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E-Learning using virtual reality for creating three Dimensional

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Abstract - Multiple decades of study have been devoted to examining the potential for and advantages of implementing VR into educational settings. It is possible to read about certain VR apps in the published literature, but there is yet no comprehensive review of the market's offerings. In addition to tracking the evolution of VR edtech's offers, content, and features from 2019 to 2021, this research analyzes the market for VR edtech in that time period. Good educational policies that encourage students to apply what they've learned to real-world learning environments are crucial to students reaching their full potential. The goal of education should be to develop the whole person so that they may contribute in meaningful ways to the society of tomorrow. Knowledge alone is insufficient to meet the challenges of tomorrow's civilizations, particularly in this age of fast change. Simply put, the information available today is insufficient to address the challenges of tomorrow.

Keywords - virtual reality 3D, creativity, leadership, sensitivity, flexibility

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INTRODUCTION

The usage of fully immersive 3D virtual environments is on the rise, with applications in both conventional and online classrooms. People access these worlds via a representation of themselves called an avatar, and then move their avatar about as if it were literally walking or flying. This is what is meant by the term "richly immersive and highly scalable 3-D environments." Virtual worlds are unbounded settings where users may shape the environment, the things in it, and the actions of the characters inside it. The study's overarching goal is to persuade educators at elite institutions of higher learning to prioritize the digitization of their curricula in order to better serve their students. Learners may utilize this material to obtain instructions on their electronic devices in a more convenient manner than using traditional methods. 360-degree training experiences, such as being able to use VR to see an operating engine from all sides, are priceless. Gaining theoretical knowledge and accumulating practical experience to learn by doing are inextricably intertwined in vocational education. Successful vocational training relies on offering Trainee exposure to a real-world working environment, but this may be difficult and costly to arrange.

LITERATURE REVIEW

Pengfei Li et.al (2022) Practical skill-based education requires exemplary face-to-face operational teaching, and VR can enhance online distance learning, facilitating an alternative form of “face-to-face” teaching, which results in better teacher–student communication and learner self-efficacy. It also constitutes as a useful substitute for in-person teaching, and it also has a positive impact on learning effectiveness. In this study, a mixed-method approach was used, which utilized the following methodologies: a combination of quantitative and qualitative measures, document collection, case and comparative analysis, and VR teaching that utilizes “You, Calligrapher” as a survey tool. Teachers and students of art were selected, who then used an educational VR-based calligraphy game application for teaching activities. We investigated the impact of virtual time, space, and technical availability on learners’ understanding, imagination, and interactivity in VR education, and then we evaluated the positive impact via learner feedback. Research tools that we utilized consist of comprehension, imagination, and how feedback motivation scales with effective learning; we have also used Chinese calligraphy performance tests. The SPSS statistical analysis software was used for related statistical processing, and α was set to 0.05. The results of this study indicated that Chinese calligraphy studies in VR time and space affect students’ understanding and imagination but not their operational abilities. According to our research, a fundamental difference between traditional and modern teaching methods is a shift toward the use of VR (and the internet) in education. Therefore, the focus of this study is on understanding the impact on practical skills during distance learning and investing the impacts in order to form an effective approach to the use of VR in education.

Onele Nicholas Ogbonna (2020) This paper deals with technology education, its aspirations and existing condition, particularly in poor nations. It looked at virtual reality: its evolution, kinds, usage and how it may be employed to better teaching and

learning. The article evaluated many publications that contrasted VR systems and other technological resources for teaching and learning. Advantages of virtual reality were emphasized; they would encompass both social and intellectual difficulties. There was a short discussion of both immersive and non-immersive virtual reality for education, including how each kind may be used in the classroom, how much it costs, whether or not it's good for students' health, and a few other considerations.

