education.

Table: 3.2

Category	Details
1. Location	Quetta
2. Institute	Government Girls College Jinnah town
3. Level of Study	Undergraduate
4. Discipline	Art and humanities
5. Gender	Female
6. Age	18-23
7. Field of Study	Education

3.3 Sample of the Study

The 30 students selected from Jinnah town Girl College to represent this larger population. This small group of sample represents the population. The research was an experimental research.

3.3.1 Sampling Frame

1. Prospective teachers of Jinnah town college Quetta 30 students from ADE first semester

3.3.2 Sampling method and sampling technique

The researcher chose a random cluster sampling technique to collect the data. The sample of this study was undergraduate students because they were being made familiar with the Virtual Reality.

Research Instrument

In research, an 'instrument' is any apparatus used to collect data or calculate variables of interest. It plays a vital role in getting accurate and valid data can be used to answer research questions or hypotheses. The instrument was an adapted including closed ended questions for quantitative research. Instrument contained 30 questions which were distributed into 30 students by instructor using experimental study.

3.5.1. Validity of Instrument

Validity stands for an instrument's capacity to measure what it was intended to, measure. As a result, an instrument is termed "Valid" if it measures what it was designed to measure. The validation of research tool in this research was done by

1. The expert in the field of Education, Air University, Islamabad Dr Sohaib Sultan
2. Virtual Reality Expert Sir Hameed Ur Rehman

3.5.2. Reliability of an instrument

An instrument which is reliable makes sure to get accurate, repeatable and consistent outcomes. This can be achieved through Cronbach's alpha in SPSS.

Sr #	Research instruments for Prospective teachers	No of Items	Cronbach Alpha
1.	Effectiveness of Virtual Reality in enhancing Motivation at undergraduate level	30	0.80

3.6. Data Collection Method

The experiment took place in the classroom setting for the duration of 4 weeks. Firstly, the prospective teachers were provided with questionnaire asking them questions about learning of teaching methods subject through simple teaching technique. The topics were taught on daily basis. Topics included

1. Teacher focused strategy
2. Two-way strategy
3. Question answer strategy
4. Show casing strategy
5. Teaching with technology
6. Use of technology for different subjects such as

- Science

Prospective teachers were than being taught with Virtual Reality showing them the importance of technology in classroom with applications such as human anatomy for science classroom where students were able to understand the concept of human system in an immersive environment. Instrument was distributed among the respondents. They filled the instrument through Likert scale based on their motivation level. The instrument was an adapted questionnaire based on ARCS model

DATA ANALYSIS

The current chapter is providing the deliberate systematic process of recorded analysis by the researcher.

Table for Paired T- test of attention

T -Test for Attention

4.1.1 The content I learn through Virtual Reality gets my attention.

Mean	t	df	Significance value (P)
-1.90	-6.66	29	0.00

There was figurative big conflict in the scores prior M= 2.400 SD= 1.22 and after intervention M= 4.300 SD= 0.87 t(29) = - 6.61, p < 0.01,with the mean difference of -1.90.

4.1.2 The content in Virtual Reality is eye-catching.

Mean	t	df	Significance value (P)
-2.36	-10.4	29	0.00

There was figurative big conflict in the scores prior M=1.966 SD= 0.808 and after intervention M=4.333 SD= 0.758 t(29) = -10.410 , p < 0.01,with the mean difference of -2.36.

4.1.3The information I read through Virtual Reality looks dry

Mean	t	df	Significance value (P)
-2.70	-10.4	29	0.00

There was figurative big conflict in the scores prior M= 4.633 SD=0.92 and after intervention M=1.933 SD= 0.98 t(29) = -10.410 , p < 0.01,with the mean difference of -2.70

4.1.4The content and style of writing in Virtual Reality is worth using.

Mean	t	df	Significance value (P)
-1.83	-6.27	29	0.00

There was figurative big conflict in the scores prior M=2.66 SD=1.27 and after intervention M=4.300 SD=0.91 t(29) = -10.410 , p < 0.01,with the mean difference of -1.83.

