Utilization of Padlet Technology and Performance of Senior Secondary Two Students in Agricultural Science in Uyo Local Government Area

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ABSTRACT

This study was on the Utilization of Padlet Technology and Academic Performance of Senior Secondary Two Students in Agricultural Science in Uyo Local Government Area. Three research questions and three research hypotheses were raised to direct the study. Dual-coding theory of cogitation and learning community and activity theory were used to guide the study. This study employed Quasi experimental pre-test post-test non randomized control group design. The population consisted of 2,534 senior secondary two Agricultural Science students for 2019/2020 academic session in all the 13 public secondary schools in Uyo Local Government Area. Purposive sampling technique and simple random sampling technique of balloting was used in selecting 240 students from four intact classes from two schools and used for experimentation and control. A researcher-made instrument called Agricultural Science Performance Test (ASPT) was used for the study. The instrument was face validated by three validates in the Faculty of Education, University of Uyo and a reliability coefficient of .81 was obtained for the instrument. The data from the respondents were analyzed using descriptive statistics of mean and standard deviation to answer all the research questions and were analyzed using descriptive statistics of mean and standard deviation to answer all the research questions and Analysis of Covariance was used to test all the hypotheses at .05 significant level. Results of the analysis showed a significant difference in academic performance of Agricultural Science students taught with Padlet technology when compared with those taught with expository method. There were also significant differences in academic performance of male and female students as well as the performance of students in urban and rural school locations. It is concluded that Padlet technology enhanced agricultural science students' performance. Based on these results, some recommendations are made to improve the teaching and learning of Agricultural Science which summarize that Padlet technology should be utilized to enhance students' performance in Agricultural Science among other recommendations.

KEYWORDS: Padlet Technology, Academic Performance and Agricultural Science

Introduction

The teaching and learning community in today's world is becoming increasingly characterized by technology-driven approaches like the use of smartphones, tablets, computers etc. in the classrooms. The increasing usage of technological resources in all areas of our daily lives has led to their deployment in the classrooms to respond effectively to the demands of the students. It is envisaged that technology has become a functional requirement for the 21st century learners for effective learning to be achieved. These innovative technologies like Padlet, Wordle,

Powtoon among others can enhance students' performance in Agricultural Science. Students are eager to experiment with different technologies to support their learning, largely because they are skilled in the use of mobile technologies and computers and they are conversant with using applications and games designed for such devices such as class dojo, class 123, canvas, Moodle, Chamilo, Talent LMS, BlackBoard Learn, Sakai, Atutor, Padlet among others.

Padlet was founded in 2008 by Nitesh Goel. According to Goel, Padlet is seeing close to three million monthly unique users across its platform, and has a lot of attraction in the classroom setting, in particular. This includes teachers using Padlet for lesson planning and assignments, as well as in-class activities where students work together on websites (Weller, 2013; Kaya, 2015; and Jaganathan, 2016). Padlet works like an online paper sheet where people can post any contents (e.g images, videos, documents, texts) anywhere on the page. Anyone can access any contents posted on Padlet from many devices such as laptop, tablet, or smartphones (Kaya, 2015). Padlet is a free web 2.0 multimedia wall that allows real-time interaction among students and between the students and the teachers. An increasing number of teachers during recent years has recognized that Padlet is a useful tool to improve collaborative learning. According to Zhi and Su (2015), some of the advantages are; easy usage, instant collaboration (any student can see when anyone else is uploading something in the wall), multimedia (almost everything can be placed on the Padlet), mobile (it can work on many different devices).

