EFFECT OF EDMODO ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN PHYSICS IN ILORIN METROPOLIS, NIGERIA

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Abstract

The study focused on the effect of Edmodo on secondary school students' academic performance in physics in Ilorin metropolis, Nigeria. The study adopted quasi-experimental pre-test, post-test design control group design. Population for the study comprised all science students of senior secondary school while the target population for the study were SS2 students. The sample size of this study were 142 senior secondary school students. The sample size was sampled from two senior secondary school in Ilorin metropolis. The control group was randomly selected as they were taught physics with the conventional teaching method. Edmodo was used in exposing the experimental group to some topic in physics. Physics Performance Test (PPT) and Computer Self-Efficacy Questionnaire (CSQ) was the measuring instruments. The instrument was face and content validated by three educational technology lecturers from the department of educational technology, and three ICT expert from the department of compiter science,University of Ilorin. Its reliability yielded PPT (r = 0.75) and CSQ (r = 0.78). Data were analysed using Analysis of Covariance and Bonferroni post –hoc test at 0.05 level of significance. The study showed that Edmodo had significant main effects on academic performance in physics, there is no significant two-way interaction effects of gender and computer self-efficacy on achievement in physics ($F_{(1, 206)} = 0.11$, $p>0.05$; partial $\eta^2 = 0.00$). It was therefore recommended that Physics teachers should be adequately sensitized through workshops, seminars, and conferences on the use of Edmodo for instructional delivery at secondary school level.
Keywords: Edmodo, Physics. Performance and Academics

Introduction

Education is described as a function of a person's life experiences that enable them to cope with and enjoy life. The importance of education has grown in recent years, especially in the developing countries like Nigeria, because of the need to catch up with the developed world in a variety of sectors, including global competitiveness and best practices. The fast progress of information and communication technology (ICT), with which students and instructors can more easily handle assignments and interact across time and distance, is one of the significant changes in recent times that is altering education (school activities, teaching, and learning). As a result, new approaches, methods, and strategies are needed to create rich-learning environments supported by technology tools and software focused on student-centered education to make learning more successful. Physics is essential to every country's overall technical and industrial growth.

Physics is concerned with the nature, structure, and characteristics of matter, and it contributes significantly to the nation's economic growth and development. Telecommunications, architecture, engineering, power production and transmission, building, and transportation are some of the areas where physics plays important roles. As a result, physics may be defined as an essential topic for any country's socioeconomic growth because it aids in the progress of knowledge of the natural world (Erinosho, 2013). Physics is the field of science that studies things, energy, and interactions between them. Physics has made enormous contributions to the development of instruments, equipment, and gadgets that help mankind. Physics is a vital topic in science and technology. The knowledge of physics has led inventions in a variety of fields. Since it explores the essence of natural events and helps people understand the fast-changing society (Bello, 2012).

According to NERDC (2008), the objectives of Nigeria's senior secondary school physics curriculum include; providing basic physics literacy for functional living in the society, acquisition of basic physics concepts and principles as a preparation for future studies, acquisition of essential scientific skills, attitudes as a preparation for technological application in the modern world, stimulation, and enhancement of creativity. These goals are admirable but achieving them has proven difficult over time. Notably, education objectives cannot be met if the planned curriculum for such a

level of education is not well implemented (Adebule & Akomolafe, 2014). Additionally, learning science concept, through traditional mode of instruction has been perceived difficult by the students. However, online learning, facilitates the student to choose the time to learn and create flexible learning. online learning also can increase the student motivation in learning (Vania, Setiawan & Wijaya, 2018).

Online learning helps to address the rising demand of non-traditional students by providing a variety of teaching approaches. Online learning does not only meet students' needs, but it also gives teachers choices for dealing with the obstacles of delivering instructional information (Geith &Vignare (2008). Learners may manage the order, time, and pace of information delivery through online learning, by leveraging the internet to distribute curricular content. Learning management systems (LMS) are one of the platforms which facilitate teachers to set up and manage their online classes easily (Witherspoon, 2011). In conventional face-to-face, hybrid, or online learning contexts, a learning management system (LMS) is a complete and integrated programme that supports the development, delivery, evaluation, and administration of courses.