4.1.5 The content is so abstract in Virtual Reality that it was hard to keep my attention on it.

Mean	t	df	Significance value (P)
-2.66	-11.05	29	0.00

There was figurative big conflict prior M=4.733 SD=0.78 and after intervention M=2.066 SD=0.944 t(29) =-11.05 , p < 0.01,with the mean difference of -2.66.

4.1.6 Vast information in Virtual Reality is difficult to remember.

Mean	t	df	Significance value (P)
2.36	-8.26	29	0.00

There was figurative big conflict in the scores prior M=4.566 SD=0.93 and after intervention M=2.200 SD=1.186 t(29) =-8.26 , p < 0.01,with the mean difference of 2.366.

4.1.7 The content in Virtual Reality stimulates my curiosity.

Mean	t	df	Significance value (P)
-1.466	-5.07	29	0.06

There was figurative big conflict in the scores prior M= 2.733 SD= 4.118 and after intervention M= 4.200 SD=1.095 t(29) =-1.947 , p < 0.01,with the mean difference of -1.466.

4.1.8 There is so much content provided through Virtual Reality that it is irritating me.

Mean	t	df	Significance value (P)
1.700	-7.44	29	0.00

There was figurative big conflict in the scores prior M= 4.100 SD= 1.39 and after intervention M=2.400 SD= 1.248 t(29) =5.007 , p < 0.01,with the mean difference of 1.700.

4.1.9 The graphics and writing in Virtual Reality keeps me focused.

Mean	t	df	Significance value (P)
-2.033	-7.441	29	0.00

There was figurative big conflict in the scores prior M=2.366 SD= 1.245 and after intervention M= 4.400 SD=1.037 t(29) = -7.441 , p < 0.01,with the mean difference of -2.033.

4.1.10 the style of writing in Virtual Reality is boring.

Mean	t	df	Significance value (P)
2.733	11.195	29	0.00

There was figurative big conflict in the scores prior M=4.733 SD= 0.784 and after intervention M= 2.000 SD=

0.909 t(29) = 11.195 , p < 0.01,with the mean difference of 2.733

Relevance

4.1.11 The content in Virtual Reality is not relevant to my needs.

Mean	t	df	Significance value (P)
-1.80	-5.63	29	0.00

There was figurative big conflict in the scores prior M= 3.833 SD=1.205 and after intervention M=2.033 SD=0.88 t(29) = 5.639 , p < 0.01,with the mean difference of 1.800.

4.1.12 The pictures and examples in Virtual Reality brings more clarity in learning.

Mean	t	df	Significance value (P)
-1.73	-7.099	29	0.00

There was figurative big conflict in the scores prior M= 2.633 SD=1.188 and after intervention M= 4.366 SD=0.6195 t(29) = -7.099 , p < 0.01,with the mean difference of -1.73

4.1.13 Virtual Reality content is relevant to my needs

Mean	t	df	Significance value (P)
-1.33	-4.76	29	0.00

There was figurative big conflict in the scores prior M= 2.633 SD=1.188 and after intervention M= 3.966 SD= 1.033 t(29) = -4.746 , p < 0.01,with the mean difference of -1.3.

4.1.14 The amount of repetition in the content taught through Virtual Reality bores me.

Mean	t	df	Significance value (P)
-2.50	-9.56	29	0.00

There was figurative big conflict in the scores prior M=4.566 SD= 0.93 and after intervention M=2.066 SD= 0.907 t(29) = 9.56 , p < 0.01,with the mean difference of -2.50

4.1.15 Most of the content included in Virtual Reality confuses me.

Mean	t	df	Significance value (P)
2.26	7.88	29	0.00

There was figurative big conflict in the scores prior M= 4.566 SD=0.935 and after intervention M= 2.300 SD= 1.118 t(29) = 7.88 , p < 0.01,with the mean difference of 2.26

4.1.16 there is some unexpected content in Virtual Reality.

Mean	t	df	Significance value (P)
0.23	7.93	29	0 .43

There was figurative big conflict in the scores prior M= 2.933 SD=1.808 and after intervention M= 2.700 SD= 1.118 t(29) = 7.93 , p < 0.01,with the mean difference of 0.23

4.1.17 this material I learn through Virtual Reality is more difficult to understand.

