EFFECTS OF GAMIFICATION ONLINE LEARNING PLATFORM ON STUDENTS' MOTIVATION AND ACHIEVEMENT IN EDUCATIONAL TECHNOLOGY AMONG UNIVERSITIES IN NIGERIA

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Abstract
This study investigated the effects of gamification online learning platform on students' motivation and achievement in educational technology among universities in Nigeria. Guided by three research questions and two null hypotheses, a sample of 150 (65 males and 85 females) year two students was used. Quasi-experimental research design was used. Educational Technology Achievement Test (ETAT) and a motivation questionnaire were used for data collection. Data collected was analysed using decision mean and standard deviation for the research questions while ANOVA was used to test the two null hypotheses that were formulated. The findings of the study indicated that those taught with gamification learning platform had higher mean achievement scores in ETAT than those students in the control group and also there was no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform. The result also showed that majority of the students indicated high level of motivation towards the use of gamification learning platform Based on the findings of the study, it was recommended that Universities and other tertiary institutions should implement the use of gamification learning platform in teaching and learning process for the purpose of enhancing learning outcome.

Keywords: Gamification, Motivation, Achievement, online learning, University education

Introduction

Educational Technology has become an important part of modern education as it creates opportunities for learners to develop their cognitive, critical thinking, information reasoning and communication skills. It caters for individual's academic needs and abilities through the use of modern instructional technology such as the internet, Learning Management System (LMS), online learning and where mobile technologies are used. It has the potential to enhance teaching and learning activities and create an ideal learning environment. Hence, it becomes an integral part of both the teaching and learning process (Ajulo, 2008).

Educational technology at higher institutions of learning, especially in the universities and colleges of education is valued and its application requires knowledge from several areas such as pedagogy, psychology, didactics, computer sciences, and informatics. Because of these diversity in teaching and learning process educational technology is still not being applied adequately (Onasanya, Ayelaagbe & Laleye, 2012). And in spite of the prevalent use of a variety of efficient online learning platforms which are learner-centred that focuses on delivery of great learning experiences at different period to improve classroom teaching in Nigeria, the use of conventional teacher centred teaching method continued (Olutola & Olatoye, 2017). Ukpong (2012) stated that this conventional teacher centred method of teaching are not

logically sequenced to fit the ability of the learners, as teachers could not provide teacher-led practice to engage in reciprocal teaching such as online learning.

Online learning, briefly written as e-learning is an inclusive term that describes the use of modern technologies such as computers, digital technology, networked digital devices, associated software and course ware for teaching and learning processes. Hedge and Hayward (2004) defined it as an innovative approach for delivering electronically mediated, well-designed, learner-centred and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in concern with instructional design principles. Online learning is becoming the conservative approach of teaching students in universities worldwide, changing the education systems which are now focusing on learning through new technological methods such as Integriertes Lern-, Informations- und Arbeitsko operations System (ILIAS), Moodle, gamification and so on (Ahmad, 2012). The use of online learning is not a new phenomenon in promoting education in some parts of world. Presently, some institutions in Nigeria are using it to promote distance education (DE) and lifelong learning (Eke, 2011). However, the teaching model in Nigerian universities is inconsistent with the use of online technologies such as gamification learning platform, which can be used to enhance teaching and learning.

Gamification learning platform is an educational approach that involves selecting elements of games and using them to create a game-like environment in a non-game context. It also involves utilizing a challenge or game to teach or support classroom concepts. These game elements include items such as points, leader boards, and badges. However, game elements also can include avatars, three-dimensional environments, feedback, ranks, levels, competition, communication systems, and time pressures (Hanus & Fox, 2015). A game offers students instant feedback, gives students who might otherwise have sat quietly in the background a chance to participate, and can place an emphasis on practice and mastering the information. One of the major benefits of gamification in the classroom is its versatility. Teachers can choose whether to make an individualistic game out of learning for the whole class to play at once, or a game played in small groups to encourage teamwork (Goehle, 2013). This change in direction will benefits students who are not motivated to engage with concepts through reading a textbook or memorizing course materials.

