British Journal of Education
Vol. 9, Issue 8, pp.35-49, 2021
Online ISSN: 2054-636X
Print ISSN: 2054-6351

PEDAGOGICAL, TECHNICAL AND SOCIAL AFFORDANCE OF MOODLE USAGE DURING THE COVID-19 ERA: SENIOR HIGH SCHOOL TEACHERS PERSPECTIVE

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ABSTRACT: *The main purpose of the study was to investigate the pedagogical, technical, and social affordance of Moodle usage during the COVID-19 era with the focus on Senior High School teachers in the Greater Accra Region. The positivist research paradigm and quasi-experimental research design was adopted for the study. The purposive sampling procedure was used to sample 200 respondents for the study. The Cronbach alpha value of 0.89 was obtained on the structured questionnaire. Among the three affordances (pedagogical, technical, and social) of Moodle usage, the findings of the study revealed that there was no statistically significant influence of SHS teacher's pedagogical affordance on Moodle usage in the Greater Accra region. Moreover, the findings showed a statistical significance influence on SHS teacher technical affordance and social affordance respectively. It is recommended that frequent in-service training and refresher courses on the pedagogical aspect of the Moodle platform should be organized for SHS teacher to enable them gain mastery and competencies in the pedagogical aspect of Moodle usage.*

KEY WORDS: Moodle, pedagogical affordance, technical affordance, social affordance, social constructivist, Technology Acceptance Model (TAM)

INTRODUCTION

Based on the quick adaptation on the use of modern technologies to improve the various activities undertaken within the educational sector as a result of the Covid -19 pandemic in Ghana, education in Ghana has gained numerous benefits in terms of improvement on how information is shared and accessed during the pandemic period. e-Learning has a great impact on the educational environment that through the use of technology many chances have transcended within the teaching and learning process to enable students develop personal skills through the amazing experiences that technology gives (O'Hara & Pritchard, 2015). e-Learning provides students with

more flexible time and relaxed atmosphere to learn as well as motivate them to complete learning tasks (Salamat, Ahmad, Bakht, & Saifi, 2018).

Students feel comfortable and motivated when they learn from the Learning Management System (LMS) on the internet. Modular Object-Oriented Learning Environment (Moodle) is free and an open-source Learning Management System (LMS) or an e-learning platform. There is no requirement such as certification or license that serve as a prerequisite for its usage. According to Salmon (2000), Collis and Moonen (2001), Marra (2002), and (Norlin, 2014) there are some pedagogical roles performed by the teachers which requires certain key competence. These roles which demands teacher to meet these expectations include:

i. Coming up with rules on how to use the platform
ii. Designing the course outline, the syllabus and lesson objective
iii. Ensuring that effective learning activities in the discussion forum are well planned for a successful course
iv. Bringing in appreciable learning approach and creating learning materials to be used by students
v. Allocating time for discussions and quizzes
vi. Designing a grading system to be used in assessing students' performances
vii. Monitor academic performances of learners and help keep their records
viii. Give immediate responses to students' questions to promote learning
ix. Determine the appropriate interventional strategies to offer to help scaffold students with learning challenges.

When all these pedagogical roles are performed, the pedagogical affordance of Moodle usage by teachers will be meet.The next affordance teachers must show competence is technical affordance; Moodle usage is technical and needs technical experts like teachers who are knowledgeable about the operations of the Moodle platform. Norlin, (2014) came out with the findings that some technical skills required of online teachers will include; procedures involved in operating the Moodle platform, ways of uploading key and supplementary information unto the Moodle platform, ways of uploading course outlines, process involved in retrieving submitted works, appropriate ways of marking or vetting the submitted works and ways of giving prompt feedbacks to students.