Mean	t	df	Significance value (P)
2.43	10.2	29	0.00

There was figurative big conflict in the scores prior M= 4.700 SD=0.794 and after intervention M= 2.266 SD=0.827 t(29) = 10.215 , p < 0.01,with the mean difference of 2.43.

4.1.18 I already know most of the information in Virtual Reality.

Mean	t	df	Significance value (P)
1.766	6.02	29	0.00

There was figurative big conflict in the scores prior M= 4.066 SD=1.229 and after intervention M= 2.300 SD= 1.022 t(29) = 6.002 , p < 0.01,with the mean difference of 1.766.

Confidence

4.1.19 when I look at the content through Virtual Reality, I find it easy for me.

Mean	t	df	Significance value (P)
-2.20	-7.40	29	0.00

There was figurative big conflict in the scores previous M=2.066 SD=1.080 and after intervention M=4.266 SD=1.01 t(29) = -7.405 , p < 0.01,with the mean difference of -2.20

4.1.20 confidently I can acquire the content l through Virtual Reality.

Mean	t	df	Significance value (P)
-1.533	-5.42	29	0.00

There was figurative big conflict in the scores. Previous M=2.700 SD=1.290 and after intervention M= 4.233 SD=0.897 t(29) = -5.426 , p < 0.01,with the mean difference of -1.533

4.1.21 the content I read through Virtual Reality will be useful for me in the future.

Mean	t	df	Significance value (P)
-1.366	-4.59	29	0.00

There was figurative big conflict previous M=2.700 SD= 1.51 and after intervention M=4.066 SD=0.691 t(29) = -4.595 , p < 0.01,with the mean difference of -1.366

4.1.22 the content taught through Virtual Reality is too difficult.

Mean	t	df	Significance value (P)
2.53	10.84	29	0.00

There was figurative big conflict in the scores previous M=4.66 SD= 0.922 and after intervention M=2.13 SD= 0.681 t(29) = 10.84 , p < 0.01,with the mean difference of 2.53

4.1.23 after reading the introductory information through Virtual Reality, I feel more confident.

Mean	t	df	Significance value (P)
-2.133	-7.14	29	0.00

There was figurative big conflict in the scores previous M=2.066 SD=1.080 and after intervention M=4.200 SD=0.886 t(29) =-7.14 , p < 0.01,with the mean difference of -2.13.

4.1.24 .I could not really understand the material taught through Virtual Reality

Mean	**t**	**df**	**Significance value (P)**
2. 2.366	8.172	29	0.00

There was figurative big conflict in the scores previous M=4.266 SD=1.112 and after intervention M=1.900 SD=0.844 t(29) =8.172 , p < 0.01,with the mean difference of 2.366.

Satisfaction

4.1.25 learning content through Virtual Reality gives me a feeling of satisfaction.

Mean	**t**	**df**	**Significance value (P)**
-2.36	-8.17	29	0.00

There was figurative big conflict in the scores previous M= 2.166 SD=1.366 and after intervention M= 4.33 SD= 0.844 t(29) = -7.523 , p < 0.01,with the mean difference of -2.36

4.1.26 I really enjoy studying with Virtual Reality.

Mean	**t**	**df**	**Significance value (P)**
-1.800	-4.913	29	0.00

There was figurative big conflict in the scores previous M= 2.433 SD=1.755 and after intervention M=4.233 SD= 0.93 t(29) =-4.913 , p < 0.01,with the mean difference of -1.800

4.1.27 Enjoyment in acquiring content through Virtual Reality so much, I would like to know more of the content.

Mean	**t**	**df**	**Significance value (P)**
-1.80	-4.91	29	0.00

There was figurative big conflict in the scores previous M= 2.433 SD=1.755 and after intervention M= 4.233 SD= 0.935 t(29) = -4.913 , p < 0.01,with the mean difference of -1.800

4.1.28 learning content through Virtual Reality gives pleasure

Mean	**t**	**df**	**Significance value (P)**
-2.100	-9.9	29	0.00

There was figurative big conflict in the scores before M= 2.133 SD=1.252 and after intervention M=4.233 SD= 0.678 t(29) = -7.822 , p < 0.01,with the mean difference of -2.100

4.1.29 the content in Virtual Reality is well designed.