Fiester and Green (2016), defined Padlet as a web 2.0 Student Response System (SRS) used by teachers and students to post their thoughts, ideas, questions, and answers on a virtual bulletin board. According to the author, SRS is a form of technology that allows for immediate student-response of teacher created questions, as well as immediate teacher feedback regarding student-responses. All information posted to Padlet occur in present time, links, pictures, videos and lesson contents can be inserted into the posts that may further support students teaching (Fuchs, 2014). Padlet is a free social-networking site in which people can argue or discuss about certain topics and easily use multimedia elements to enhance their words. They can upload images, videos, documents and PDFs, share links, comment on each other's posts, make public or private walls and exchange information. it is an empty virtual wall which provides users with this good amount of features that facilitate communication among people and stimulates them to express themselves. They do not need to be at their computers to participate in this site, they can use their smart phones, iPads, tablets or any other device that has an Internet connection. The most amazing feature of Padlet is that users do not need to register, students can join a Padlet created by their teacher (Algraini, 2014). Teachers can invite students to join by inviting them through their e-mail address or by sending a code or link for them to use and join the Padlet group.

Online learning system is very effective and helps students build their critical thinking skills. It is essential that technology play an active role in content curriculum as it engages students in activities that foster such skills by discussing and sharing experiences. The anonymous aspect of Padlet technology is that students' privacy is not easily compromised since it incorporates social media, it enables students to create, share and exchange content with others in the class and hence, fosters a sense of community (Funchs, 2014) Kleinsmith (2017), argue that teachers need to develop Technological Pedagogical Content Knowledge (TPACK) in order to be successful users of technology in their teaching. Similarly, Udosen and Ukpong (2019) in their study, observed the problem of pedagogical efficiency in the use of new information

technologies including blended learning strategy. Teachers must be able to flexibly incorporate new resources including technology into their knowledge of subject pedagogy in ways that enhance learning. In the same vein, the ability of the students to retain and remember what they have been taught depends heavily on the use of varieties of media. Therefore, teachers can use Padlet technology in lesson delivery, designing questions, administering quiz, and, afterwards, facilitating discussion about the correct or incorrect responses.

Agricultural science is the science of cultivating the soil, harvesting crops, and raising of livestock. It is also the science or art of production of plants and animals useful to man, and in varying degrees the preparation of such products for man's use and/or disposal. Agriculture plays important roles in the economy and development of all nations especially Nigeria and other developing countries (Olatoye and Adekoya, 2010). There seems to be a relationship between performance of students and variables decreasing teacher's teaching methods, learning materials, learning styles, etc. In any education system, instruction is aimed at enhancing the performance of the learners. There has been a drastic reduction in the standard of performance by students in science and technology at all levels of education in Nigeria (Emaikwu, 2012). The poor performance of students in science subjects including Agricultural science has assumed a disturbing dimension. In the light of this, Agricultural science teachers need to seek suitable ways of tackling the current mass failures if they are to prevent the drifts of students to arts and social science subjects (WAEC) Reports, 2018).

Gender refers to the state of being male or female. Earlier studies on gender have indicated that there are gender differences in usage and attitudes. Cooper (2012), posited that there is gender difference in performance as far as creativity is concerned. This finding agrees with the findings of Nelson and Balow (2011), who indicated that boys were more likely to score higher in the areas of mathematics and science while girls typically performed better in reading and English. This finding is also in line with the findings of Ema (2017), who reported that there is a significant difference in the performance of male and female students and that male students performed better than their female counterparts when taught Agricultural science concepts with social media technologies.

School location is the geographical location of the school which may be rural or urban. Rural areas are the areas, which lack basic amenities like electricity, pipe-born water and good roads and are thinly populated with low standard of living. On the other hand, urban areas are densely populated with people living a high standard of live, exposed to good basic amenities and availability of infrastructure. Owoeye and Yara (2011), posited that students performed better in urban areas than their rural counterparts. It is against this background that the researcher carried out this study to examine if the utilization of Padlet technology can enhance SS II students' performance in Agricultural science in Uyo Local Government of Akwa Ibom State. The study is set on dual-coding theory of cogitation by Allan (1971), learning communities and activity theory of Engestrom (1987), in Etim, Udosen and Ema, (2016). According to Etim, Udosen and Ema (2016), dual coding theory postulates two distinct information processing strategies vis-à-vis verbal and visual information processing and that learning improves when both systems are employed. In this process, students learn better from processes that are sensory, visual induction and active especially when colours and diagrams are employed. The learning communities and active theory postulated the use of cooperative and collaborative learning strategies that encourages students active participation as supported by Cross (1998) and also for

the construction and sharing of knowledge between groups and communities through collaborative learning activities (Blelaczye & Collins, 1999). This encourages active student's participation in online discussion.