When teachers are able to perform their role effectively by ensuring positive affordance, students will be able to visit the Moodle platform to download learning materials, present assignments, take tests, communicate with teachers and peers, and sometimes access news items. In addition, the Moodle will support collaborative interaction among students, provide online inquiry and discovery learning to students (Brandl, 2005). The perceived rate of acceptance of e-learning among teachers can be explained from a theoretical perspective of the technology acceptance model (TAM) which helps to model how peoples come to admit an utilize new technologies. The constitute of TAM being the perceived ease of use (PEU), perceived usefulness (PU) and attitude toward technology may influence the Moodle usage acceptance among SHS teachers coupled with

the affordances that may be generated as a result of either perceived ease of use or perceived usefulness.

To situate Moodle usage by SHS teachers to a philosophical position, the social constructivist philosophy of teaching will be adopted to explain how SHS teachers' Moodle usage can contribute to learner-centred teaching and learning. Within the social constructivism theory, much focus is placed on the learner through which learners are encouraged to create their own meanings and understanding of their world based on the experiences they get from their environments. Studies from Driscoll (2000) revealed that constructivism learning is when learners create knowledge in their own minds. From Driscoll (2000), understanding is best obtained as learners are allowed to manipulate the Moodle platform, engage in interactive communications with their teachers and peers and also practice more on their own. Students get better understanding of their real-world and constantly gain new experiences from their environment. Learners will continually adjust to new information based on their previous experience and will therefore create their own meaning of reality. By inferences, for learning to become permanent and very difficult to forget, learners must be actively engaged in the learning process. Contrasting view of low-order learning in the forms of route learning, memorization, recalling of facts are not applied rather higher-order thinking such as analysis, synthesis, evaluation and creativity is promoted in this theory (Loyens & Gijbels, 2008; Taber, 2006). The nexus between the social constructivism and Moodle usage is that constructivist theory lays emphasis on students interacting with each other, collaborating together and connecting themselves to learn which is not different form the orientation for Moodle usage which also to creates the opportunity for its users to exchange ideas, interact with each other as well as have an inner satisfaction of contributing to the development of this Moodle.

However, the effectiveness or ineffectiveness of the management of the Moodle platform to perform these activities depends on the teachers' knowledge and competencies on the Moodle tools and their utilization. Inherently, the Moodle platform has its capabilities and limitations for which affordance is key. According to Said and Bin (2014), Moodle affordances present themselves in various types but they posit three types of Moodle affordances (pedagogical, technical, and social) (Said & Bin, 2014). These types of Moodle affordances interrelate throughout the teaching and learning process on the platform for which the Senior High School teachers must be competent in all these three affordances in order to execute their task effectively and efficiently.

There have been several studies on Moodle usage and its related issues for which John and Sutherland (2005) argue that there is a relationship between pedagogy within a subject area, the subject domain and its culture and the technology which is crucial in engendering quality learning if teacher do not possess the requisite competencies and skills in navigating through such e-learning tools. Furthermore, Alzouebi and Sallam (2014) studied teacher perceptions of the use of Moodle and found that teachers who are not willing to use the platform because they saw the Moodle usage as an additional responsibility and time-consuming. Again, John and Sutherland (2005) contributed in this respect and posited that Moodle usage offers a wide range of ways in which people can create representations of their knowledge and share them depending on the

attitude and technological skills of the teacher. To buttress this point, Mealor (2008) and Bervell and Umar (2017) discussed the efficacy of repurposing Moodle to create online communities whereby members have greater capacity to contribute to and design the environment. Yet, it is bizarrely problematic to establish that Mealor (2008) and this point, Mealor (2008) and Bervell and Umar (2017) focus was on designers' perception of using Moodle, and not the teacher education purposes. Gauging from the above bases, the potential of teachers in affecting the utilization of the Moodle platform tools for design and development of online learning resources becomes a challenge to teachers in respect to in built operation tools of Moodle. From this justification, the teachers who use Moodle must possess certain affordance competencies concerning Moodle platform. It is there imperative to ascertain the pedagogical, technical and social affordances of Moodle usage among Senior High School teachers in the Greater Accra Region of Ghana.

