

Effectiveness of Virtual Reality Learning Strategy on Secondary School Teachers Climate Change Awareness in Borno and Yobe State, Nigeria

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Abstract

The study attempt to study Climate change awareness level among teachers in Borno and Yobe state Nigeria and how virtual reality can be employed as strategy in teaching secondary school students. Impacts of Climate change are increasing in severity all over the world therefore, developing teaching strategies as interventions to encourage behaviors that address climate change is important. This study will also investigate virtual reality could impact teaching about climate change in schools and influence climate friendly behavior. Sudarjat (2023) suggested that one of the well-known methods to introduce and raise students awareness about global warming in class is through experiential learning which is a learning process that encourages process of knowledge being created through transformation of experience. This study will employ simulations of climate scenarios to teach potential impacts of rising temperatures, flooding, and deforestation on communities and ecosystems. Research on climate change and virtual learning in secondary schools in Nigeria is relatively less hence the study on effectiveness of virtual reality on climate change awareness in secondary schools in Borno and Yobe state Nigeria. Results of this study may provide opportunities for further research, improve awareness among students and teachers on climate change behaviors.

Keywords: Climate Change, Teacher, Learning Strategy, Virtual Reality.

Original Research Article

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Introduction

Climate change is fuelling the increase in frequency and intensity of extreme events such as heat waves, storms, and droughts. While human activity and the resultant emissions are responsible for increased carbon dioxide concentrations in the atmosphere leading to global warming and climate change. Virtual reality Learning strategy which is a computer-generated environment that creates immersive illusion that the user is somewhere else and interact with an artificial three-dimensional environment through electronic devices and receive information like motion sensors and movement trackers may be effective in teaching about climate

change by teaching (Gartner 2021). Virtual Reality is an emerging innovative technology used in several fields of education due to their positive impact on motivation, increased time on-task, memory retention and enjoyment (Kavanagh 2017). Hance can help develop positive emotions, memory recall, skills and increase levels of engagement compared with traditional teaching approaches of chalk and talk.

Despite benefits of virtual reality strategy could have on learning, it is not introduced into classroom teaching and learning in secondary school education in Borno and Yobe state. School teachers awareness of negative effects of human activities on ecosystem



can help reduce effects of climate change through mitigation behaviors and prepare students for unavoidable impacts of climate change through teaching. Virtual reality technique can encourage climate change-related behaviors, such as learning more about climate change, demanding policy action, and preparing one’s home for flooding or wildfires through practical comparison of reality and images. Environmentally friendly behaviors are referred to as climate change actions. There is need for investigation into role of virtual reality in climate change awareness among teachers for the benefit of students in school. Studies have shown the benefits of using the strategy to teach students about risk perception, involvement with nature, positive and negative affects of climate change can help students in secondary schools develop climate friendly behaviors.

Problem Statement/Justification

Studies on environmental issues have shown that virtual reality effects on knowledge gains and self-efficacy demonstrated that body movement is essential in learning, creating socio-psychological attachments to environment leading to attitude change. Boulen (2023) suggest that moving virtual space meaningful to learning activity helps participants elaborate and understand the consequences of climate change, leading to learning gains. This study aimed at comparing the effects of virtual reality strategy on climate change learning, teaching, and awareness by teachers in secondary schools. Teachers experience in teaching at the secondary schools level if not aware of challenges of climate change may not be able to teach students with Virtual reality strategy to inculcate the desired knowledge of risk perception, causes and beliefs about increased carbon dioxide emissions. The processes involved in learning about climate change according to Mirauda (2020) can be influenced not only by teaching and learning of the experience but also by non-verbal aspects of the information. For example, students exposed to new information, are constantly reasoning about the informant’s characteristics such as physical appearance, voice, and gestures and the implications of the information received. Virtual reality strategy expose students to experiences that can help in reasoning about complex environmental issues.