Udosen and Adie (2019) stated that use of variety of technologies would be practically shown students how to use the software to (i) post assignment and announcement for students, (ii) create and published students assignment, (iii) archives courses taught, etc. This will enable school to benefit from the plethora of gains from the software and the solution offers.

Statement of the Problem

The relevance and importance of Agricultural science as one of the science subjects and its importance in economic development cannot be overemphasized. The mode by which a teacher presents instruction affects responses from the students and determines whether they are interested, motivated and involved in the lesson in such a way as to result in a good learning. As at now, technology has become an important aspect of our life, particularly in the educational field. The expository method of teaching and learning of Agricultural science makes students feel bored and lose interest. It does not significantly help in improving their performance. On the other hand, technology makes the educational environments joyful and interesting which leads to effective and efficient learning.

Most teachers are not sufficiently technologically equipped and as such cannot design instruction to suit the 21st century learners. Some Agricultural science teachers are still digital novice sticking to the expository method of lesson delivery and cannot use technology inspired software's like Padlet in delivering instruction. It is also observed that in this technological era, secondary school students not properly tutored on why and how to utilize emerging technology learning-advantages positively, prefer to use mobile phones including computers for entertainment, sharing racy pictures among others to their disadvantage. This teachers' deficiency in utilizing innovative technologies in teaching Agricultural science concepts has negatively affected students' performance in Agricultural science. The question now is; would the use of Padlet technology improve the academic performance of senior secondary two students in Agricultural science? This warrants the need for this study, aimed at finding out if the utilization of Padlet technology can enhance students' performance in Agricultural science in Uyo Local Government Area of Akwa Ibom State, Nigeria.

Purpose of the Study

The purpose of this study was to determine the effect of Padlet technology on academic performance of SS II Agricultural science students in Uyo Local Government Area of Akwa Ibom State.

The specific objectives of this study were:

1. To determine the difference in the academic performance of SS II Agricultural science students taught with Padlet technology as against the use of the expository method.

2. To find out the difference in the academic performance of male and female SS II Agricultural science students taught using Padlet technology.

3. To examine the difference in the academic performance of urban and rural SS II Agricultural science students taught using Padlet technology.

Research Questions

To guide the study, the following research questions were raised:

1. What is the difference in the academic performance of SS II Agricultural science students taught using Padlet technology and the expository method?

2. How does the performance of male and female SS II Agricultural science students differ when Padlet technology is used for instructions?

3. What is the difference in the academic performance of urban and rural SS II Agricultural science students using Padlet technology for instruction?

Research Hypotheses

The following research hypotheses were formulated to guide the study and were tested at .05 level of significance.

$H0_1$: There is no significant difference in the academic performance of SS II Agricultural science students taught with Padlet technology and the expository method.

$H0_2$: Male and female SS II Agricultural science students do not significantly differ in their academic performance when Padlet technology is used for instruction.

$H0_3$: There is no significant difference in the academic performance of urban and rural SS II Agricultural science students when Padlet technology is used for instruction.

