

Challenges and opportunities in the use of e-assessment in physics as perceived by physics teachers in Umuahia north local government area of Abia State

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Received: October 29, 2023

Accepted: November 28, 2023

ABSTRACT

The growth of technology in Nigeria's economy has made Information and Communication Technologies a very important concept in education. The impact of ICT in education can be seen in the improvement of the learning process and environment. A descriptive survey design was employed to assess the opportunities and challenges encountered in assessing Physics students with E-assessment. The population of the study is 104 secondary school Physics teachers in Umuahia North Local Government Area of Umuahia Education Zone of Abia State. Out of this population, 50 (18 males, 32 females) formed the sample of the study using purposive sampling technique to sample only teachers that use E-assessment to assess their Physics students. The researcher developed questionnaire of the four-point rating scale type was used as the instrument for data collection to elicit information on the opportunities and challenges of using E-assessment in assessing secondary school Physics students. The study was guided by two research questions and two hypotheses tested at 0.05 level of significance. The instrument was validated and its reliability obtained as 0.89 and 0.83 using Test Retest and Cronbach Alpha respectively. Mean was used to answer the research questions while t test statistics was used to test the hypotheses. The study among others revealed that provision of friendly learning environment, immediate feedback, and students' flexibility in learning are some of the opportunities of using E-assessment to assess Physics students while poor technical infrastructure and unfamiliar students with computer are some of the challenges. It was recommended that Physics teachers be trained on how to use e-assessment to assess students to enable them use them in the physics/science classrooms and that students should be trained to be conversant with the use of e-assessment.

Keywords: E-assessment, Physics, Learning environment, Feedback, Students' flexibility.

INTRODUCTION

Science is the key to renewed economic growth and meeting the challenges of the 21st century from sustainable energy to global security to lifelong health and wellbeing (Wendy, 2011). The process of science is a way of building knowledge about the universe -constructing new ideas that illuminate the world around us. Ting-Kueh (2006) explained that science plays major roles in creation of wealth, new knowledge and economic development. Science helps to eradicate poverty and provides better health care. This means that science assures social wellbeing and also improves the quality of human living in many ways. It is not an over statement to conclude that science can be applied in all areas of life which include agriculture, medicine, energy and power supply, biotechnology, space research and nuclear technology. The understanding of science therefore can help man to understand the universe and things around us. Science is made up of basic disciplines which are Physics, Chemistry, Mathematics and Biology. Having seen the importance of science, it is imperative that science teachers should know exactly how ICT can be used as a teaching and learning tool, for their own purposes and to help students to use them.

For the technological breakthrough of the nation Nigeria, Physics is very essential. Its study therefore opens up broad way to many other disciplines in our life

that hold the key to scientific and technological development. It is clear that no society can develop without technology of which physics education is paramount in conveying. The implication is that the quality of physics instruction and assessment must be geared towards enhancing students' knowledge in the subject and this can only be achieved if Physics is properly taught and assessed. In this 21st century, students are being connected to the wider global community through technologies. A lot of information can now be accessed through the internet and this has helped students to be familiar with the use of information and communication technologies (ICTs). ICTs are becoming very much integrated in education especially at the secondary school level. The new requirement for working and surviving in this age is the ability of students to become technologically compliance. ICT is a term which explains communication devices or applications like radio, computers, network, hardware and software, television, internet and other electronic delivery systems as well as various applications and services that are connected with them which include e-learning, distance learning, e-assessment and videoconferencing.

The use of information technology in any activity related to assessment is known as E-assessment. This means that e-assessment embraces a wide range of students' activity ranging from the use of a word processor to on-screen testing. The term E-assessment can be used to describe the use of computers within the assessment process. It is any form of assessment that uses technology for any part of the process. In other words, it is the full end-to-end assessment process of creation, delivery and marking of assessment on a computer. Cognitive and practical abilities can be assessed using E-assessment. E-testing software are used to assess the cognitive abilities while e-portfolios or simulation software are used for the assessment of practical abilities. The term online assessment, computer-based testing, computer-based assessment are used interchangeably and are also referred to as e-assessment. Depending on the teacher or assessor, e-assessment can be used for formative or summative assessments. There has being a lot of development in the learning process due to the introduction of e-learning and e-assessment in the teaching and learning process Gilbert, Whitelock and Gale (2011), asserted that the introduction of e-assessment in the teaching and learning process has improved learner outcomes and this has in turn made it possible for students to obtain immediate and direct feedback. This is why Alruwais, Wills, and Wald, (2018) advocated the need to create a system that can assess students taking into account the educational goals and at the same help students to develop skills that will be useful for the society in the long term.

