

EFFECTIVENESS OF AUGMENTED REALITY TO ENHANCE LATERAL THINKING OF HIGH SCHOOL STUDENTS

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ABSTRACT

In this paper the researcher explores the effectiveness of augmented reality to enhance the lateral thinking of high school students. The researcher adopted experimental method. Tools used were Augmented reality marker-based content and lateral thinking scale developed and validated by the researcher. Augmented Reality can also inspire empathy in an individual. It offers two-dimensional methods of presenting information versus the traditional one-dimension. The result shows that there is a sign of the effectiveness of augmented reality to enhance the lateral thinking of high school students.

Keywords : *Augmented Reality, Educational Technology, Lateral thinking.*

Introduction

Today, people are dependent on technology for everything they do. Technology has revolutionized the way they perform their day-to-day activities and work in the modern world. Educational technology has improved the efficiency and effectiveness of almost all formal systems in the human experience. These educational technology elements in the educational process have magical efforts. A nation's intellectual strength depends on educational technology support. The use of computing and communicating technology, to enhance the efficacy of transactions and productivity, is the driving force in this new era of social and economic transformation in the new society.

Review of Related Study

David R. Squires (2020) conducted a study on Instructional Designs and Educational Technologies within Augmented Reality Transmedia Storytelling. This study investigates whether AR systems provide a uniquely beneficial learning context due to AR's native function to overlay information onto physical spaces at an art museum and the impact on participant perceived self-efficacy and overall engagement within the AR-enhanced environment. Participants also took part in an open-ended survey within the application.

The rationale for the study

Present educational scenario is complicated and very challenging, particularly for science students with multi-faced problems like understanding the process, complex structure,

function, and practicals. So lateral thinking is vital for problems faced by learners because it is the key to finding new ideas and better ways to do things. Innovation is a necessity for competitive advantage and survival. Lateral thinking is a tool for creativity that leads to innovation. The conventional method of teaching is not enough for skill development they want more than that. Improving this skill can be challenging as lateral thinking comes more naturally to some people than others. A search of the internet reveals a variety of web-based Augmented Reality tools and apps are promoted 21st-century skills such as creativity, problem-solving, critical thinking, coding analysis, and testing. This study is an attempt to find out the effectiveness of augmented reality to enhance lateral thinking. Moreover, such a study on the 9th-standard students is an untouched area particularly Tamilnadu in Sivagangai District. Hence the study was undertaken by the researcher.

Objectives of study

1. To find out the effectiveness of Augmented Reality to enhance the lateral thinking of high school students.

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2. To find out whether there is any significant difference between the control group and Experimental group high school students in their lateral thinking.
3. To find out whether there is any significant difference between pre-test and post-test scores of experimental group high school students in their lateral thinking.
4. To find out if there is any significant difference between male and female and rural and urban high school students in their lateral thinking.

The method used

The researcher adopted a pre-test post-test experimental design in which tools were employed for the pre-test assessment of lateral thinking of selected students in the first stage. In the second stage, there was an experimental group and a control group. The experimental group was taught using Augmented Reality content, and the control group was taught with traditional method of teaching. In the third stage, the post-test assessment was done.

Population

The population of the study consists of high school students in the Sivagangai district of southern Tamilnadu in India

Sample

The investigator selected 90 high school students studying in the Sivagangai district of southern Tamilnadu in India. The investigator used the stratified random sampling technique.

Tools Used

The researcher used the following tools for data collection.

1. Augmented reality marker-based content (2022)
2. The lateral thinking scale was developed and validated by the researcher (2022)

Procedure

Selected students were given appropriate and detailed instructions about the study, and the purpose of the study was clearly mentioned. Ninety participants were selected for the study. The participants selected were divided into two groups. The researcher has taken the

pretest from these two groups on lateral thinking. Augmented Reality content was used for the experimental group and the conventional method was used to the control group. After the completion of 21 days, the post-test was conducted for two groups for the assessment of lateral thinking.

ANALYSIS

Hypothesis 1: There is no significant difference between pre-test and post-test scores of experimental group high school students with regard to their lateral thinking.