Li Xiao-Dong et.al (2020) Incorporating virtual reality, cloud computing, context awareness with blended learning mode in a flipped classroom, the paper seeks to meet the demands of personalized teaching and learning by constructing a ubiquitous, smart, and non-stop learning environment that could truly achieve the student-centered teaching envisioned by educational IT, advanced concepts of ubiquitous learning, and mobile learning. Thus, this research built and examined a VR-supported hybrid flipped classroom model, which may create a three-dimensional virtual learning scenario to replicate a user's physical presence in a virtual or fictional setting, providing a novel cognitive experience. An actual research was conducted using the model in a "English News" course at a university. The findings demonstrated the model's efficacy in the classroom and its illuminating role in the development of educational informatization, with the goals of raising students' horizons in terms of their cultural competence and preparing them to meet the demands of national, social, and individual advancements.

Jang Hee Lee et.al (2019) The Korean National Competency Standards and the Fourth Industrial Revolution are the subjects of this study. The purpose of this investigation is to contrast the effectiveness of VR-based and conventional approaches to robotics education by analyzing two university engineering courses. The writers employed a combination of the expert method, in-depth interviews with key stakeholders, and a systematic comparison to reach their objective. The correlation between pedagogy and learning outcomes was investigated via three hypotheses and four questions. The writers selected Korea University of Technology and Education as their case study, and they created a survey to evaluate the students' abilities. The participants were second- and third-grade university students. The researcher's custom interview forms yielded quantitative data, while the expert approach and a comparison study shed light on the qualitative information gathered. Competency growth in the VR class was dramatically different from that in a traditional class following the same curriculum. Additionally, it was observed that the development of skills is influenced differently by various teaching approaches; competencies may be developed with the help of VR technologies, but not all of them. Researchers discovered that using virtual reality (VR) effectively in the classroom necessitated a different approach to instruction and had a direct impact on students' capacity to acquire new skills.

Dorota Kami ´nska et.al (2019) Because of the intricacy and significance of abstract thinking and ideas in the educational process, students sometimes struggle to grasp the material. There has been an uptick in the use of innovative technological resources by schools all around the globe in an effort to better accommodate their increasingly multicultural student bodies. In the past several years, virtual reality (VR) has expanded beyond the realm of entertainment to that of education and training. It's a vital part of the educational experience, offering students a fun and interactive method to learn. Following is a synopsis of the current state of virtual reality (VR) in the classroom, including its most prominent trends, possibilities, and problems. We highlight emerging VR prospects and compile the most intriguing, up-to-date VR apps now being utilized in education in a variety of contexts, including but not limited to general, engineering, and health education. This survey also adds to the body of knowledge by providing examples of scenario creation techniques and testing and validation strategies. Finally, we provide our last thoughts on where virtual reality (VR) is headed and how it may enhance the educational process.

VIRTUAL REALITY FOR E-LEARNING

The primary objective of a virtual classroom or laboratory is to provide all the required simulations, tools, applications, and settings to create an effective environment for experimentation, communication, and cooperation that may be utilized to preserve and disseminate a body of knowledge. Therefore, the virtual environment hosting the labs should provide all the essential capability to its users so as to imitate the actual processes as realistically as possible, so as to better simulate the learning process from beginning to end.

In these digital labs, people are portrayed by 3D avatars that may freely move about the space, interact with the simulated instruments, and work together by chatting with one another. Students will be able to conduct experiments in accordance with the chosen curriculum in a virtual laboratory where, for instance, chemistry is chosen as the application area.

The capabilities provided by the Virtual Laboratory will depend on the type of laboratory being simulated, and this allows the platform to better serve its intended purpose. In any event, the system must be able to accommodate the following:

- Making Virtual Laboratories so that experimental materials can be arranged and manipulated in advance.
- Representation of the users both teacher and learners.
- Designing items with changeable qualities like color, illumination, etc.

- Definition of the possible ways of communication.

METHODOLOGY

The author spent 2019–2021 researching and comparing Oculus–based virtual reality (VR) apps currently used in the classroom. It's true that you can get virtual reality applications in other stores, including Vive and Steam, but they all have a lot of similarities and the same apps are typically made accessible for several VR systems.