An electronic assessment where all the assessment procedures from the beginning to the end are done electronically is said to be E-assessment. The means everything is done electronically from the point of test design, test implementation, record of students' responses to the point of giving students the feedback of the test. Explaining some of the important factors that drive the application of e-assessment, Whitelock, Reudel and Mackenzei (2006) opined that motivation is the main point that drives the application of E-assessment. Whitelock, Reudel and Mackenzei (2006), explained the steps of E-assessment to include creation and design stage, testing stage retrieval of data stage and outcome evaluation stage. E-assessment has been found to have students' friendly interfaces and learning environments. Stressing further on the benefits of E-assessment, Peterson (2013) opined that it is also very

easy and fast to use. Comparing this type of assessment with paper test, Gilbert, Whitelock and Gale (2011) opined that it gives immediate feedback which improves students' level of learning better the paper test. Students' motivation increases with E-assessment thereby enhancing students' performance. Explaining the advantage of E-assessment in remote areas, Marriott (2009) asserted that students are able to assess learning in their location at any time making learning easier and flexible.

E-assessment has been found to save the teacher's time, improve the quality of feedback for the students and helps in tracking students' performance among others (Peterson, 2013; Eljinini & Alsamarai, 2012). Jordan and Mitchell (2009) also stated that there are also some challenges in the use of E-assessment which includes students' not being experienced with the use of computer or with using online assessment process, some teachers' unfamiliarity with technology and accessibility of computer and internet by both students and teachers among others. Based on this, there is the need to assess the opportunities and challenges of E-assessment in physics students. The major purpose of this study is to identify the opportunities and challenges in the use of E-assessment in physics students.

Research questions

The following research questions were asked to guide the study

1. What is the perception of physics teachers on the opportunities of using e-assessment in physics?
2. What is the perception of physics teachers on the challenges of using e-assessment in physics?

Hypotheses

The following hypotheses were tested at 0.05 level of significance.

1. The mean perception scores of male and female physics teachers on the opportunities of using e-assessment in physics is not significantly different.
2. The mean perception scores of male and female physics teachers on the challenges of using e-assessment in physics is not significantly different.

METHODOLOGY

Descriptive survey design was used to investigate the opportunities and challenges encounter while using E-assessment in the assessment of students in Physics. Using purposive sampling technique, a sample of 50 (18 males, 32 females) Physics teachers who use E-assessment to assess their physics students was selected from a population of 104 Physics teachers in Umuahia North Local Government Area of Abia State. The researchers' developed questionnaire of the four-point rating scale type of Strongly Agree (SA), Agree (A), Disagree (DA) and Strongly Disagree (SD) rated 4,3,2 and 1 respectively was the instrument used for data collection to elicit information on the opportunities and challenges of using E-assessment in assessing secondary school Physics students.. The researchers' developed questionnaire of the four-point rating type (of Strongly Agree, Agree, Disagree and Strongly Disagree) was the instrument used for data collection to elicit information on the opportunities and challenges of using E-assessment in assessing secondary school Physics students. The instrument was validated using Test Retest and Cronbach Alpha and its reliability obtained as 0.89 and 0.83 respectively. The research questions were answered using mean while the hypotheses were tested using t -test statistics.

RESULTS

Research question 1

What is the perception of physics teachers on the opportunities of using e-assessment in physics?

Table 1

Physics teachers' mean perception scores on opportunities of using e-assessment for physics students

S/N	Item statements: E-assessment	Mean	Remarks
1.	Has friendly interface	3.2	Agree
2.	Is fast and easy to use.	3.9	Agree
3.	Gives students immediate feedback compared to paper test	3.5	Agree
4.	Enhances students' learning level	2.8	Agree
5.	Enhances students' performance	3.0	Agree
6.	Motivates students	2.7	Agree
7.	Helps students to learn at anytime	3.4	Agree
8.	Saves time for the teacher	2.8	Agree
9.	Improves teachers' quality of feedback to students	2.5	Agree
10.	Helps teacher track students' performance	2.3	Disagree
11.	Helps teachers understand and solve students' misconceptions	2.2	Disagree
12.	Helps to reduce the teachers' burden when assessing large number of students.	3.8	Agree

From the above table, all the items have mean scores greater than 2.5 except items 10 and 11 which has 2.3 and 2.2 respectively. This means that except items 10 and 11 the others are above the criterion mean value of 2.50 on a 4-point rating scale.