Table 1
Difference between the mean score of pre-test and post-test scores of experimental group high school students with regards to lateral thinking

Lateral thinking	Mean	SD	't' value	df	Remarks at 5% level
pre-test	18.7	3.67	8.60	38	S
post-test	37.65	2.89			

(At 5% level of Significance of the table value of 't' is 1.96)

It is inferred from the above table that there is a significant difference in the mean scores between pre-test and post-test of the experimental group high school students with regard to their Lateral thinking. Therefore the null hypothesis is rejected.

Hypothesis 2: There is no significant difference between the pre-test and post-test of a control group of high school students with regard to their lateral thinking.

Table 2
Difference between the mean score of pre-test and post-test of control group high school students with regards to lateral thinking

Lateral thinking	Mean	SD	't' value	df	Remarks at 5% level
pre-test	18.4	3.5	1.73	38	NS
post-test	22.2	3.04			

(At 5% level of Significance of the table value of 't' is 1.96)

It is inferred from the above table that there is no significant difference in the mean scores between pre-test and post-test of the control group high school students with regard to the Lateral thinking. Therefore the null hypothesis is accepted.

Hypothesis 3: There is no significant difference between male and female high school students with regard to their lateral thinking.

Table 3

Difference between the mean score of male and female high school students with regards to lateral thinking

Lateral thinking	Mean	SD	't' value	Remarks at 5% level
Male	44.65	5.65	0.36	NS
Female	44.62	6.29		

(At 5% level of Significance of the table value of 't' is 1.96)

It is inferred from the above table that there is no significant difference in the mean scores between male and female of high school students with regard to their Lateral thinking. Therefore the null hypothesis is accepted.

Hypothesis 4 :

There is no significant difference between rural and urban high school students with regard to their lateral thinking.

Table 4

Difference between the mean scores of rural and urban high school students with regard to their lateral thinking

Lateral thinking	Mean	SD	't' value	Remarks at 5% level
Rural	43.98	5.928	2.140	NS
Urban	45.43	5.831		

(At 5% level of Significance of the table value of 't' is 1.96)

It is inferred from the above table that there is no significant difference in the mean scores between rural and urban of high school students with regard to their Lateral thinking. Therefore the null hypothesis is accepted.

Hypothesis 5 :

There is no significant difference between hostel and day scholar high school students with regards to lateral thinking

Table 5

Difference between the mean score of hostel and day scholar of high school students with regards to lateral thinking

Lateral thinking	Mean	SD	't' value	Remarks at 5% level
Hostel	44.35	6.753	0.564	NS
Day scholar	44.78	5.460		

(At 5% level of Significance of the table value of 't' is 1.96)

It is inferred from the above table that there is no significant difference in the mean scores between hostel and day scholar of high school students with regards to the Lateral thinking. Therefore the null hypothesis is accepted.

Discussion and summary

The result shows a significance between the pre-test and post-test scores of experimental group high school students with regard to their lateral thinking. It is inferred that Augmented Reality can also inspire empathy in an individual. It offers two-dimensional methods of presenting information versus the traditional one-dimension. This combination of interactivity and engagement with emotion, in turn, could enhance the ability of students to remember what they have learned– and lead to faster acquisition of information and skills. Hence it is concluded that Augmented Reality enhances lateral thinking in high school students.

This paper proposes a marker-based augmented reality application to be used in teaching-learning process that will help to combine virtual objects with the real environment facilitating. Augmented Reality enables sensory activities (including visual, auditory, hepatic, somatosensory, and olfactory.) in skill development. The main advantage is the use of low-cost devices as compared to the costly head-mounted display devices. Augmented Reality provides less distraction of attention and uses fostering images, and 3D animations, that induce sensory activities and can develop lateral thinking skills.

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women, their progressive principles "completely collapsed when coupled with religious and societal difficulties." Indian society has not yet embraced a scientific way of thinking, despite having superior technologies. It must draw a line between religion and science, economics, politics, and other fields.

"The International Women's Year Conference in Mexico City in 1975 and the World Conference of the United Nations for Women in Copenhagen in 1980 both acted as impetuses for the current surge in women studies. "In order to create a just, advanced society where women are treated equally, scholars should investigate and assess changes in women's status and function in society"

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