Since 2012, Oculus has provided consumers with access to high-quality VR headsets at reasonable prices. There are two distinct variants available: a wireless headset that requires a computer (Quest) and a standalone headset that does not (Rift). The anticipated share of the VR market is 51.7%, however the business has never disclosed unit sales of any of its VR devices. Steam, a digital distribution service, conducts a monthly survey from which this figure was derived.

Exploratory learning was the topic of discussion between Severino and Messina (2010). The results of the experiment demonstrated that the experimental group exhibited higher levels of both creative emotional qualities, such as adventure, curiosity, and challenge, and creative cognitive abilities, such as opening force, accuracy, and title, than the control group. Law & So (2010) studied the effect of the intervention of inspiring games in physical education class on junior high school students' creative thinking that inspiring games could significantly enhance junior high school students' creativity tendency and creativity cognition ability. The inspiring games referred to "inspiring game activity" proposed by the USA in 1971 (Steinberg, 2011); it is the exploratory education activity mentioned in this study. Rhodes and Martin (2013) found that students who took part in exploratory education activity programs were better able to value themselves and others, work together effectively, think creatively, solve problems from a neutral perspective, and put their newfound knowledge to use in their daily lives thanks to the findings of their mobile research. Yorio and Feifei (2012) looked at the impact of exploratory education on students from a variety of backgrounds in junior high school and found that it improved students' problem-solving and teamwork abilities, that students had generally positive experiences with the activity, and that teachers were able to facilitate students' professional development.

H1: Exploratory education shows remarkable effects on creativity.

H2: Using exploratory education under virtual reality appears the optimal effect on the promotion of creativity.

DATA ANALYSIS

The study's author used content analysis as a quantitative research approach to determine factors such as location, language, price, size, rating (in stars), and quantity of reviews for VR apps used in education. Virtual reality (VR) learning apps available in the Oculus Store were the focus of the study's examination.

The Area was used to categorize each application. Twenty-one use cases for 2019, twenty-four for 2020, and twenty-three for 2021 have been identified under this rubric. Nature, space, medicine, art, and history made up the largest percentages of applicant categories (Table 1, Figure 2).