Specifically, the study will address the following research questions:
1. What influence does pedagogical affordance have on teachers' usage of the Moodle platform?
2. How can technical affordance influence teachers' usage of the Moodle platform?
3. How can social affordance influence teachers' usage of the Moodle platform?

It is envisaged that the findings of this study will provide valuable information on the use of Moodle in delivering lessons in the Senior High Schools in Ghana to enable teachers make instructional decisions and choices regarding the use of Moodle in facilitating teaching and learning among students. Also, the findings of the study are envisaged to enlighten Senior High School teachers on their technical, social and pedagogical affordance of Moodle usage to enable them strengthen their gains and complement their weakness. Furthermore, it is envisaged that the findings of the study will serve as a valuable material and a reference point to other researchers interested in investigating Moodle usage affordances among educators. Notwithstanding the significance of the study, the study was delimited to the Senior High School (SHS) teachers within the Greater Accra Region specifically the SHS schools were: Accra Wesley Girls' High School, Accra Girls' High School and St. Mary's Senior High School. The section of these schools was based on that fact that these three Senior High School opted the use the Moodle e-learning platform to facilitate teaching and learning during the Covid pandemic.

METHODOLOGY

The study opted for a more epistemological view and adopted the positivist paradigm in undertaking this research. A quasi-experimental design was used as the research design. This was to establish the cause-and-effect relationships among the variables. The researcher adopted this research design because this design is most frequently used for non-randomized study. The population of the study comprised all Senior High School teachers within Accra Wesley Girls' High School, Accra Girls' High School and St. Mary's Senior High School. During the sample size determination, Yamane (1967) sample size determination formula was used but a margin error of (0.05) is assumed.

$$n = \frac{N}{1 + N(e)^2}$$
$$n = \frac{400}{1+400(0.05)^2}$$
$$n = \frac{400}{2}$$

$n =$ 200 Teachers
Where:
N = population size = 400 teachers
n = Sample size
e = margin of error (0.05)

Also, the sample size of the teachers is 200, from the total population of 400, which is the lowest number of responses required from respondents to maintain a 95% confident interval. A non-probability sampling techniques "purposive sampling" was used to selected the respondents for the study. A structured questionnaire with a five-point Likert scale was used as the main data collection instrument. The researchers ensured that the face and content validate was met. Furthermore, the questionnaire was pre-tested at the Oguaa Secondary Technical Senior High School with the aim of improving the internal validity of the instruments. The Crombach alpha value of the pre-test was 0.89. This co-efficient could be considered high because, according to Fraenkel and Wallen (2000), reliability co-efficient of .70 and above is seen to be highly reliable for eliciting the expected result. STATA 11 was used to analysis the data. As Peng, Lee and Inggersoll (2002) believe that, linearity between dependent and independent variables is not predicted by logit and that standardized coefficients correspond to the beta-coefficients in the ordinary least square regression models. Also, the model does not assume homoskedasticity and normally distributed variables as a result the overall logistic probability model was specified as follows:

$$P_i = F(Z_i) = F(\beta_0 + \sum \beta_i X_i) = \frac{1}{1+e^{-z_i}} \quad (1)$$

For better understanding and easier interpretation of the coefficients, Hosmer and Lemeshow (2000), suggested that odd ratio and log of odd should be used in the model. This odd ratio means the ratio of the probability () that Moodle usage affordances will help increase academic performances when used as a teaching and learning tool to the probability (1-) that academic performances will not be increased when Moodle usage affordances is not used as a teaching and learning tool;

$$(1 - P_i) = \frac{1}{1+e^{-z_i}} \quad (2)$$

Therefore,

$$\frac{P_i}{1-P_i} = \frac{1 + e^{z_i}}{1 + e^{-z_i}} = e^{z_i} \quad (3)$$

The natural log of equation (3), will give:

$$Z_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_m X_m \quad (4)$$

Due to the dichotomous nature of the dependent variable, logistics regression model was chosen over the others for analyzing the data for attainment of objectives of the study. This enhanced the use of cumulative logistic probability model as follows:

$$P_i = F(Z_i) = F(\beta_0 + \sum \beta_i X_i) = \frac{1}{1+e^{-z_i}} \quad (5)$$