Methodology

The study adopted quasi-experimental pre-test-post-test non-randomized control group design. The population of the study consisted of 2,534 SS II Agricultural science students in all the 14 public secondary schools in Uyo Local Government Area of Akwa Ibom State for the 2019/2020 academic session. Purposive sampling technique was used in selecting schools with; (a) Internet gadgets, (b) computers, and (c) schools that have registered student for WAEC/NECO examinations for at least 3 years. Five schools met the criteria and simple random sampling technique of hat and draw was used in selecting two schools, one in the urban and one in the rural setting for the study. A total of 240 respondents from four intact classes of 58, 60, 60 and 62, were used in the two schools selected comprising 118 male and 122 female students. These students formed the experimental and control groups used for the study. A researcher-made instrument called Agricultural Science Performance Test (AGSPT) was used for the study. The Agricultural Science Performance Test (AGSPT) was developed on the concept "Rock

Formation" which was used for the study. AGSPT had a total of 20 multiple-choice questions with response options (A – D) with only one correct option that carried 5 marks each, making a total of 100 marks. The instrument AGSPT was subjected to face validation by three validates in Faculty of Education, University of Uyo. A reliability coefficient of .81 was obtained from the instrument using split half method. The instrument was therefore considered suitable for use in the study.

Agricultural science instructional package on "Rock formation" was designed by the researcher using Padlet technology. Agricultural science textbook for senior secondary schools by Iwena (2018), was used in developing the lesson content and ADDIE model was used in designing the package. The experimental groups of 118 were taught using Padlet technology whereby the lesson content were posted on Padlet platform for students to access using the 12digit alpha numeric code sent by the researcher while the remaining 122 students were taught using the expository method. The research procedure lasted for one month. Before the commencement of the treatment, all the students were pre-tested and post-tested after the treatment. Descriptive statistics of mean and standard deviation were used in answering all the research questions and analysis of covariance was used in testing all the hypotheses at .05 significant level.

Results

Research Question 1: What is the difference in the academic performance of SS II Agricultural science students taught using Padlet technology as against use of the expository method? The result of the analysis is presented in Table 1.

Table 1: Mean and Standard Deviation of Pre-test and Post-test Scores of Students' Performance in Agricultural Science taught using Padlet technology and those taught with expository method

Treatment Groups	N	Pre-test		Post-test		Mean Gain	Mean Diff.
		$\bar{X}$	SD	$\bar{X}$	SD		
Taught with Padlet (Experimental)	118	28.40	5.60	73.56	6.70	45.16	
							4.37
Expository (Control)	122	28.20	5.14	68.99	9.09	40.79	

N = 240

Data in table 4.1 indicates the means of 28.40 and 73.56 of the experimental group with their respective standard deviations of 5.60 and 670. The table further shows the means of 28.20 and 68.99 of the control group with standard deviations of 5.14 and 9.09 with a mean difference of 4.37 between the two treatment groups. this means that utilization of Padlet technology in teaching Agricultural science concepts enhanced students' performance better when compared with those taught with expository method.

Research Question 2: How does the performance of male and female SS II Agricultural Science students differ when Padlet technology is used for instruction? The result of the analysis is presented in Table 2.

Table 2: **Mean and Standard Deviation of Pre-test and Post-test Scores of Male and Female Students Performance in Agricultural Science taught using Padlet technology**

Treatment	Gender	N	Pre-test		Post-test		Mean Gain	Mean Diff.
			X̄	SD	X̄	SD		
	Male	58	28.62	5.33	70.60	9.40	41.98	
Taught with Padlet								15.52
	Female	60	27.76	5.13	54.22	8.08	26.46	

N = 118

The result of the analysis on Table 4.2 shows the means of 28.62 and 70.60 of male students taught with Padlet with their respective standard deviations of 5.33 and 9.40. The table further shows the means of 27.76 and 54.22 of female students with standard deviation of 5.13 and 8.08 with a mean difference of 15.52 between the two treatment groups. This means that utilization of Padlet technology in teaching Agricultural science concepts enhanced male students' performance more than their female counterparts.

Research Question 3: What is the difference in the academic performance of urban and rural SS II Agricultural Science students using Padlet technology for instruction? The result of the analysis is presented in Table 3.