Research Objectives

- The objectives of this study are to:
- 1) Determine how Virtual Reality learning strategy can influence teaching about climate change in secondary schools in Borno and Yoe state.
 - 2) Identify the relationship between secondary school teachers climate change awareness and teaching effectiveness in Borno and Yobe state.
 - 3) examine how knowledge of climate change relate to climate change behavior
 - 4) Determine whether virtual reality strategy can achieve more effective correction outcomes on climate change behavior compared to social media.

Significance of the Study

This study is essential for students because learning about effects of climate change with virtual reality will help in acting on environmental issues in their communities. To teachers, the study will serve as reference material for teaching issues in other school subjects. The study may benefit policymakers and environmental organizations as it provides insights into how climate change awareness can be achieved through schools. The findings of this research can help in designing effective awareness programs, policy interventions, and encourage participation on climate change in Nigeria school system.

Literature Review

Climate change is one of today's most urgent problems, having significantly reshaped human environment. This increases the average temperature of the earth, which is known as global warming. All countries are thus acknowledging their responsibility to gradually prioritize carbon neutrality and develop global warming as climate change modules in educational content, namely climate change education (Nisa et al 2019). Teachers awareness of climate change and relevant teaching strategies for educating students can encourage change in attitude toward poor environmental behaviors as well helps make informed decisions on climate change education and related issues. In the classroom, students can be taught the impact of climate change and learn how to adapt to climate change. But especially relevant teaching strategy would motivate the students to know

important role they can play regarding negative effects of climate change starting with their local communities

Virtual reality strategy can be a combination of formal, informal, or non-formal educational approaches one of the known strategies to raise students awareness about climate change is through virtual learning since virtual Learning involve process that encourages knowledge creation through transformation of experience and apply the learning from experience to other relevant situations. Students are taught about climate change to be able to find critical problems in the environment and prepare solutions to solve the problem. Learning climate change contents with Virtual reality strategy can help students' experiences and play a central role in their learning and understanding of environmental and climate change information.

Learning about climate change in Nigeria schools is important and necessary, Baulen (2023) suggested that when exposed to new information, students are constantly reasoning about the informant's characteristics such as physical appearance, voice, and gestures and the implications of the information received. When receiving information from media environments such as animations and experiences, reasoning about the informant becomes more complex, as the informant is not a person but a simulated environment, and the human characteristics that we used to reason about the source of information are absent or transformed.

Methodology

The method and procedure adopted for the study will be presented under the following subheadings; research design, population and sample, sampling techniques, instrument for data collection, validity and reliability of the instrument, procedure for data collection and method of data analysis.

Research Design

The study will adopt survey research design. The design is selected because it allows for separate determination of main teachers with knowledge of climate change and those without knowledge of climate change as well as knowledge of virtual reality strategy in teaching. And their interaction effects on teaching and learning about climate change in secondary schools.

Population

The population of this study consist of 145 teachers from 20 junior secondary schools in Borno state and Yobe state. The data source is obtained from Borno State Ministry of Education, and Yobe state education board 2024. The breakdown of the population distribution based on gender male 78 and female 67 data are presented in Table 1.

Sample

The sample of schools will be made up of 4 junior secondary schools, to be selected from the 20 junior secondary schools that fall within the study area. The criteria that would guide the choice of the schools to be chosen will include school location; Urban schools, rural schools and gender.

Instrument for Data Collection

The researcher will use two instruments to collect data for the study. The instruments are; virtual reality cameras and questionnaires.

Reliability

To determine the reliability of the instrument a trial testing of the instrument will be conducted using a sample of 20 teachers from secondary schools ten in Maiduguri and ten in Damaturu metropolitan Local Government Area, which will not form part of the main study. Also, the stability of reliability of teachers climate change awareness will be ensured using test-retest for stability of items in the questionnaire. This will be done by giving the instrument twice to the teachers and the results obtained from the two administration of the test will be correlated using Pearson Product moment correlation to get a coefficient for the.