Odd ratio or probability (), that academic performances will be increased when Moodle is used as teaching and learning tool, to the probability (1-) that academic performances will not be increased when Moodle is not used as a teaching and learning tool;

$$(1 - P_i) = \frac{1}{1+e^{-z_i}} \quad (6)$$

Therefore,

$$\frac{\mathrm{P_i}}{1-\mathrm{P_i}} = \frac{1 + \mathrm{e^{z_i}}}{1 + \mathrm{e^{-z_i}}} = \mathrm{e^{z_i}} \quad (7)$$

The natural logarithm of a number is its logarithm to the base of the mathematical constant 'e', where 'e' is an irrational and transcendental number approximately equal to 2.718281828459
The natural log of equation (3), will give:

$$Z_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_m X_m$$

Furthermore, Moodle usage affordances among teachers were analyzed using the binary logistic regression model. Moodle usage affordance was explained as the ability to use Moodle in teaching and learning effectively and efficiently. Regularly used variables were therefore defined as 1 if Moodle affordance is regularly used by teachers to improve academic performances and 0 if otherwise. The respondents were assured of confidentiality, anonymity of information given and guaranteed that information provided would only be used for academic purpose.

RESULTS AND DISCUSSION

This section deals with the presentation and discussion of the results that were drawn from the data collected in order to find answers to the research questions. The preliminary variables (sex, age, teachers learning platform used and self-reported usage on learning platform) of the respondents were analyzed. The selection of these variables was to enable the researchers to fully ascertain the entry requirement and behavior of the respondents.

Sex Characteristics of the Respondents

From Figure 1, 83(41%) of the respondents were females as compared to 66(33%) of the respondents were males. However, 26% (51) of the teacher participants preferred not to say their gender.