Table 3: **Mean and Standard Deviation of Pre-test and Post-test Scores of Urban and Rural Students Performance in Agricultural Science taught using Padlet technology**

Treatment	School Location	N	Pre-test		Post-test		Mean Gain	Mean Diff.
			X̄	SD	X̄	SD		
	Urban	58	29.15	5.82	75.71	5.51	46.90	
Taught with Padlet								3.12
	Rural	60	28.81	5.51	72.93	12.20	43.78	

N = 118

Table 4.3 shows the means of 29.15 and 75.71 of urban located students taught with Padlet with their respective standard deviations of 5.82 and 5.51. The table further shows the means of 28.81 and 72.93 of rural located students with standard deviations of 5.51 and 12.20 with a mean difference of 3.12 between the two treatment groups. This means that urban located students performed better than rural located students when Padlet technology was used in teaching Agricultural science concepts.

Research Hypothesis 1: There is no significant difference in the academic performance of SS II Agricultural science students taught with Padlet technology and expository method. Students' data on Agricultural Science Performance Test was used for analysis with the help of ANCOVA. The summary of the analysis is presented in Table 4.

Table 4: **Summary of ANCOVA analysis of Students in Agricultural Science taught with Padlet Technology and those taught with expository method**

Source	Type III Sum of Squares	df	Mean Square	F-cal.	F.crit.	Remarks

Corrected Model	7230.768	2	406.709	3.380		
Intercept	65266.572	1	65266.572	542.469		
Pre-test	443.552	1	55.444	.461		
Main Effect*	6196.679	1	688.520	5.72	3.00	Sig.
Error	26589.395	221	120.314			
Total	1196091.000	240				
Corrected Total	33910.163	239				

N = 240, *Significant at .05 level

An examination of Table 4.4 reveals that the calculated F-value of 5.72 is greater than the critical F-value of 3.00 at degree of freedom 1 and 238 at .05 level of significance. Therefore, the null hypothesis of no significant difference in the academic performance of Agricultural science taught with Padlet technology and those taught with expository method is rejected. There is a significant difference in the performance of Agricultural science students taught with Padlet technology when compared with those taught with expository method.

Research Hypothesis 2: Male and female SS II Agricultural science students do not significantly differ in their academic performance when Padlet technology is used for instruction. Students' data on Agricultural Science Performance Test was used for analysis with the help of ANCOVA. The summary of the analysis is presented in Table 5.

Table 5: Summary of ANCOVA analysis of Male and Female Students in Agricultural Science taught with Padlet Technology

Source	Type III Sum of Squares	df	Mean Square	F-cal.	F.crit.	Remarks
Corrected Model	4252.859	2	250.168	4.936		
Intercept	45544.451	1	45544.451	898.596		
Pre-test	241.010	1	34.430	.679		
Main Effect*	3802.627	1	475.328	9.38	3.07	Sig.
Error	5068.404	100	50.684			
Total	557813.000	118				
Corrected Total	9321.263	117				

N = 118, *Significant at .05 level

An examination of Table 4.5 reveals that the calculated F-value of 9.38 is greater than the critical F-value of 3.07 at degree of freedom of 1 and 116 at .05 level of significance. Therefore, the null hypothesis of no significant difference in the academic performance of male and female Agricultural science students taught with Padlet technology is rejected. This means that there is a significant difference in the academic performance of male and female SS II Agricultural science students when taught using Padlet technology.

Research Hypothesis 3: There is no significant difference in the academic performance of urban and rural SS II Agricultural science students when Padlet technology is used for

instruction. Students' data on Agricultural Science Performance Test was used for analysis with the help of ANCOVA. The summary of the analysis is presented in Table 6.