Mean	**t**	**df**	**Significance value (P)**
-2.100	**-7.950**	**29**	**0.00**.

There was statistically significant difference in the scores before M=2.266 SD=1.311 and after intervention M=4.366 SD= 0.781 t(29) = -7.950 , p < 0.01,with the mean difference of -2.100

4.1.30 the positive feedback after learning through Virtual Reality helps me feel rewarded for my effort.

Mean	**t**	**df**	**Significance value (P)**
-1.266	-3.229	29	0.00

There was figurative big conflict in the scores previous M=3.133 SD=1.756 and after intervention M=4.400 SD=0.813 t(29) = , p < 0.01,with the mean difference of -1.266.

RESULTS AND DISCUSSIONS

This chapter provides an impact of the research collection drawn from the analysis, and presents suggestions for both future research and experimental implementation. Work purpose describes find role of Practical Realness tools in deepening student education at the undergraduate level.

5.1 Findings

ARCS model based components (Attention)

This work explored the effect of Virtual Reality in enhancing the attention of prospective teachers by examining their pretest and post-test results. T test was applied for ten items linked to the attention concept. The outcomes showed that a statistically major enhancement in overall all items, displaying that Virtual Reality based content importantly improved prospective teacher's attention except statement that there was an increase of mean from Mean value before = 2.733 (Standard Deviation = 4.118) to after value Mean= 4.200 (Standard Deviation = 1.095), the outcome t(29) = -1.947which didn't proved to be statistically different as the significant value 0.06 indicated a positive effect but didn't confirm stimulating of curiosity.

Relevance

A number of paired sample t-tests were performed to examine effects in participants' views related to the relevance and understanding of information taught through Virtual Reality before and after the implementation. The outcomes showed statistically high enhancement in calculated items except item number 6 in which the statement about unexpected content showed (Mean difference = 0.23), the outcome was significant in statistical aspect, t(29) = 7.93, However, the experiential significance showed little effect size with value 0.43.

Confidence

A chain of tests was performed to examine the effect Virtual Reality has on students' confidence and views regarding content understanding. The outcomes showed that a statistically major enhancement in overall all items, displaying that Virtual Reality based content importantly improved prospective teacher's confidence.

Satisfaction

A series of paired sample t-tests were conducted to evaluate the impact of Virtual Reality (VR) on students' satisfaction with learning content. Each item measured different aspects of learner satisfaction before and after the VR intervention. Results showed statistically significant improvements across all six satisfaction-related items.

CONCLUSION

- This study investigated the effect of Virtual Reality in improving the motivation of future teachers at the undergrad level.
- The experiment was performed at Government Girls College, Quetta, where the research explored how virtual reality compared with old traditional pedagogical approaches for learning. Quantitative method approach was used in which statistical data was gathered through pretest and post-tests which was based on ARCS model of john keller particularly a motivation model.
- It can be concluded that before and after the intervention a significant difference was observed. These results indicate and show that prospective teachers motivation enhanced through virtual reality for better learning in an immersive and engaging, environment for better comprehension.

5.3 Recommendations

Recommendations may include:

1. Undergraduate programs need to work with Virtual Reality developers to regularly update tools based on user reviews, addressing potential ethical considerations while increasing the tools' relevance and accessibility.
2. To increase the profits of Virtual Reality, universities requires to offer digital literacy workshops that assist students understand and use advanced virtual realities functionalities effectively. These training cover aspects such as knowing virtual realities and using Virtual Reality without over-dependency.
3. Teachers need to supervise Virtual Reality use in coursework to ignore over-dependency and dependency
4. To prevent over-dependency, institutions should make awareness programs that educate students about the importance of balancing Virtual Reality use with traditional skills, such as manual research, critical analysis, and independent writing.

REFERENCES

1. Arif, F. (2021). Application of Virtual Reality for infrastructure management education in civil engineering. Education and Information Technologies, 26, 3607–3627.https://doi.org/10.1007/s10639-021-10429-y
2. Cai, S., Ke, P., Narumi, T., & Zhu, K. (2020). Thermairglove: A pneumatic glove forthermal perception and material identification in Virtual Reality. In IEEE Conference on Virtual Reality and 3D User Interfaces (pp. 248–257). IEEE.
3. Colreavy-Donelly, S., Ryan, A., O'Connor, S., Caraffini, F., Kuhn, S., & Hasshu, S.(2022). A proposed VR platform for supporting blended learning post COVID 19.Education Sciences, 12(7), 435.

