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Student's Awareness, Perception, and Interest in VR-Based Physics Learning in Lafiagi Educational Zone

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Abstract

This study investigated students' awareness, perception, and interest in using virtual reality as a learning tool to help them understand challenging concepts in physics class at Lafiagi educational zone. Descriptive survey research design was used for the study, purposive sampling techniques was used to select 800 science student from population of 1200 students and simple random sampling techniques was used to select 100 students that participated in the study . Three research questions were formulated for the conduct of the study. The instruments for data collection were questionnaires. The questionnaire instruments were pilot tested and reliability coefficients of 0.87 was obtained. Data collected from the administration of the research instruments was analyzed using descriptive statistics of Mean and Standard deviation to answer the research questions. The findings of the study revealed that students' awareness of the use of VR-based learning methodologies for comprehending physics subjects was moderate with mean value of 3.0. The students had a moderate level of perception of VR - based learning of 3.0 mean value of four point rating scale of 2.50 decision rule. Students showed a moderate extent of interest in using virtual reality (VR)-based learning to better understand difficult physics concepts. Based on the findings, it was recommended among others that Physics Teachers and policymakers should think about incorporating virtual reality learning methods into the curriculum. Policy makers and stakeholders should give teachers resources and training In order to successfully incorporate VR-based learning methodologies into their teaching practices.

Keywords*:* Awareness, Perception, Interest and Virtual Reality

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Introduction

According to Adeyemo (2018), physics is an essential subject for acquiring scientific functional literacy and comprehending the natural world. Since physics has connections to all other fields, whether they include living things or inanimate objects, studying it unifies all other sciences Wang and Chen, (2025). According to Ajomiwe,etal (2024), understanding physics is essential for humans to explore the cosmos. Nonetheless, the majority of students struggle to comprehend the intricate physics ideas, which results in subpar academic performance and a lack of enthusiasm for the subject (Ogunleye, 2020). Therefore, how the concepts are taught and how well the students perform determine whether or not they believe them to be simple.

Awareness refers to having knowledge or understanding of something, such as an issue, problem, or situation. Awareness refers to the participants' or respondents' knowledge or understanding about a particular subject (Omori et al., 2023).

Perception refers to the process of interpreting and comprehending sensory information, ideas, or situations. It involves how individuals interpret, organize, and make sense of their environment, experiences, or information (Smith et al., 2020). Students perceive the instruction, which places a strong emphasis on problem-solving, is a key source of difficulties for them, according to Nava and Camarao (2017). The majority of ideas with too many equations and laws, as well as those with too many calculations but little actual work, were problematic for Bello, et al. (2018). Students frequently view physics as an abstract and conceptually hard subject as a result of traditional teaching techniques that prioritize theoretical derivations over real-world applications. According to Hamilton et al. (2021) this strategy has been linked to lower engagement and difficulties with knowledge retention. Given the significance of physics and mathematics in academic and professional training within science and engineering-related disciplines, it is critical to identify effective instructional approaches, particularly in the case of numerous dropouts linked to difficulty in these subjects (Khan et al., 2023).

Interest consists of increased focus, positive emotions, and a strong desire to learn. According to Adeyemo, (2018) it is the psychological condition of engaging in or having a propensity to engage in a specific subject over time. Some of the causes of low academic performance in physics include student’s

worldwide abandoning physics as a basic science subject or losing interest in taking physics courses in school. According to secondary school students, physics is more challenging and dull than any other subject taught in the curriculum (Ugwu, et al., 2019).

Conventional teaching techniques, such lectures and textbooks, frequently fall short of expectations and provide insufficient assistance for learning (Kwon, 2019). With its ability to replicate real-world events and offer immersive, interactive learning experiences, virtual reality (VR) technology has emerged as a promising instrument for advancing physics education (Huang, 2020). According to Elmqaddem, (2019), virtual reality is a computer-generated, three-dimensional immersive environment that can replicate both the real world and a fictitious cosmos, making it useful in a variety of professions. As technology advances, virtual reality has now permeated a wide range of industries and domains, including language learning In science and engineering education, virtual simulation or virtual lab for the enhancement of practical skills for college students is increasingly adopting VR technology. For example, Paxinou et al. (2020) highlighted the combination of three various teaching scenarios during biology laboratory class, highlighting the potential predominant effectiveness of teaching and improvement in students' learning through the use of the three-dimensional VR educational tool, Onlabs. These features, along with surgical education, cultural heritage, and sports training are driving the growing number of higher education institutions utilizing VR to develop and promote practical skills among college students.

