Journal of Research Administration
Society of Research Administrators International

EFFECTIVENESS OF EXTENDED REALITY IN VISUALIZING SOLID SHAPES AMONG VIII STANDARD STUDENTS

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ABSTRACT

This study examines the effectiveness of extended reality in visualizing solid shapes among VIII standard Students. The sample of the study consists of 50 students, from a Government higher secondary school in Chennai district. In that 25students came under Experimental Group and 25 students came under Control Group. The students in both control group and experimental group were undergoing pretest. The experimental group students were taught 'Visualizing solid shapes' using Extended Reality and the Control group students were taught 'Visualizing solid shapes' using traditional method. After teaching Experimental group through extended reality and Control group through traditional teaching, they were given post test. The students in the experimental groups scored more in their post test than the control group students.

Keywords: Effectiveness, Extended Reality, Visualizing solid shapes

INTRODUCTION

Extended Reality (XR) refers to an umbrella term encompassing a spectrum of immersive technologies that blend the physical and virtual worlds, providing users with interactive experiences that go beyond traditional methods of human-computer interaction. XR combines elements of Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) to create environment where digital objects coexist and interact with the real world or simulate entirely virtual spaces. Extended Reality has a wide range of applications across various industries, including gaming, entertainment, education, healthcare, manufacturing, architecture, and retail. From immersive training simulations and interactive storytelling to virtual prototyping and remote collaboration, XR technologies are transforming how people work, learn, communicate, and entertain themselves.

REVIEW OF LITERATURE

Arthur Dogbe et al (2022), investigated that mathematics is required to be passed in the majority of countries in order to be admitted to postsecondary institutions. This is not to say that the arithmetic performance of the students is not concerning. Data were gathered for the study using a standardised questionnaire, which followed a survey design. The population was made up of Ghanaian undergraduate students attending a public university. 373 first-year undergraduate students at Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development (AAMUSTED) were chosen using convenient and purposeful sampling approaches. However, students' learning interest in mathematics acted as a full mediating factor in the impact of peer-assisted mathematics learning on arithmetic performance.

Elsayed, sabah Abdulla et al (2021) investigated the impact of augmented reality technology on middle school students in Saudi Arabia's academic motivation and visual thinking in mathematics. The experimental method with a quasi-experimental design was used to achieve the research aims. It comprised an experimental group, a control group, and pre- and post-tests for both groups. The Visual Thinking Test and the Academic Motivation Scale were two of the research instruments used in this study, which involved 76 randomly selected students. According to the findings, the experimental group outperformed the control group in terms of academic motivation and visual thinking. Both researchers suggested using augmented reality technology in mathematics training at various educational levels in light of the findings.

Alice, Canto, et al (2021) examined a study on social virtual reality (VR) applications. These apps allow users to engage in interpersonal communication and collaborate on tasks in real time. They could alter the manner in which language learners practise speaking a foreign language. Our goal in designing this study was to investigate the ways in which presence, immersion, and interaction impact the whole social experience. Using Spanish as their lingua franca at the A2 level, students from Germany and the Netherlands participated in High-immersion VR (HiVR) virtual exchange sessions. Based on the surveys and reflection diaries, the preliminary findings indicate that students enjoyed using a social VR app to converse with peers from different countries in the target language since it made them feel fully present and involved in the social interactive VR realm. This could increase participation and reduce nervousness.

Yildirim, Fatih Serdar (2021) examined the efficacy of middle school students' science instruction utilising augmented reality (AR)-prepared instructional materials. In the experimental

study, 61 sixth grade students from a middle school in Antalya were chosen at random for the 2019–2020 academic year. A mixed research design was used to gather information about the students' academic performance as well as their opinions regarding the use of augmented reality in science classes. The study's findings showed that implementing augmented reality (AR) improved students' science learning processes and raised their academic performance. Additionally, it was demonstrated that using AR enhanced students' interest and enthusiasm in science classes while also helping them learn meaningfully by giving abstract concepts a concrete form.

OBJECTIVES OF THE STUDY

1. To find out the significant difference between the pre test and post test scores of Experimental Group for the criterion test.
2. To find out the significant difference between the pre test and post test scores of Control Group.
3. To find out the significant difference between the pre test scores of Control Group and Experimental Group.
4. To find out the significant difference between the post test scores of Control Group and Experimental Group.

HYPOTHESES OF THE STUDY

1. There is no significant difference between the pre test and post test scores of Experimental Group for the criterion test.
2. There is no significant difference between the pre test scores and post test scores of Control Group for the criterion test.
3. There is no significant difference between the pre-test scores of Control Group and Experimental Group.
4. There is no significant difference between the post test scores of Control Group and Experimental Group.

METHODOLOGY

The design selected for the present study is Experimental and Control group pre test and post test method. The design of the study has the following structure.

TABLE 1.0- Design of the Study

GROUPS	EXPT	PRE TEST	POST TEST
EG	Given	Yes	Yes
CG	Given	Yes	Yes

EG- Experimental group **CG-Control Group**

The Researcher has selected 2 groups of students.

The pre test and post test were given to Control Group. They were taught using Traditional learning method.

The pre test and post test were given to Experimental Group . They were taught using Extended Reality.

VARIABLES OF THE STUDY

1. Learning the concept 'Visualizing solid shapes' through Extended reality.
2. Learning the concept 'Visualizing solid shapes' through traditional teaching method.
3. Criterion test for 'Visualizing solid shapes'.