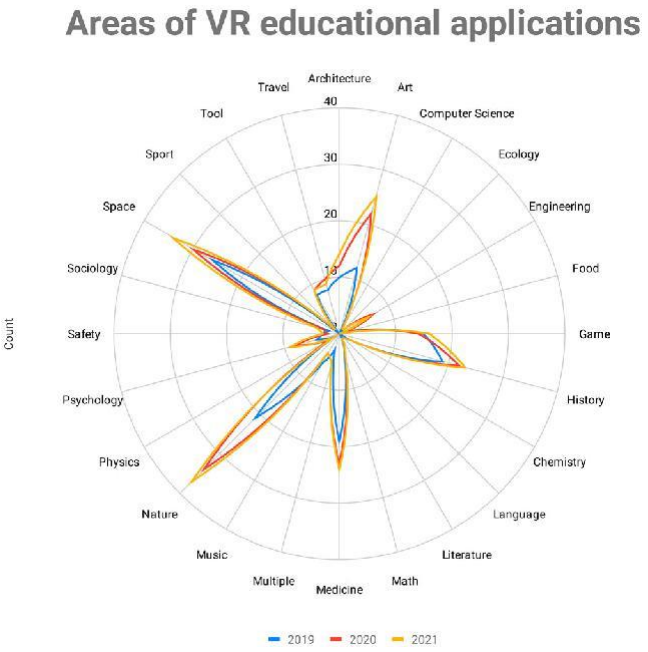

Figure 1**: Areas of VR educational applications in 2019 - 2021.**

Table 1**: VR application areas**

2019						2021		
Area	N	%	Area	N	%	Area	N	%
Space	26	15.2	Nature	34	15.5	Nature	37	15.8
Nature	21	12.3	Space	30	13.7	Space	34	14.5
History	19	11.1	Medicine	23	10.5	Art	25	10.7
Medicine	19	11.1	Art	22	10.0	Medicine	24	10.3
Game	15	8.8	History	22	10.0	History	23	9.8
Art	12	7.0	Game	14	6.4	Game	16	6.8
Architecture	10	5.8	Architecture	12	5.5	Architecture	14	6.0
Tool	8	4.7	Travel	10	4.6	Psychology	9	3.8
Travel	8	4.7	Tool	9	4.1	Tool	9	3.8
Engineering	6	3.5	Psychology	8	3.7	Travel	9	3.8
Music	6	3.5	Engineering	7	3.2	Engineering	6	2.6
Psychology	4	2.3	Multiple	5	2.3	Multiple	5	2.1
Math	3	1.8	Math	4	1.8	Math	4	1.7
Multiple	3	1.8	Music	4	1.8	Music	4	1.7
Safety	3	1.8	Sociology	3	1.4	Sociology	4	1.7
Chemistry	2	1.2	Chemistry	2	0.9	Safety	3	1.3
Sociology	2	1.2	Physics	2	0.9	Chemistry	2	0.9
Ecology	1	0.6	Safety	2	0.9	Computer Science	1	0.4
Food	1	0.6	Computer Science	1	0.5	Ecology	1	0.4
Literature	1	0.6	Ecology	1	0.5	Language	1	0.4
Physics	1	0.6	Food	1	0.5	Literature	1	0.4
			Language	1	0.5	Physics	1	0.4
			Literature	1	0.5	Sport	1	0.4
			Sport	1	0.5			

Variance Analysis of exploratory education and creativity

Table 2: Variance Analysis of exploratory education and creativity

	Variable	F	P	Scheffe post hoc
Exploratory education	Sensitivity	9.662	0.001**	Exploratory education>traditional type
	Fluency	6.533	0.000**	Exploratory education>traditional type
	Flexibility	10.523	0.002**	Exploratory education>traditional type
	Originality	8.637	0.000**	Exploratory education>traditional type
	Elaboration	12.416	0.000**	Exploratory education>traditional type

* stands for p<0.05, ** for p<0.01

We use an ANOVA to examine how different types of schooling affect students' ability to think beyond the box. Table 2 shows that there are significant differences between exploratory education and the traditional type in terms of sensitivity, with exploratory education appearing to have a higher sensitivity than the traditional type; in terms of fluency, with exploratory education displaying a higher fluency than the traditional type; and in terms of flexibility, with exploratory education displaying a higher degree of flexibility than the traditional type. In this light, H1 is accepted.

Table 3: Variance Analysis of exploratory education and leadership

	Variable	F	P	Scheffe post hoc
Exploratory education	Motivation ability	11.273	0.003**	Exploratory education>traditional type
	Interpersonal skills	13.568	0.000**	Exploratory education>traditional type
	Personality traits	10.921	0.000**	Exploratory education>traditional type

stands for p<0.05, ** for p<0.01

Variance Analysis of exploratory education and leadership

Analysis of Variance is utilized to examine the influence of exploratory education on leadership. Table 3 shows that there are notable differences between exploratory education and the traditional type on three different dimensions: motivation ability, interpersonal, and personal. Exploratory education has a higher motivation ability, and exploratory education seems to have higher interpersonal skills, than the traditional type. Hence, H3 is confirmed.

CONCLUSION

Oculus Store virtual reality (VR) educational apps were the subject of this research. According to the data, the five most common uses of virtual reality are in the following domains: biology, astronomy, medicine, the arts, and history. More over half of the demo apps are free to download and utilize English as their primary language of interaction. In this article, we examine how instilling a creative mindset in pupils might help them become more analytical thinkers. The findings reveal that well-designed experimental courses teach leaders to guide their followers in accomplishing a series of anxious, challenging, yet doable tasks or team goals, laying the groundwork for future generalization, reflection, and application in order to boost students' sense of self-worth, acquire new leadership skills, and spread the word about needed reforms in education. The use of VR into open-ended learning environments further demonstrates that direct personal experience is superior to reading about it in a textbook when it comes to fostering a growth mindset and the incentive to alter one's behavior.

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