LMSs are software applications applications or web-based technology used to plan, implement, and assess specific learning process (Park & Mills, 2014). The software provides students and teachers with a set of tools for improving the learning process and its management and functions as a support in the traditional classroom education as well as in distance education (Al-Busaidi, 2012). Edmodo application has become one of the distinct LMS which favours collaborative learning, enabling interactions with resources from different media among all students and teachers (Abar & Barbosa, 2011) Edmodo is a free and secure learning platform for teachers, students, parents, schools, and districts that can be found at www.edmodo.com. It was created by Jeff O'Hara and Nick Borg in 2008 for teachers, students, parents, schools, and districts (Holland & Muilenburg, 2011).

Edmodo allows for bi-directional teacher-learner communication, allowing the teacher to communicate with the entire class or with individual students. Learners can also communicate with the rest of the class or send a private message to the teacher. Hypertext links can be used to make learning materials interactive, and documents can be dynamically uploaded and downloaded by both teachers and students (Kongchan, 2012). As a teaching and learning tool studies have also been conducted to investigate the use and effectiveness of Edmodo. Vegh, Nagy, Zsigmond, & Elbert, (2017) The effectiveness of the Edmodo interface in biology instruction in high schools was investigated. Students completed anonymous pre- and post-test questionnaires, which were statistically evaluated. There were 58 students in the study, 34 girls and 24 men. The experimental group developed increased feelings of importance toward Biology over the course of the semester, whereas the control group did not. In comparison to the control group, the experimental group scored higher on the positive impact of Edmodo use in the classroom at the conclusion of the semester. Enriquez, (2014) reported that the collaboration provided in Edmodo enables students to improve their online work quality. This was made possible by students' ability to receive feedback on the status of their teachers and friends.

Gender, age, attitude, technological self-efficacy, and computer self-efficacy are some characteristics or elements that should be managed while developing an online technique for instructional delivery. However, due to their strategic relevance in determining academic success in physics, gender and computer self-efficacy will be used as moderator factors in this study. Gender inequalities in science subject academic achievement have long been a source of debate among educators and scholars. Female students are less interested in physics than male students. Physics is challenging for female students, according to them, because the topic is more masculine in nature (Ehindero, 2020). However, Bada, (2013) and Adelokun, (2013) found that the performance difference between male and female students in science disciplines is narrowing. Even if the influence of gender appears to be debatable, the issue of gender is highly essential in this study.

Many studies have concluded that the combination of gender and computer self-efficacy might influence students' engagement in computer-related classroom activities, particularly physics learning (Olatundun, 2008; Okoye, 2010) Existing research into the relationship between gender and self-efficacy in scientific education has shown varied results. Previous studies revealed that male students in scientific education reported stronger self-efficacy than female students (Lerdpornkulrat, Koul, & Sujivorakul, 2012; Saglam & Togrul, 2018; Stoet & Geary, 2018). Conversely, female students exhibit stronger computer self-efficacy than male students as reported by Chandhry, Shafiq, and Berhanu (2011) and Nnamani & Oyibe (2016). Since, the results of these studies have been uneven, and findings on the influence of gender and computer self-efficacy on computer use are ambiguous. As a result, the purpose of this study is to examine the impact of Edmodo on secondary school students' academic performance in Physics in the Ilorin Metropolitan Area.

Statement of the Problem

Physics continues to be a strategic scientific topic that has the potential to spur technological growth in a variety of countries throughout the world. Over time, inconsistencies in student performance and dwindling enrolment in secondary schools have grown concern. Previous studies have revealed that the reason for the student's poor academic performance in physics has been due to teachers' rigid instructional delivery. This method of instructional delivery restricts physics students from learning at their own pace and learn outside the four walls of the classroom. Hence to bridge the gap and improve academic performance in physics, particularly at the senior secondary school level, this research aims to close the gap by implementing an online mode of instructional delivery using Edmodo, a software tool that has been generally applauded for its ability to enrich, expand, and extend student learning experiences when compared to traditional teaching.