Educational computer game is a technology-supported game that is intended to result in a desirable change in the player's knowledge while educational games serve the primary purpose of being a game, and a secondary goal of teaching something (Goehle, 2013). Gamification learning platform helps to establish flow by taking student's out of their normal routine and presenting them with a series of tasks that are engaging enough to prevent students' minds from wandering. However, currently, there has not been much research to explore the influence of gamification on students' performance in Nigerian universities. University is the highest level of education where the high level manpower, intellectual and future leaders are developed. It is a place where students come together to pursue knowledge and it promotes the development of intellectual capacities of individuals to understand and appreciate their environments (Ajayi, 2003). Universities therefore educate future leaders and develop the high-level technical capacities that underpin economic growth and development. University education is regarded as an instrument of social, political and economic development. The products of university education in any nation will determine the development of such nation. Therefore, university education contributes to national development through high level relevant manpower training;

in order to acquire both physical and intellectual skills which enable individual to be self-reliant and useful members of the society (Federal Republic of Nigeria, 2004).

However, research has shown that presently, Nigerian Universities are still lacking behind in the use of online learning platforms such as gamification and ILIAS learning platforms as an educational technology tool (Baba, 2016). While there is a great deal of knowledge and information about how online platforms are being used in developed countries, there is no much information on how it is being used in Nigerian universities. According to Usman (2016), for Nigeria Government to be proud of quality educational development especially at the university level, it should first be able to establish a functional online learning driven educational system, in order to motivate and improve learning outcomes among students. Learning outcomes describes the knowledge or skills students should acquire by the end of a particular assignment, class, course or program and help students understand why that knowledge and those skills will be useful to them (Hubball & Burt, 2007). In this study, learning outcomes comprises of academic achievement and motivation which are part of the variables under study.

Academic achievement according to Fakorede (2010) refers to knowledge and skills attained by a student in school subjects, designated by a score obtain in an achievement test. Accordingly, an achievement test is an instrument administered to an individual to elicit certain desires and expected responses, as demanded in the instrument, performance on which the individual is assigned a score representing his/her achievement. Anyagh and Okwu (2010) also noted that academic achievement is hinged on several factors such as instructional methods, learning environment, motivation for stimulating students' interest in learning and the learners. Motivation is described as an inner state that stimulates and triggers behaviour.

According to Can (2014) motivation is a state of empowerment having physiological, cognitive and affective dimensions of individuals energized for a certain goal. It also the willingness to perform an action, increasing eagerness to work, directing efforts and directly affecting the performance of workers. Consequently, the effects of gender on learning, motivation and academic achievement will be investigated by probing into learners' and learning in the process of using gamification. Therefore, this study tends to look into the aspect of teaching and learning process using modern techniques that is learner centered and activity-based such as gamification.

Statement of the Problem

Research evidences have shown that gamification is currently being implemented by schools in the western world and are set of tools that support learner centred approach (Mese & Dursun, 2019). However, there are few studies conducted on which gamification is used to motivate and engage educational technology students in Nigerian universities, and the methodology currently employed is considered to be teacher-dominated approach, which makes learning passive and the products of schools are rated low in creativity, critical thinking and problem solving, which eventually leads to poor academic performance of students (Ogo-chukwu & Fomsi, 2019). These poor performances have been attributed to poor teaching strategies and some concepts are very difficult for teachers to teach as well as for students to learn and inadequate use of new technologies in teaching such as gamification learning platform. Several teaching methods have been used to curb these situations such as Computer Assisted Instruction (CAI), Information and communication Technology (ICT), Social media, E-learning and among others, yet the problems persisted. Therefore, there is an urgent need to improve the academic

performance of Nigerian university students and also bridge the gap between developed and developing nations, and gamification learning platform may be considered a necessary tool for this purpose. For this reason, this study will investigate the effects of gamification online learning platform in educational technology among university students in Nigeria.

