A Study on The Relationships Between The Virtual Reality & Learning

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Abstract— The aim of the research paper is to study the impact of virtual reality on effective learning. Furthermore, it analyse the virtual reality education providers and the learners of a motor skill training institute to study the satisfaction and performance. The data is gathered through structured questionnaire from the VR training providers and learners from a private training institute. The performance comparison shows the improvement due to the presence of virtual reality. This research examines the opinion of VR learners with the analysis of feedback questionnaire. Spearman correlation coefficient is used to find the relationships between the user's performances in the VR environment. Research shows the advantages of virtual reality on learning. It shows the awareness level and the infrastructure availability of the training. The learners and the skill training providers favour the application of Virtual reality tool for effective learning. Even though the learners have favourable opinion regarding the VR application, the infrastructure is not adequate to meet the needs of the learners. Apart from the satisfaction among the learners, VR reduces the visualization complexity in the learning process. The presence of 3D Virtual environment develops more satisfaction among the learners. The result shows that due to the presence of virtual environment the learner's attention, perception and memory develops. This research outcome can be used in the classroom set-ups of other courses. Cloud software sharing is one of the possible to improve the current virtual reality applied learning environment.

Keywords— Virtual reality, Simulation, Learners' Satisfaction, Motor skills, Awareness, Opinion and Performance

I INTRODUCTION

There are always possibilities exists to develop the learning and teaching process and environment. Even though the class room face to face teaching methodology is the only available method throughout the world for the past hundred years, this trend is changing and developing due to the advent of information and communication technology. Virtual reality is an upcoming and developing field like IoT, Artificial Intelligence and Deep Learning. Due to the lack of infrastructure, software requirements, and knowledge in the field of VR, very few private institutes offers the courses related to VR and Augmented Reality. Virtual reality is an artificial visual and audio environment that is developed by using computer software. Virtual environment creates an illusion of real world with the help of 3D software and helmet with a screen. This term is developed from the word 'Virtual' which means near and the word 'Reality' which means real. It is a three-dimensional and computer generated environment.

Virtual reality has the potential to change the current learning scenario by creating immerse and interactive three-dimensional environments. Web Learning, Mobile Learning, Deep learning, Machine learning, and VR enabled learning has many potential impacts on effective teaching and learning. This type of advancements breaks many barriers related to class room and face to face learning   set-ups. These advancements are the breakthrough in the process of education and communication. Many research studies prove the impact advanced ICT technology on education. Virtual reality is the next step in the educative environment for effective communication. This research paper is organized as follows,

Section I introduces the VR concepts and its importance, Section II reviews the related literature work, Section III explains the research methodology followed, Section IV helps to present the results and the findings, Section V presents the conclusion from the research and explore the possibilities to improve it further.

II RELATED WORK

Claudia, experimented the Virtual reality technology for teaching language courses. They found the strong relationships between the VR technology, memory, performance and IVA-Intelligent virtual Avatar acceptance among the adult learners as well as the child learners [1]. Riva et al, found out the links between the language learning task and virtual environment. They investigated and found out the benefit learning of language comprehension and virtual motion [2]. Veronica et al, studied the virtual reality's

advantages, disadvantages, frameworks, software and other requirements. They also suggested the improvements required in VR for effective design [3]. Mcllellan traced the use of VR technology for flight training program. He wrote about the details of available literature related to VR in his book named "The handbook of research for educational communication and technology. He listed the training providers and the benefits [4]. The attitude study conducted by Mikropoulos et al, revealed the attitude changes among the learners regarding the VR environment and learning. They tested the attitude changes among the various discipline learners [5]. Salzman et al, studied the complexity of abstract concepts and the benefits of Visual reality. They found out the visualization process and features of VR. They also studied the method to identify, evaluate and use the appropriate VR environment for effective learning [6]. Chen at al, studied the importance of VR technology. He pointed the lack of design, methodology, theories, impact studies, performance analysis and the aptitude [7]. Steinberg pointed the needs of prediction experiments, design aspects, new domains and VR advantages among the students [8]. Chee suggested the basic root learning for VR using physics as a base subject for the learners. He suggested the VR technology for basic understanding about the reality [9]. Pantelidis stated the benefits of VR technology on effective learning. He suggested the use of VR like 2D animation and computer assisted simulated learning. He stressed the importance of VR to change the attitude, interest, aptitude, skills, etc [10]. Sangeetha Rajesh studied the e learning environment such as personal learning environment an virtual learning environment and its advantages [11]. Vishal et al. studied the issues related to cloud learning and virtual learning environment [12].