4. Dhimolea, T. K., Kaplan-Rakowski, R., & Lin, L. (2022). A systematic review of research on high-immersion Virtual Reality for language learning. TechTrends,66(5), 810–824. https://doi.org/10.1007/s11528-022-00764-5
5. Hays, R. T., & Singer, M. J. (2020). Simulation fidelity in training system design:
a. Bridging the gap between reality and training. Springer-Verlag.
6. Huttar, C. M., & BrintzenhofeSzoc, K. (2020). Virtual Reality and computer simulation in social work education: A systematic review. Journal of Social Work Education, 56(1), 131–141. https://doi.org/10.1080/10437797.2019.1648216
7. Ibrahim, A., Al-Rababah, A. I., & Bani Baker, Q. (2021). Integrating virtual reality technology into architecture education: the case of architectural history courses. Open House International, 46(4), 498-509.
8. Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. Education and Information Technologies, **23**(4), 1515–1529.
9. Kaplan Rakowski, R., & Gruber, A. (2021). One on one foreign languagespeaking
a. practice in high immersion Virtual Reality. In Contextual language learning: Real language learning on the continuum from virtuality to reality (pp. 187–202).Springer Singapore.
10. Khukalenko, I. S., Kaplan Rakowski, R., An, Y., & Iushina, V. D. (2022). Teachers'perceptions of using Virtual Reality technology in classrooms: A large scale survey. Education and Information Technologies, 27(8), 11 591–11 613.https://doi.org/10.1007/s10639-022-11041-2
11. Krokos, E., Plaisant, C., & Varshney, A. (2019). Virtual memory palaces: Immersion aids recall. Virtual Reality, 23(1), 1–15. https://doi.org/10.1007/s10055-018-0346-3
12. Makransky, G., Andreasen, N. K., Baceviciute, S., & Mayer, R. E. (2021). Immersive virtual reality increases liking but not learning with a science simulation and generative learning strategies promote learning in immersive virtual reality. Journal of Educational Psychology, 113(4), 719.
13. Parong, J., & Mayer, R. E. (2021). Learning about history in immersive Virtual Reality:Does immersion facilitate learning? Educational Technology Research andDevelopment, 69(3), 1433-1451
14. Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive Virtual Reality applications for higher education: Design Elements, lessons learned, and research agenda. Computers & education, 147,103778.30
15. Ros, M., Neuwirth, L. S., Ng, S., Debien, B., Molinari, N., Gatto, F., & Lonjon, N.
a. (2021). The effects of an immersive Virtual Reality application in first person
b. point-of-view (IVirtual RealityA-FPV) on the learning and generalized performance of a lumbar puncture medical procedure. Educational TechnologyResearch and Development, 69(3), 1529-1556
16. Shi et al.(2020).A neurophysiological approach to assess training outcome under stress:A Virtual Reality experiment of industrial shutdown maintenance using functional near-infrared spectroscopy (fNIRS) .Advanced Engineering Informatics.
17. Shen, C. W., Ho, J. T., Ly, P. T. M., & Kuo, T. C. (2019). Behavioural intentions of using virtual reality in learning: perspectives of acceptance of information technology and learning style. Virtual Reality, 23(3), 313-324.
18. Tilhou, R., Taylor, V., & Crompton, H. (2020). 3D virtual reality in K–12 education: A thematic systematic review. In D. Ifenthaler & D. Gibson (Eds.), Emerging
a. technologies and pedagogies in the curriculum (pp. 169–184). Springer. https://doi.org/10.1007/978-981-15-0618-5_11
19. Yıldırım, B., Topalcengiz, E. S., Arıkan, G., & Timur, S. (2020). Using virtual reality in the classroom: Reflections of STEM teachers on the use of teaching and learning tools. Journal of Education in Science, Environment and Health, 6(3), 231–245 .https://doi.org/10.21891/jeseh.713503