Purpose of the Study

The purpose of this study is to determine the effects of gamification online learning platform achievement and motivation in educational technology among university students in Nigeria. Specifically, the study attempts to achieve the following objectives:

(i) Determine the effects of Gamification learning platform and lecture method on academic achievement of students' in Educational Technology.
(ii) Determine the effect of Gamification learning platform on students' motivation.
(iii) Determine the influence of gender on students' academic achievement in Educational Technology when taught with Gamification learning platform.

Research Questions

The following questions were raised to guide the study:

(i) What are the mean achievement scores of students taught Educational Technology using gamification learning platform and lecture method?
(ii) What is the motivation of Educational Technology students after teaching them with gamification learning platform?
(iii) What is the influence of gender on the mean achievement scores of students taught Educational Technology using gamification learning platform?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

HO_1: There is no significant difference in the mean achievement scores of students taught Educational Technology using gamification learning platform and lecture method.

HO_2: There is no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform.

Methodology

The research design for this study was quasi-experimental design of the pre-test-post-test non-equivalent control group. The population for the study consisted of 150 second year Educational Technology students, comprising of 65 Males and 85 Females from two public universities purposively selected for the study and the students were drawn from 2019/2020 academic session. The two universities were randomly assigned to form the groups the study (Treatment group and Control group). University of Port-Harcourt was used as the treatment group where students were taught using Gamification learning platform while University of Ilorin was used as the control group where the students were taught using lecture method. An intact class was used from the sampled schools for the study.

The study has two research instruments firstly, a test instrument called Educational Technology Achievement Test (ETAT) and secondly, a Questionnaire titled 'Questionnaire on University Students' Motivation towards Educational Technology through Gamification Platform' (QUSMETGP). The two research instruments were developed by the researcher. ETAT is made up of fifty (50) multiple choice objective test drawn from the concept taught. The (QUSMETGP) comprises of twenty (20) items, based on a 5-point rating scale. The Educational Technology

Achievement Test (ETAT) and the questionnaire were validated by three experts in educational technology on both face and content validation.

To determine the reliability of the test instrument, a pilot study was carried out using 40 students from Federal University of Technology, Minna. ETAT was administered to the students using test-retest method. Pearson Product Moment Correlation Coefficient was used in calculating ETAT reliability coefficient index which yielded an index of 0.83 which indicated a strong reliability coefficient. To determine the reliability of the questionnaire, the motivation scale questionnaire was administered once to the same group of students and Cronbach Alpha was used in calculating the reliability of the motivation inventory scale which yielded a co-efficient of 0.87 which indicated a strong reliability coefficient of the questionnaire.

For the data obtained, decision Mean and Standard Deviation were used to answer the stated research questions. A decision mean of 3.0 was taken as acceptable mean for agreement and Analysis of Variance (ANOVA) was used to test the hypotheses formulated for the study at 0.05 level of significance. The data was analysed using statistical package for social sciences (SPSS) 23.00 version.

Results

Research Question One: What are the mean achievement scores of students taught Educational Technology using gamification learning platform and lecture method?

Table 1: Means and Standard Deviation of the Experimental and Control groups in Achievement Test

Groups	N	Pre-test		Post-test		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Experimental	83	24.01	1.158	30.41	1.148	6.40
Control	67	16.43	2.981	20.09	2.901	3.66

The data presented in Table 1 shows that the experimental group had a mean score of 24.01 and standard deviation of 1.158 in the pre-test and a mean score of 30.41 and standard deviation of 1.148 in the post-test making a pre-test post-test difference in the experimental group to be 6.40. The control group had a mean score of 16.43 and a standard deviation of 2.981 in the pre-test and a post-test mean of 20.09 and a standard deviation of 2.901 with a pre-test post-test difference of 3.66. With this result, the students in the experimental group performed better in the achievement test than the students in the control group.