III METHODOLOGY

The satisfaction level of 30 learners was gathered using a well-constructed questionnaire. The satisfaction level numbered from 0, 1, 2, 3, 4, 5 with neutral, strongly disagree, disagree, strongly agree and agree etc. The questions were framed in the areas of

- VR tool
- Opinion
- Software
- Infrastructure
- Attention
- Perception
- Interest
- Motivation
- Opportunity

Student's satisfaction and performance

Virtual reality can develop a much greater depth of learning of a theoretical concept as well as a practical application work. This immersive technology simplifies the visualization process. For example running of electrons in an orbit can be easily visualized and explained without any verbal complexity. The performance of the learners increases due to the development of understanding level and interesting level. A motivated learner shows more performance than the unmotivated learner. This VR technology develops motivation due to the opportunity. The educators as well as the learners understands the opportunity exist from the lack of facilities, technology, resources and manpower.

The research data is tabulated as

Table 1

S.No	R_1 Ranked Satisfaction	R_2 Ranked VR tool	Deviation = R_1-R_2
1	2	3	-1
2	3	4	1
3	4	5	-1
4	2	4	2
5	4	3	1
6	2	5	-3
…	…	…	..
….	…	…	..

Table 1 shows the satisfaction and VR tool ranking and the deviation to find out the correlation between the satisfaction and VR tool presence.
Five point Likert scale was used to find the satisfaction and performance of the learners.

Spearman's correlation coefficient 'r' used to study the effectiveness of the VR technology and satisfaction level.

The statistical formula

$$r = 1 - \frac{6\sum D^2}{N^3 - N}$$

D = Deviation

N = Number of variant = 30 samples

R = 0.52 shows the satisfaction and VR tool application has the positive correlations.

The above statistical correlation coefficient shows the presence of VR tool enhances the satisfaction level among the learners.

The performance is compared with VR and without VR environment. It shows the positive correlations exist between the two methods.

The qualitative questionnaire shows the opinion

1. It is so exciting and flexible.
2. The trainer has the basic knowledge.
3. Advanced facilities needed for us to feel more immersed
4. This training can be improved with the help of high tech. facilities.
5. We love the new methodology and we recommend it for other courses.
6. This is the first time we felt the immersion.
7. I am willing to go for higher education related to VR.

Findings:

Virtual Reality

1. There is no adequate technical equipments are available for the learners.
2. Lack of VR trained and certified educators are the common problem.
3. Reaching the tech savvy new generation learners requires tremendous efforts and plans.
4. There is no awareness among the educators and learners.
5. The cost of the training is higher than the other technical courses.
6. There is no structured curriculum for the VR related courses.
7. There is no adequate research works conducted in the field of VR.
8. Even though Flight and Space research organizations use the technology, till now many sectors don't have the facility and awareness.

There are no government plans for the application of VR in the educational sector.

IV RESULTS AND DISCUSSION

VR education providers opined that the learner's satisfaction level is higher than the other programming courses. The learner's attention, perception and memory enhanced due to the presence of Virtual reality in the educational environment. The learner's performance in the exam developed due to the incorporation of VR in the learning process. More than ninety five percent of the virtual reality learners have high level of expectation regarding the VR technology. Lack of adequate infrastructure is the main problem in the VR incorporated learning environment.

V. CONCLUSION AND FUTURE SCOPE

This research work concludes that there is a positive correlation links between the VR tool and satisfaction among the learners. Furthermore, there is a positive links between the VR application and exam performance improvements. This research clearly shows the lack of facility, awareness level, technical requirements, attitude among the providers and learners. Attention, perception and memory increases due to the presence of virtual learning environment. Motivation to go for another related course with the same technology is developed among the learners due to this immersive technology. There are possibilities exists to improve the current virtual learning environment. Incorporation of cloud learning environment with virtual reality has many potential advantages in the educational field.

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