The study provides evidence to justify the use of virtual reality. In a similar vein Omori et al (2023) trained medical students in hand cleanliness and personal protective equipment using virtual reality and lectures. They came to the conclusion that virtual reality could be a useful tool for practicing and learning infection control techniques. Additionally, Wells and Miller (2020) investigated how VR technology affected the performance of welding abilities during training for gas metal arc welding. According to American Welding Society standards, they discovered that the VR training group enhanced their welding proficiency. VR offers a lot of potential for welding teaching, they said notwithstanding the benefit, challenges like low-cost VR headset usability problems could detract from the overall user experience. However, students enjoy the immersive and authentic quality of VR experiences, which are seen as a significant introduction to higher education curricula. Some research have

emphasized the value of using virtual reality (VR) to enhance specific scientific abilities, such visualizing abstract concepts (Güney, 2019).

To improve conceptual learning in STEM (Science, Technology, Engineering, and Mathematics) education, a variety of digital tools have been employed. These consist of augmented reality (AR), educational apps, interactive simulations, and video-based instructional materials. A good foundation for comprehending mathematical ideas and their connection to the actual world is provided by the use of virtual reality in education, which has made it possible to represent and manipulate abstract notions digitally. Vectors are used to mathematically model several physical characteristics, including force and acceleration, in order to describe, compute, and forecast the physical world. Therefore, learning physics requires a comprehension of and proficiency with vectors. Virtual reality has drawn significant attention in the field of digital learning. Research has demonstrated that virtual reality (VR) offers a more immersive learning environment, boosting student retention and engagement A paradigm shift in scientific and engineering education is in progress, driven by the growing need for qualified experts in these fields as well as the ongoing development of virtual reality technologies. According to studies, students' inclination to employ VR-based learning methodologies is significantly influenced by their level of awareness of VR technology (Huang, 2020). Nigerian students had a moderate level of awareness about virtual reality (VR) technology, according to a study by Adeyemo (2018). Male students were more aware of and interested in using VR-based learning strategies than female students, and students from urban schools were more interested in using VR-based learning strategies for learning physics than students from rural schools.

However, there was a notable gap in their knowledge of how VR technology was used in physics education. Ogunleye, (2020) concluded that students believe virtual reality (VR) is the most effective approach to learn physics concepts, and it also showed that students are eager to use VR-based learning techniques. According to a 2019 study by Kwon, Students that employed VR-based learning methodologies had excellent levels of motivation and involvement in physics lessons, according to a study by Huang (2020). Additionally, research demonstrated that, in contrast to female students, male students showed a high degree of awareness and interest in employing VR-based learning

methodologies for physics instruction. Research has found that a number of factors, such as gender, location, and academic level, affect students' awareness, perception, and interest in using VR-based learning strategies (Ogunleye, 2020; Kwon, 2019). It also found that there was no significant difference between male and female students' awareness and interest in using VR-based learning strategies for learning physic

Statement of the Problem

This study's concern is that many secondary schools students in Lafiagi educational zone struggle to understand difficult physics topics, which leads to subpar academic performance and a lack of enthusiasm in the field according to the chief WAEC Examiner Report from 2018 to 2025 in the Zone . Elmqaddem, (2019) asserted that lectures and textbooks are examples of traditional teaching approaches that hardly ever engage students and provide sufficient learning support. Virtual reality (VR) technology has the potential to improve physics teaching because is an innovative pedagogy of instruction that engage the students to participate actively in practical class , but little is known in utilizing VR-based learning techniques to solve learning difficulties encountered in practical classes. It is on this, the study focus on students awareness, perception and interest in VR-based Physics learning in Lafiagi Educational zone

Objectives

In particular, the study aims to determine how much students know about the use of virtual reality (VR)-based learning strategies in physics education.