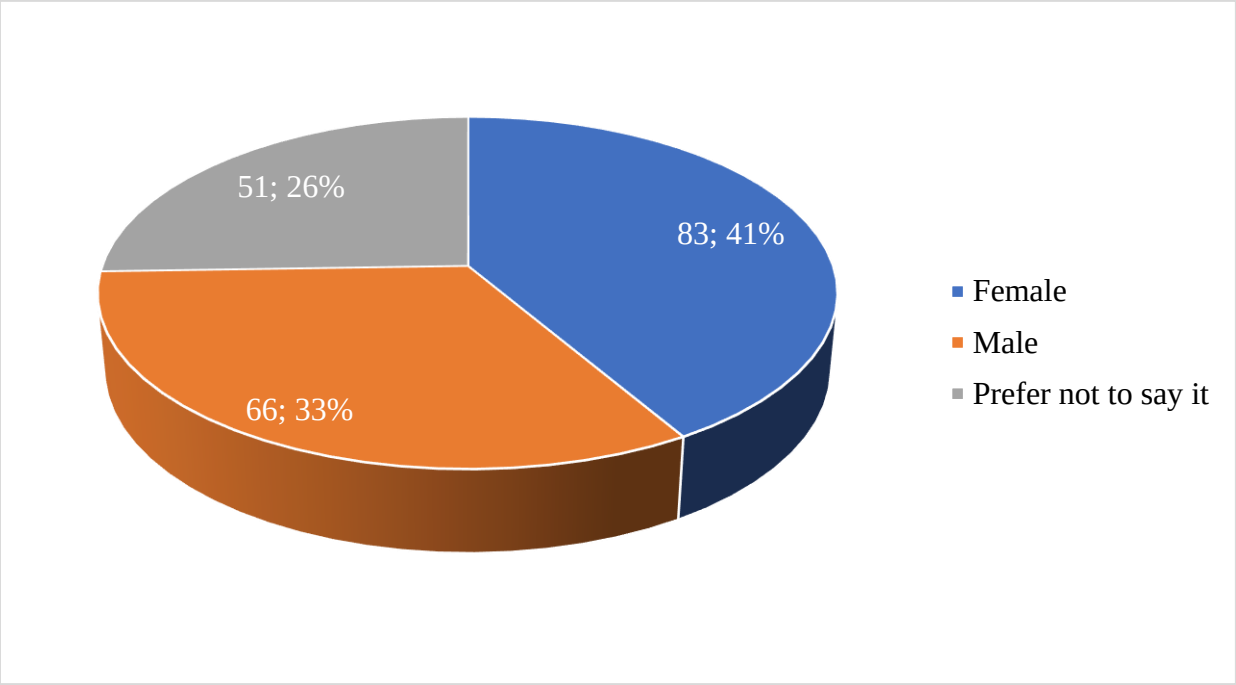
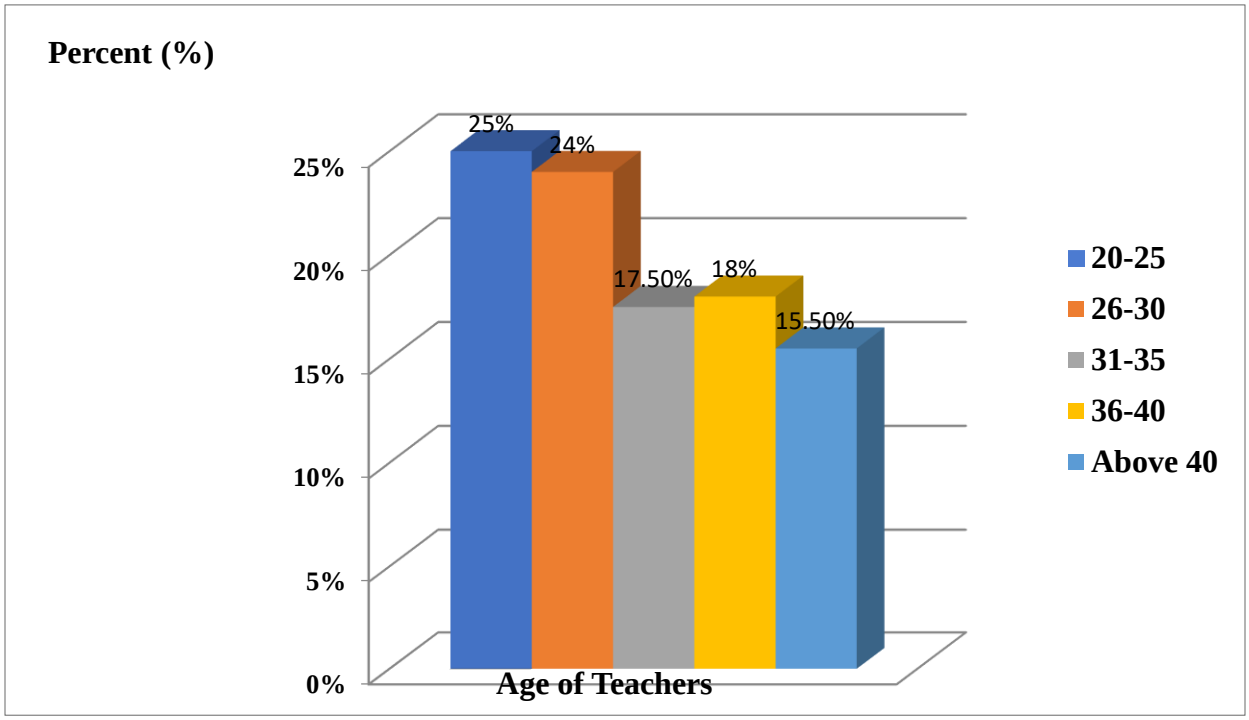


Figure 1: Sex Characteristics of the Respondents
Source: (Field Data, 2021)

Age Characteristics of the Respondents

The study obtained data on the age characteristics of the teachers who participated in the research. The distribution of the teachers according to their age is presented in Figure 2.