Research Question Two: What is the influence of gender on the mean achievement scores of students taught Educational Technology using gamification learning platform?

Table 2: Means and Standard Deviation of Achievement Mean Score Male and Female Groups of Students taught Educational Technology using Gamification learning platform

Groups	N	Pre-test		Post-test		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	49	10.23	2.01	30.55	1.081	20.32
Female	34	14.59	2.32	30.21	1.225	15.62

Results in Table 2 shows that male group had a mean score of 10.23 and standard deviation of 2.01 in the pre-test and a mean score of 30.55 and standard deviation of 1.081 in the post-test making a pre-test post-test score difference in male group to be 20.32. On the other hand, the female group had a mean score of 14.59 and standard deviation of 2.32 in the pre-test and a mean score of 30.21 and standard deviation of 1.225 in the post-test making a pre-test post-test difference of 15.62 The results show that there is a difference between the mean achievement scores of male and female students when exposed to the experimental condition in favour of the male students.

Research Question Three: What is the motivation of Educational Technology students after teaching them with gamification learning platform?

Table 3: Students' Motivation towards the use of Gamification learning platform in the learning of Educational Technology concept

S/N	Items	Mean	Std. Dev.	Decision
1	Learning educational technology concept using gamification platform make learning more interesting and encouraging to me	3.13	0.53	Agreed
2	I will prefer the use of gamification platform for my classwork, it challenges me to learn new things	3.01	0.47	Agreed
3	Compared with other students in the class, I am expected to do well in learning educational technology concept using gamification platform	3.2	0.4	Agreed
4	I'm certain I can understand educational technology concept taught on gamification platform	3.00	0.00	Agreed
5	I think I will be able to use what I learned on gamification platform in other related courses.	3.07	0.6	Agreed
6	I believe I will perform better in educational technology test using gamification platform	3.16	0.38	Agreed
7	The most motivating thing for me in this course is trying to understand the content as thoroughly as possible	3.00	0.00	Agreed
8	I can ask myself questions to make sure I understand the concept been taught on gamification platform.	3.17	0.38	Agreed
9	I think the use of gamification platform will help me retrieve from my memory what I have learnt.	3.04	0.65	Agreed
10	The knowledge of gamification will boost my understanding of ideas and its application in other field of study.	3.05	0.23	Agreed
11	The knowledge of gamification has boosted my recalling memory	3.21	0.42	Agreed
12	Working on practice exercises and answering end of lesson questions becomes easier with the knowledge of gamification platform.	3.37	0.50	Agreed

S/N	Items	Mean	Std. Dev.	Decision
13	The instant feedback made available through the application of gamification will motivate me to do better in learning educational technology concept.	3.47	0.51	Agreed
14	I think I will be motivated to participate more often in learning using gamification platform in order to get better grades.	3.21	0.42	Agreed
15	Even when educational technology concept are dull and uninteresting, gamification platform keeps me learning to the end.	3.47	0.51	Agreed
16	When preparing for a test, I can practice important concept over and over again using gamification platform	3.00	0.00	Agreed
17	I believe I can use what I have learned using gamification platform to do my assignment in educational technology and other courses.	3.11	0.32	Agreed
18	I find that I have been reading for lesson, but using gamification platform can help me know what the material is all about.	3.11	0.32	Agreed
19	Using gamification during teaching and learning has made me to be more attentive in the classroom.	3.00	0.00	Agreed
20	When using gamification platform, I can stop once in a while and go over what I have read	3.20	0.40	Agreed
	GRAND MEAN	**3.15**		**Agreed**

Table 3 shows the mean responses of Students' Motivation towards the use of Gamification learning platform in the learning of Educational Technology concept. The mean response of items 1 to 20 all ranked up above the weighted mean which is $\bar{x}$=3.00. This implies that educational technology students had a high level of motivation towards the use of gamification learning platform.

Research Hypotheses

Ho_1: There is no significant difference in the mean achievement scores of students taught Educational Technology using gamification learning platform and lecture method.