I. To find out students' level of awareness in using VR-based learning tools in learning concept in physics.

II. To determine students' perception of usefulness of VR-based learning strategies for learning in physics classes.

III. To determine students interested in learning physics through a VR-based approach.

Research Questions

Three research questions were developed to determine the stated objectives.

I. What is the level of student's awareness in using VR-based learning tools in physics?

II. What is student's perception of using VR-based learning strategies in learning in physics class?

III. What is the student's level of interest in leaning physics through a VR-based approach?

Methodology

The research design used in the study was a descriptive survey. The study covers a population of 1,200 secondary school students from Lafiagi Educational Zone. Purposive sampling technique was used to select 800 science students while simple random sampling technique was used to select 100 students to form part of study sample. Three instruments of Student's Awareness Questionnaire (SAQ), Student's Perception Questionnaire (SPQ) and Student's Interest Questionnaire (SIQ) which consist of five items each were developed by the researchers and validated by two education specialists have gathered 20 years' experience in the field for face and content validity and the corrections were affected. The study instruments were administered to 100 students from the entire population. A reliability coefficient of 0.87 was obtained for students' who are not participating in the study using cronbach's alpha to determine the internal consistency of the items, this shows that the instruments were reliable and usable. Statistical Package for Social Sciences (SPSS) version 20 was used to examine the data gathered through the administration of the instruments to the students in-person, and analysed using a four-point rating scale of numerical value 4,3,2,1 assigned with a decision rule of 2.50. The research questions were answered using the descriptive statistics of mean and standard deviation.

Results

Research Question One: What is the extent of student's awareness in using VR-based learning tools in learning physics?

Table 1: Analysis of Responses of student's awareness in using virtual reality tools in learning Physics

Awareness of students in using virtual reality tools in physics.	**N**	**Mean ($\bar{x}$)**	**SD**	**Remark**

I am aware that VR can create immersive, 3D simulations of physics phenomena (e.g electric fields, planetary motion).	100	3.50	0.71	Moderate extent
I understand that VR allows me to manipulate variables in a physics experiment (e.g change gravity, adjust mass)	100	3.10	0.88	Moderate extent
I am aware that VR can visualize abstract concepts that are hard to see in the real world , like magnetic fields or quantum waves functions	100	3.21	0.94	Moderate extent
I know that VR tools can provide real-time data and graphs based on my actions within the virtual environment	100	2.30	0.83	Low extent
Grand Mean		3.03	0.84	Moderately Extent

The results of students' extent of awareness of the use of virtual reality-based learning tools to comprehend difficult physics ideas are displayed in Table 1. The decision rule of 2.5 is exceeded by the grand mean of 3.03 with a standard deviation of 0.84. This indicates a moderate level of student awareness. The majority of respondents, among others, believed that there is a low degree of awareness, as evidenced by the mean of 2.30 and standard deviation of 0.83.

Research Question Two: What is the student's perception of using VR-based learning strategies in learning physics concepts?

Table 2: Analysis of Responses students' perception of using VR-based learning in learning physics

Students' perception on VR in learning physics concepts.	**N**	**Mean ($\bar{x}$)**	**SD**	**Remark**
majority of physics students feel:				
Using Virtual lab helps me understand complex physics concepts better than the traditional method	60	3.50	0.71	Highly perceived
Visualizing abstract ideas (like electric fields or light waves) in VR makes me easier to comprehend	100	2.10	0.88	Low perception
I feel that the knowledge I gain from VR simulations stays with me longer	100	2.21	0.94	Low perception
Using VR helps me connect physics formulas to their real-world meaning	100	3.42	0.83	Moderately Perceived
After a VR session, I feel more confident in my ability to solve related physics problems	100	3.23	0.87	Moderate Perceived
Grand Mean		2.9	0.86	Moderately Perceived

The results of students' perceptions of VR-based learning strategies to aid in their comprehension of difficult physics subjects are displayed in Table 2. The decision rule of 2.5 is exceeded by the grand mean of 2.90 with a standard deviation of 0.86. This indicates that students had a moderate opinion of VR technology-based learning. It is important to note that, with a mean score of 2.90 and a standard deviation of 0.86, the majority of respondents concurred that using a virtual reality tool to learn physics concepts is very effective.