Source: (Field Data, 2021)

Figure 2: Age characteristics of Respondent - Teacher

Result from Figure 2 shows that 50(25%) of the respondents were within the age bracket of 20-25 years, 48(24%) of the respondents were in the age bracket of 26-30 years whiles 35(17.5%) of the respondents were within the age bracket of 30-35 years. In relation to their distribution, the researchers proceeded to find out teachers self-reported usage of online learning platform. The findings on the respondents self-reported usage of online learning platform are presented in Figure 3.

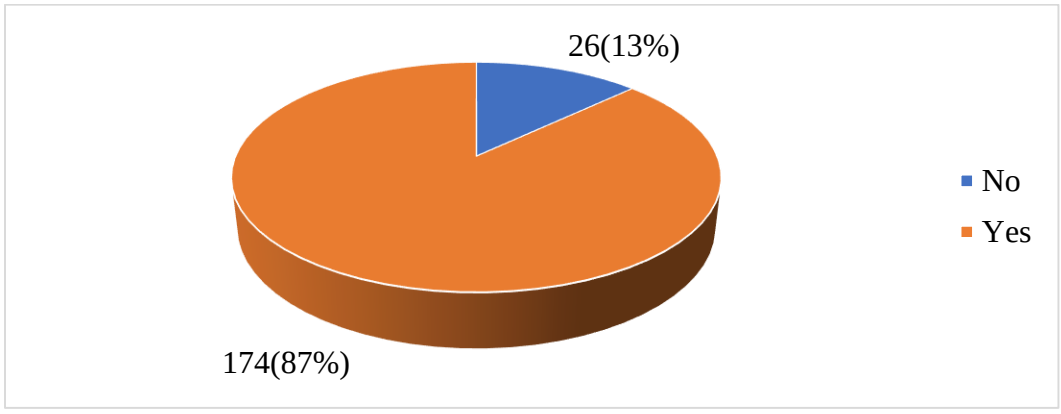


Figure 3: Self-reported Usage of Online Learning Platform of Teachers

Source: (Field Data, 2021)

Figure 3 shows that majority of the teachers that is 174 (87%) of the teachers responded that they had used an online learning platform to teach a course before whiles 26(13%) of the teachers responded that they have not used any learning platform to teacher before. The researcher probed further to ascertain the learning platforms used by the teachers for which the result is presented in Figure 4.