Research question 2

What is the perception of physics teachers on the challenges of using e-assessment in physics?

Table 2

Physics teachers' mean perception scores on challenges of using e-assessment for physics students

S/N	Item statements: challenges of using e-assessment in assessing physics students	Mean	Remarks
1.	Students are inexperienced with the use computer and online assessment process	3.9	Agree
2.	The inability of students to access computer and internet	3.4	Agree
3.	Poor technical infrastructural development	3.8	Agree
4.	Difficulty in scoring and correcting questions	3.5	Agree
5.	Difficulty in assessing group projects	2.8	Agree
6.	Unfamiliarity of some teachers with technology	3.3	Agree

Analysis of data in Table 2 above revealed that the mean scores are between 2.8 and 3.9 meaning that they are above the criterion mean of 2.5. This means that the items listed above are the challenges of using e-assessment to assess students in Physics.

Hypothesis 1

The mean perception scores of male and female physics teachers on the opportunities of using e-assessment in physics is not significantly different.

Table 3

t-test analysis of male and female physics teachers' perception on the opportunities of using e-assessment for physics students

Sex	N	Mean	SD	df	t-cal	t-tab	Decision
Female	32	2.53	1.27	48	1.44	1.96	NS
Male	18	2.80	0.92				

Result in Table 3 showed the calculated value of t (t-cal = 1.44) to be less than the table value of t (t-table = 1.96) at 0.05 level of significance. Therefore the null hypothesis which states no significant difference in the mean perception scores of male and female physics teachers on opportunities of using e-assessment in assessing physics students is accepted.

Hypothesis 2

The mean perception scores of male and female physics teachers on the challenges of using e-assessment in physics is not significantly different.

Table 4

t-test analysis of male and female physics teachers' perception on the challenges of using e-assessment for physics students

Sex	N	Mean	Sd	df	t-cal	t-tab	Decision
Female	32	2.8	1.07	48	1.72	1.96	NS
Male	18	3.3	0.71				

The result in Table 4 showed that the table t value (t-table = 1.96) is greater than the calculated t value (t-cal = 1.72) at 0.05 level of significance. This means that there is no significant difference in the mean scores of male and female responses to the challenges of using e-assessment in assessing physics students.

DISCUSSION OF FINDINGS

This study was designed to assess the opportunities and challenges on using e-assessment for physics students. In relation to the first research question, the result clearly showed that all the physics students both males and females agreed that the twelve items listed above are opportunities in using e-assessment for physics/science students and disagreed with only two items. The above result agrees with the findings of Ridgway, McCusker, and Pead (2004) who stated that students prefer E-assessment because of their ability to have more control and friendly interfaces of the test. This result is also in agreement with the opinion of Peterson (2013) and Eljinini & Alsamarai (2012) who in their independent studies stated that e-assessment is fast and easy to use, provides immediate feedback to students when compared with paper test and helps to improve the learning level of the students.

The result in Table 2 also agreed with Williams and Wong (2009) who opined that students being inexperienced with the use of computer and online assessment is one of the challenges of using e-assessment to assess physics students. This means that it is important for the students to be trained on the use of e-assessment at the beginning of the learning process for them to be familiar with E-assessment. The study agrees with Crews and Curtis (2010), who observed the non-access of students to computers. They went further to suggest that Universities should provide fully equipped computer laboratories with internet access for students. The result in Tables

3 and 4 showed no significant difference in the mean scores of male and female physics students' responses to the opportunities and challenges of E-assessment of physics students. This implies that gender plays no role in the perception of physics teachers on the opportunities and challenges to the use of e-assessment in physics.

CONCLUSION

E-assessment has being found to reduce the time and effort of the physics teacher, provide direct and immediate feedback for student, encouraging high-order thinking and improves student performance. On the other hand, E-assessment is faced with challenges like students' unfamiliarity with the use of computer and online assessment process, poor technical infrastructure and some teachers' unfamiliarity with technology among others.

RECOMMENDATIONS

The following recommendations are made based on the findings of this study;

1. There is the need to train Physics teachers on how to use E-assessment to assess students to enable them use them in the Physics/Science classrooms.
2. Physics students should be trained at the beginning of the learning process to be familiar with E-assessment.
3. The Federal Ministry of Education should provide well equipped computer laboratories with internet access for physics/science students to enable them have access to computers and internet.

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