Table 6: Summary of ANCOVA analysis of Urban and Rural Students in Agricultural Science taught with Padlet Technology

Source	Type III Sum of Squares	df	Mean Square	F-cal.	F.crit.	Remarks
Corrected Model	2936.961	2	183.560	1.165		
Intercept	52084.095	1	52084.095	330.431		
Pre-test	702.624	1	140.525	.892		
Main Effect*	2034.277	1	339.046	5.15	3.07	Sig.
Error	15920.090	101	157.625			
Total	591192.000	118				
Corrected Total	18857.051	117				

N = 118, *Significant at .05 level

An examination of Table 4.6 reveals that the calculated F-value of 5.15 is greater than the critical F-value of 3.07 at 2 and 116 at .05 level of significance. Therefore, the null hypothesis of no significant difference in the academic performance of urban and rural SS II Agricultural science students taught with Padlet technology is rejected. This means that there is a significant difference in the academic performance of urban and rural SS II Agricultural science students when taught using Padlet technology.

Discussion of Findings

The result in Table 1 and 4 revealed a significant difference in the academic performance of Agricultural science students taught with Padlet technology when compared with those taught with expository method. The result showed that students taught with Padlet technology performed better than those taught with expository method. The reason for this result is that students are very susceptible to innovations in the classroom and Padlet technology is an innovative technology used by students to exchange information and share pictures among others. The finding of this study is in line with the findings of Kleinsmith (2017). Algraini (2014), and MunirahHaris and Jamaludin (2017), whose findings showed that the utilization of Padlet technology in teaching enhanced students' performance. The finding of this study corroborates the findings of Fuchs (2014), who asserted that Padlet allows students to be engaged at the same time and also collaborate simultaneously. This finding agrees with the position of Bichi (2013), who posited that the ability of the students to retain and remember what they have been taught by the teacher depends heavily on the appropriateness of the method used. This finding is also in agreement with the position of Udosen and Adie (2019) who posited that the use of variety of technologies would be practically shown students how to use the software to (i) post assignment and announcement for students, (ii) create and published students assignment, (iii) achieve archives courses taught, etc. This will enable school to benefit from the plethora of gains from the software and the solution offers.

The result in Table 2 and 5 indicated a significant difference in the academic performance of SS II Agricultural science student taught using Padlet technology for instruction considering gender.

This means that male students performed academically better than female students when Padlet technology was used for instruction. The reason for this result is that though the use of Padlet technology enhanced academic performance of students, male students can withstand harder tasks than their female counterparts especially in sciences and social science subject. This finding is supported by the submission of Cooper (2012), who stated that there is gender difference in performance as far as creativity is concerned. This finding agrees too with the findings of Nelson and Balow (2011), who indicated that boys were more likely to score higher in the areas of mathematics and science while girls typically performed better in reading and English.

Results in Table 3 and 6 indicated a significant difference in the academic performance of urban compared with rural Agricultural science students using Padlet technology for instruction. This means that urban students performed academically better than rural students when Padlet technology was used for instruction. The reason for this result is that Global System for Mobile communication (GSM) network functions well in urban areas which afforded the students increased access and interaction with the teacher as well as with students. This finding corroborates the findings of Owoeye and Yara (2011), who asserted that there is a significant difference in students' academic performance in rural compared with urban secondary schools. They posited that students in urban areas had better academic achievement than their rural counterparts. This is in line with the findings of Etim and Ema (2017), who submitted that urban located students performed better than their rural counterparts when taught using online resources. The reason is because in Nigeria, most rural based schools lack enough qualified teachers and have poorly equipped classroom. They also lack basic amenities, all serving as inhibiting factors on the use of social media technologies towards achieving good academic performance.

Conclusion

Based on the findings of this study, it can be concluded that utilization of Padlet technology in teaching Agricultural science concepts enhanced students' performance more than the expository method of teaching.

Recommendations

By reason of the findings and conclusion drawn, the following recommendations are made to improve students' performance in Agricultural science.

(1)　Agricultural science teachers should utilize and encourage students on the use of Padlet Technology as it promotes flexible learning along with autonomous and independent learning.

(2)　Agricultural science teachers should motivate boys and girls to learn effectively to avoid gender disparities in performance.

(3)　Global system for Mobile Network (GSM) should improve on their services for a steady network to be achieved especially in rural areas.

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