Procedure for Data collection

The researcher wrote an introductory letter to the principals of schools selected for the study seeking permission to conduct a study with teachers on climate change awareness. Thus, after the familiarization and interaction with the teachers concerned, a date for the commencement of the study was agreed upon with the school authority. The researcher also discuss with the principal and teachers on the modalities of the study.

Scoring Procedure

The Teachers climate change awareness questionnaire (TCCAQ) will be scored using the five-point Likert scale of Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points, Strongly Disagree (SD) = 1 points and Undecided (UN) = 0 points. The scores will be later computed using mean and standard deviation. A cluster mean of 2.5 above will be positive attitude and below 2.5 will be considered as having negative attitudes.

Teachers use of Virtual Reality Strategy (TUVSR) multiple choices will be marked right or wrong. Two (2) points will be scored for any correct answer and zero (0) for incorrect answer.

Method of Data Analysis

The researcher adopt descriptive statistics in analyzing the data for the study. The descriptive statistics mean and standard deviation will be used to analyse data for answering the research questions. While ANCOVA will be used to analyse data for testing the hypotheses formulated for the study. All hypotheses will be tested at 0.05 level of significance using the Statistical Package of the social sciences (SPSS) version 22.2 the t-test or independent samples will be used to determine any significant difference in the mean score of two different groups base on the variables under investigation.

S/N	ITEMS	SA	A	D	SD
1	Teachers are not aware of climate change challenges.	20 (41%)	21 (42%)	7 (14%)	2 (4%)
2	Virtual reality strategy is not use in teaching school subjects.	18 (36%)	17 (34%)	6 (12%)	9 (18%)
3	Students like learning with visual aid.	5 (10%)	10 (20%)	26 (52%)	9 (18%)
4	Teachers find it easy to cope with virtual reality aid.	32 (64%)	9 (18%)	2 (4%)	7 (14%)
5	Teaching with virtual reality strategy always disturb classroom exercise.	3 (6%)	9 (18%)	28 (56%)	10 (20%)
6	A controlled and well managed classroom enhances virtual reality strategy.	24 (48%)	18 (18%)	8 (16%)	1
8	Adequate knowledge of climate change enhances interaction between teacher and students.	17 (34%)	29 (58%)	4 (8%)	2 (4%)
9	Availability of instructional resources enhances teaching efficiency.	22 (44%)	14(28%)	10 (20%)	4 (8%)

10	Climate change awareness can be mitigated through education.	21 (42%)	15 (30%)	12 (24%)	2 (4%)
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The results from table show the grand percentage rating of responses by teachers on 10 items;

Findings from the study revealed that the attitude of teachers toward teaching climate change with virtual reality strategy is encouraging and positive attitude of students toward mitigating climate change as a result of virtual reality strategy encouraging.

Findings from this study showed conducive and controlled learning can help attain teaching objective with virtual reality.

CONCLUSION

With the keen interest to study the effectiveness of virtual reality strategy in teaching climate change and climate change related issues in secondary school, it was discovered that teachers knowledge of climate change was encouraging. Virtual reality was not familiar in teaching among teachers. Students are interested in learning with virtual reality especially on contemporary topics like climate change. It was concluded that positive responses experienced by teachers while using virtual reality in teaching climate change issues have influence on retention and academic performance of students.

RECOMMENDATIONS

The following recommendation were forwarded:

1. Teachers need training and re-training on instructional methods, strategies, and techniques to meet contemporary instructional challenges.
2. Students should be incoreged to take advantage of virtual reality strategy and other virtual learning aids such as social media to understand develop independent learning skills.
3. Hearing impaired students be taught with virtual reality strategy to achieve teaching objectives.

4. Seminars and workshops should be organized at different intervals to help teachers meet up with 21st centaury classroom expectations.
5. Teachers, students, and other stakeholders in education should develop positive attitude toward invocation in teaching and learning.

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