Purpose of the study

The main purpose of this study was to investigate the effect of Edmodo on secondary school students' academic performance in physics in Ilorin metropolis Specifically, the study:

1. examine difference in the performance of students taught physics using Edmodo and those taught using lecture methods
2. Determine the difference in the pre- and post-performance mean scores of the students in the experimental group
3. Examined the difference in the mean score of male and female students in physics after exposure to Edmodo
4. Determine the influence of computer self-efficacy on students' performance in physics

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

Ho_1: There is no significant main effect of Edmodo on students' performance in physics

$H_{O2:}$ There is no significant main effect of gender on students' performance in physics

Ho_3: There is no significant main effect of computer self-efficacy on students' performance in physics

Ho_4: There is no significant effects of treatment, gender, and computer self-efficacy on students' performance in physics.

Methodology

The study adopted a quasi-experimental pre-test, post-test design control group design. The target population for the study were all senior secondary school II student in Ilorin metropolis. Purposive sampling technique was employed in selecting two schools owing to the availability of computer and Internet facilities. The sample size of this study were 142 students in SS2. The sample size was sampled from two senior secondary school in Ilorin metropolis. The control group was randomly selected as they were thought some physics concept using the conventional teaching method. Edmodo was used in exposing the experimental group to some topic in physics. The learning contents were three modes; audio, video, and text. Physics Performance Test (PPT) and Computer Self-Efficacy Questionnaire (CSQ) were the measuring instruments. Physics Performance Test (PPT) consists of thirty-five (35) multiple choice items constructed on the physics curriculum. Each items have four Options-D with only one correct answer. The test was used in determining the performance of students in physics before and after being exposed to the treatment. A rearrangement of the same questions was used for the post-test. The instrument was validated by three educational technology lecturers and three ICT expert, their corrections and modifications were used to improve the quality of the instruments. The reliability of the instrument was determined. Physics Performance Test ($r = 0.75$) and Computer Self-Efficacy Questionnaire ($r = 0.78$). Treatment lasted for a period of 6 weeks. Data were analysed using mean, Analysis of Covariance (ANCOVA) and Bonferroni post–hoc test at 0.05 level of significance.

Results

Demographic Information of Respondents

Table 1

Gender	Frequency	Percentage

Male	53	37.3
Female	89	62.7
Total	142	100.0

Table 1 shows that the total number of students that participated in this study was 142,53(37.3%) were male while others who constitute 89(62.7%) were female. The result from this table implies that female students participated more in the study than the male students.

Table 2: Distribution of Participants based on Treatment Groups

Group	**Frequency**	**Percentage**
Edmodo	90	63.4
Traditional	52	36.6
Total	**142**	**100.0**

Table 2 shows that 90(63.4%) of the participants were in Edmodo group and 52(36.6%) were in the traditional method group.

Table 3: Analysis of Covariance (ANCOVA) of Post-Performance by Treatment, Gender, and Computer self-efficacy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7513.039	12	626.087	66.200	0.000	.794
Intercept	838.883	1	838.883	88.700	0.000	.301
Pre-Performance	3234.834	1	3234.834	342.037	0.000	.624
Treatment	306.255	2	153.128	16.191	0.000*	.136
Gender	10.940	1	10.940	1.157	0.283	.006
Computer self-efficacy	0.437	1	0.437	0.046	0.830	.000
Treatment x Gender	20.168	2	10.084	1.066	0.346	.010
Treatment x Computer self-efficacy	6.785	2	3.393	0.359	0.699	.003
Gender x Computer self-efficacy	1.013	1	1.013	0.107	0.744	.001
Treatment x Gender x Computer self-efficacy	24.776	2	12.388	1.310	0.272	.013
Error	1948.258	129	9.458			
Total	108747.000	142				
Corrected Total	9461.297	141				