Table 4: Summary of Analysis of Variance (ANOVA) for Post-test between Experimental and Control Groups

Sources	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3948.465	1	3948.465	880.696	.000
Within Groups	663.535	148	4.483		
Total	4612.000	149			

*Significant at P < 0.05

Table 4 reveals that there was a significant difference in the mean scores of Experimental and Control Groups with F (1, 149) = 880.696, p < 0.05. Hence the null hypothesis stated was rejected.

Ho_2: There is no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform.

Table 5: Summary of Analysis of Variance (ANOVA) for Post-test between Male and Female Students

Sources	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.391	1	2.391	1.833	.180
Within Groups	105.681	81	1.305		
Total	108.072	82			

*Significant at P < 0.05

Table 5 reveals that there was no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform. F (1, 82) = 1.833, p > 0.05. Hence the null hypotheses stated above was retained.

Discussion

The result presented in table 1 showed the post-test mean achievement scores of the experimental group with a mean score of 30.41and standard deviation of 1.148 and the control group had a mean score of 20.09 and a standard deviation of 2.901. With this result, the students in the experimental group performed better in the achievement test than the students in the control group. This result was confirmed on null hypotheses one presented in table 4 that there was a significant difference in the mean scores of Experimental and Control Groups with F (1, 149) = 880.696, p < 0.05. Hence the null hypothesis stated was rejected. The differences might be as a result of additional instructional material used for the study or the gain in achievement might be a result of blending conventional teaching method with a proper instructional material for example the Gamification learning platform used for this studies which make the findings in line with the work of Ahmad, (2012) and Anyagh nd Okwu, (2010) that indicates a higher gain in the achievement scores of an experimental group to that of the control group.

The data presented in Table 2 shows that there was a significant difference between the mean pre-test scores of both male and female groups. Their post test result indicated that the male students had a mean score of 30.55 and standard deviation of 1.081 and the female students had a mean score of 30.21 and a standard deviation of 1.225. This result implies that the male students performed better in the achievement test than the female students. However, Table 5 result reveals that there was no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform. F (1, 82) = 1.833, p > 0.05. Hence the null hypothesis stated above was retained the outcome might be as a result of both genders having abilities to learning more when taught with instructional materials or that instructional materials meets their learning need. This confirmed the study of Goehle, (2013); Olutola and Olatoye (2017), their finding recommended that gamification learning platform should be adopted as the most effective instructional in teaching because of

its influence on achievement of male and female students that were taught students taught Educational Technology have similar influence on their achievement scores.

Table 3 presented the mean responses of Students' Motivation towards the use of Gamification learning platform in the learning of Educational Technology concept. The mean response of items 1 to 20 all ranked up above the weighted mean which is $\bar{x}$=3.00. This implies that educational technology student had a positive impact on their motivation towards the use of gamification learning platform. That means that the experimental group showed much higher motivation than the control group. This is probably because gamification makes the lessons more interesting, giving all students an opportunity to participate and get instant feedback or results at once. The finding is in accordance with (Can, 2014) who asserted that gamification can be used to stimulate learning since they influence mental and social conditions.

Conclusion

From the findings of the study, the result revealed that gamification online learning platform not only increased students' motivation, but also enhanced their learning outcomes. Also revealed in this study was that students in the experimental group performed better than those in the control group. This indicates that the application of digital games can transform any contents that is boring or difficult to be interesting and easier to understand. Based on this finding, it can be concluded that with the use of certain game elements, gamification can bring positive outcome to students' learning and it should be widely implemented by teachers or lecturers in teaching and learning process.

Recommendations

In line with the findings of the study, the following recommendations were made:

(i) Universities and other tertiary institutions should implement the use of gamification learning platform in teaching and learning process.

(ii) Workshops, seminars and conferences should be organized by government and institutional authorities to equip lecturers with the needed ICT skills for the use of gamification.

(iii) Students should be encouraged and motivated to use gamification online learning platform to improve their academic performance.

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