TOOLS USED IN THE STUDY

1. Criterion test on the 'Visualizing solid shapes' developed and validated by the researcher (S.Vijayasanthi) with the help of the research supervisor(Dr. V. Sharmila).
2. The stimulus material used is Extended Reality developed and validated by the researcher(S.Vijayasanthi) with the help of the research supervisor(Dr.V.Sharmila).

HYPOTHESIS-1

There is no significant difference between Experimental Group pre test and post test scores in Criterion test.

TABLE 1.1

N, MEAN AND STANDARD DEVIATION VALUES OF EXPERIMENTAL GROUP PRE TEST AND POST TEST SCORES

Variables	N	Mean	S.D	't'	Significance
Experimental Group Pre test scores	**25**	**25.08**	**3.67**	**12.2**	

Experimental Group Post test scores	**25**	**33.68**	**3.19**		Significant for the df of 24 at 0.05 level (1.71)

It is evident from the above table that the 't' value found out is 12.2. It is higher than the critical value of 1.71 and it is significant at 0.05 level. Hence, it is concluded that there exists significant difference between the pre test and post test scores of experimental group. The mean value of the post test (33.68) scores of experimental group is higher than the mean value of pre test (25.08) scores of experimental group. The experimental group has performed well after the experiment. So, the null hypothesis stated is rejected. It can be interpreted that the student learnt Visualizing solid shapes through Extended Reality scored higher marks in their post test compared to their pre test scores. Thus there is a significant difference between Experimental group Pretest scores and Post test scores.

HYPOTHESIS - 2

There is no significant difference between Control Group pre test scores and post test scores.

TABLE 1.2

N, MEAN AND STANDARD DEVIATION VALUES OF CONTROL GROUP PRE TEST AND POST TEST SCORES.

Variables	N	Mean	S.D	't'	Significance
Control Group Pre test scores	**25**	**24.08**	**2.78**	**13.26**	Significant for the df of 24 at 0.05 level (1.71)
Control Group Post test scores	**25**	**25.84**	**3.06**		

It is evident from the above table that the 't' value found out is 13.26. It is higher than the critical value of 1.71 and it is significant at 0.05 level. Hence, it can be concluded that there exists significant difference between the pre test and post test scores of control group . The mean value of the post test (25.84) scores of control group is higher than the mean value of pre test (24.08) scores of control group. So, the null hypothesis stated is rejected. It is concluded that the students who were taught Visualizing solid shapes through traditional method scored higher marks in their post test than their pre test scores. Thus there is a significant difference between Control group Pre test scores and Post test scores.

HYPOTHESIS-3

There is no significant difference between Experimental Group and Control Group in their Pre test scores.

TABLE 1.3

N, MEAN AND STANDARD DEVIATION VALUES OF EXPERIMENTAL PRE TEST AND CONTROL GROUP PRE TEST

Variables	N	Mean	S.D	't'	Significance
Control Group Pre test scores	**25**	**24.28**	**3.67**	**1.62**	Not Significant
Experimental Group Pre test scores	**25**	**25.08**	**3.06**		

It is evident from the above table that the 't' value found is 1.62. It is lower than the critical value of 1.71 at 0.05 level. It is not significant. Hence, it can be concluded that there is no significant difference between the experimental group and control group in their pre test scores. So, the Null hypothesis stated is accepted. Thus There is no significant difference between Experimental Group and Control Group in their Pre test scores..

HYPOTHESIS-4

There is no significant difference between Experimental Group and Control Group Post test scores.

TABLE 1.4

N, MEAN AND STANDARD DEVIATION VALUES OF EXPERIMENTAL GROUP POST TEST SCORES AND CONTROL GROUP POST TEST SCORES

Variables	N	Mean	S.D	't'	Significance
Control Group Post test scores	**25**	**25.84**	**3.19**	**8.77**	Significant for the df of 24 at 0.05 level (1.71)
Experimental Group Post test scores	**25**	**33.68**	**3.06**		

It is evident from the above table that the 't' value found is 8.77. It is higher than the critical value of 1.71 and it is significant at 0.05 level. It is significant. Hence, it can be concluded that there exists significant difference between the experimental group and control group in their post test scores. The mean value of the post test (33.68) scores of experimental group is higher than the mean value of post test (25.84) scores of control group. So, the null hypothesis stated is rejected. The students belong to the experimental group excelled in their post test scores than their control group. It is evident that the Visualizing solid shapes through Extended Reality was more clear than their counter parts. Thus there is a significant difference between Experimental Group post test scores and Control Group Post test scores.

Table 1.5

Effectiveness of Extended Reality among VIII Standard Students

VARIABLES	SIGNIFICANCE	REMARKS
Pre test scores and Post test scores of Experimental Group	Significant	Experimental Group post test scores > Experimental Group pre test scores
Pre test and Post test scores of Control group	Significant	Control group post test scores > Control group pre test scores
Pre test scores of experimental group and control group	Not Significant	Experimental group Pre test scores = Control group pre test scores

Post test scores of experimental group and control group	Significant	Experimental Group post test scores > Control Group post test scores

CONCLUSION

The study reveals that the VIII standard students in experimental group who studied the Visualizing solid shapes through Extended Reality excelled in their post test scores than their pre test scores and also in the post test scores of control group who studied the Visualizing solid shapes through traditional learning. It is concluded that the extended reality is highly effective for Visualizing solid shapes among VIII standard students. This elucidate that the Extended Reality is more effective tool for Teaching solid shapes.

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