R Squared = 0.79 (Adjusted R Squared = 0.78) * denotes significant p<0.05

Table 3 indicates that there is a significant main effect of (instructional strategy) on students' performance in physics ($F_{(2, 206)} = 16.19$; $p<0.05$, partial $\eta^2 = 0.14$). The effect is 14.0%. This implies that 13.6% of the variation in students' performance in physics is due to the significant main effect of the treatment. Hence, hypothesis 1 was rejected. To explore the magnitude of the significant main effect across treatment groups, the estimated marginal means of the treatment groups were carried out and the result is presented in Table 2

Table 4: Estimated Marginal Means for Post-Performance by Treatment and Control group

Treatment	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Edmodo	27.71	0.49	21.96	24.29
Traditional Method (TM)	26.97	0.34	16.57	19.49

Table 4 indicates that students exposed to the treatment (Edmodo) with highest adjusted post-performance mean score in physics (27.71) than their counterparts in the Traditional method™ control group (26.97). This order is represented as Edmodo > TM. To determine which of the groups causes this significant main effect, the Bonferroni post-hoc analysis is carried out across the treatment groups and the result is presented in Table 4.

Table 5: Bonferroni Post-hoc Analysis of Post-Performance by Treatment and Control Group

Treatment	Mean	Edmodo	TM

Edmodo	27.71		*
Traditional Method (TM)	26.97	*	

Table 5 shows that the post-performance in physics mean score of students taught with the Edmodo is significantly different from their counterparts in the control group This indicates that the significant difference reveals by the post-hoc summary is due to the result of difference between the treatment group (instructional strategy) and the control group (Traditional Method)

Discussion of Findings

The findings from the study indicated that there was a significant main effect of treatment on SS II physics students' performance. This means that Edmodo has a significant impact on the performance of physics students. To put it another way, students who were exposed to this strategy outperformed students in the control group in physics. After the trial, students' performance improved because of Edmodo, which allows learners to interact and collaborate in a virtual environment. Some of the critical factors that have been documented in the literature as being responsible for students' poor performance in physics include teacher and student-related factors, poor motivation to learn the instructional content, and lack of interest in the subject matter, all of which can be linked to the teaching approach used by many teachers during the instructional delivery process. This result correlates with Vegh, Nagy, Zsigmond, & Elbert, (2017) who reported that there was positive impact of Edmodo use in the classroom, in comparison to the control group. also, Enriquez (2014) reported that the collaboration provided in Edmodo enables students to improve their online work quality.

Additionally, the result obtained showed that the three-way interaction effects of treatment, computer self-efficacy and gender on senior secondary students' achievement in physics were not significant. The findings of this study are in agreement with Bada, (2013) and Adelokun, (2013) who revealed the gap between male and female students' performance in science subjects is disappearing. However, this finding is not in agreement with Lerdpornkulrat, Koul, & Sujivorakul, 2012;Saglam & Togrul, 2018;Stoet & Geary, (2018) who stated that male students had higher self-efficacy than female students in science education. Also, the findings of the study is not in agreement with Chandhry, Shafiq, and Berhanu (2011) and Nnamani & Oyibe (2016) who reported that female students exhibit stronger computer self-efficacy than male students as reported by

Conclusion

This research investigated the effect of Edmodo on secondary school students' academic performance in physics. Findings established that the use of Edmodo significantly improved students' performance in physics. It was also established that Edmodo stands out as an effective tool for improving secondary school students' performance. Also, findings revealed that gender and computer self-efficacy of the students has no significant main effect on students' academic performance. The use of Edmodo in the teaching and learning of physics can foster students' learning engagement and improve students 'academic performance.

Recommendations

Based on the finding of this study, the following recommendations are considered appropriate:

1. Edmodo should be actively employed by teachers to supplement the traditional classroom strategy
2. Physics teachers should be adequately sensitized through workshops, seminars, and conferences on the use of Edmodo for instructional delivery at secondary school level.

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