Research Question Three: What is the student's level of interest in using VR-based learning approach?

Table 3: Analysis of responses on student's level of interest in learning physics with virtual reality approach

Student's interest level in learning physics with virtual reality approach.	**N**	**Mean ($\bar{x}$)**	**SD**	**Remark**
majority of physics students have:				
The idea of using VR for learning excite me	100	3.60	0.71	High Interest
I am curious about what it would be like to learn using VR	100	3.10	0.88	Moderate Interest
I would choose a class that uses VR over one that uses only traditional methods (like textbooks and lectures)	100	2.11	0.94	Low Interest
I look forward to using VR as part of my studies	100	3.42	0.83	Moderate Interest
I think learning with VR would be boring	100	1.56	0.85	Very Low Interest
In my free time, I would explore educational VR applications	100	3.94	0.88	High Interest
I often think about how VR could be used to learn about new topics	100	3.10	0.94	Moderate Interest
I am interested in trying VR to learn even difficult subjects	100	3.60	0.71	High Interest
If given the opportunity, I would spend extra time learning with VR	100	3.70	0.86	High Interest
I feel enthusiastic about the future of VR in education	100	2.90	0.93	Moderate Interest
Grand Mean		3.10	0.85	Moderate Interest

The results of the students' interest in learning physics concepts using VR-based learning are displayed in Table 3. The decision rule of 2.5 is exceeded by the grand mean of 3.10 with a standard deviation of 0.85. This indicates that there was a moderate level of student interest in VR-based learning. It is

important to note that, with a mean score of 3.94 and a standard deviation of 0.88, the majority of respondents concurred that there is a strong level of interest in utilizing VR-based learning.

Discussions

The table presenting the results of this study on students' awareness, perception, and interest in using virtual reality as a learning tool to help them understand complex concepts in physics class at Lafiagi Educational Zone revealed that students' awareness was moderate. This is in line with findings from Huang (2020) and Kwon (2019), as well as a study on the topic of virtual reality-based learning by Adeyemo (2018) and similar findings by Ogunleye (2020). Students had a moderate perception of VR-based learning, according to the findings in Table 2.

This result is in line with Lee and Wong's (2014) study as well as Huang's (2020) and Ogunleye's (2020) investigations on how students see VR-based learning approaches. Huang (2020) found that male students showed a higher level of awareness and interest in using VR-based learning methodologies for physics instruction than female students. Table 3's results showed that students' interest in using VR-based learning was moderate. This result is in line with a 2019 study by Kwon that discovered that students who utilized VR-based learning approaches were very motivated and involved in physics classes. Furthermore, this outcome is in line with Lee & Wong's (2014) investigation into how students see VR-based learning techniques.

Conclusions

In order to better understand difficult ideas in physics class at Lafiagi Educational Zone, the study examined students' awareness, perception, and interest in using virtual reality as a learning tool. The results of the study indicate that students' awareness of the use of VR-based learning methodologies for comprehending physics subjects was moderate. In order to better grasp difficult ideas in physics class, the students had a moderate opinion of VR technology-based learning. Students showed a considerable amount of interest in using virtual reality (VR)-based learning to better understand difficult physics concepts.

Recommendations

According to the results of the study, the following recommendations are suggested:

I. Incorporate virtual reality learning methods into physics education: The findings of the study indicate that using virtual reality in learning can improve students' comprehension and engagement in physics. Physics educators and policymakers should think about incorporating virtual reality learning methods into the curriculum.

II. Give teachers resources and training: In order to successfully incorporate VR-based learning methodologies into their teaching practices, teachers may require resources and training. Workshops for professional development, access to VR gear, and technical assistance are a few examples of this.

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