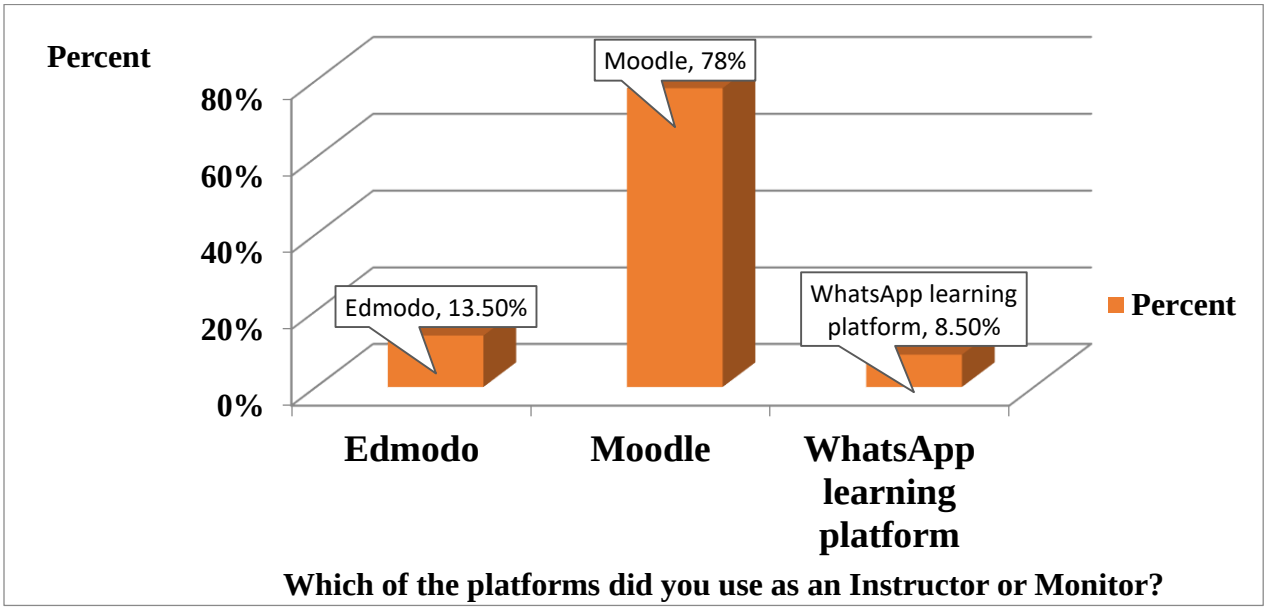


Figure 4: Learning Platforms Reported to have been Used by Teachers
Source: (Field Data, 2021)

From Figure 4, the results shows that 136(78%) out of 174 teachers use Moodle platform as their online teaching and learning platform, 23(13.5%) and 15(8.5%) use Edmodo and WhatsApp as their teaching and learning platform respectively. From this background of the respondents, the researcher proceeded to the pedagogical, technical and social affordances of Moodle usage as a means of addressing the research questions of this study.

Research Question 1: What influence does pedagogical affordance have on teachers' usage of the Moodle platform?

This research question seeks to examine the influences of pedagogical affordance of Moodle platform usage among SHS teachers. The Table 1 will be used to present the findings of the study.

Table 1: Pedagogical affordance of Moodle platform usage among SHS teachers

Variable	Odds ratio	Std. Err	Z	p>(Z)
Accomplishing teacher's tasks as an administrator of the Moodle platform helps teachers to feel that they have contributed effectively and efficiently to the improvement of students' academic performance	0.402377	0.253991	-0.14	0.149
I was able to teach well on Moodle platform	1.691364	0.965932	0.92	0.357
The methodology I applied in teaching my online students helped them to understand the lesson easily	1.25605	0.767840	0.37	0.709
Teaching online helped me accomplished a higher quality work than teaching in a regular classroom.	1.093491	0.615905	0.16	0.874
Teacher involve students in online teaching and learning process.	1.310613	0.629630	0.56	0.573
Constant	3.013057	1.557375	2.13	0.033
Goodness of fit of the model				
Number of Observations				200
LR Chi^2 (5)				2.83
Prob > Chi^2				0.7256
Pseudo R^2				0.0134
Log likelihood				-103.965
Number of Groups				3
Hosmer-Lemeshow ch^2 (1)				0.25

Source: (Field Data, 2021)

Table 1 shows the logistic regression model of pedagogical affordance of Moodle usage of teachers. The findings indicates that responses on teachers' ability to teach via Moodle platform negatively affected the pedagogical affordance of teachers at a statistically non-significance of 30%. This implies that for those who were able to teach via Moodle, a lower probability or odd ratio (1.69) of pedagogical affordance was obtained than those who were not able to teach via Moodle. This finding contradicts earlier studies by Moore, Morales and Carel (2013) which argued that the use of Moodle platform helps teachers to teach well as they get access to most recent documents and information for their students easily through technology. Moreover, responses obtained on teachers' ability to accomplish their tasks as administrators of Moodle platform, thus helping them to feel that they have contributed effectively and efficiently to the improvement of students' academic performance positively affected the pedagogical affordance of teachers at a statistically significance of 10%. This finding was in confirms the findings of Cornell (2002), Said, Forret and Eames (2013), and Tahir, Said, Daud and Ali (2014) through which they recommended

that administrators should encourage active participation on the platform instead of acquiring knowledge passively

Research Question 2: How can technical affordance influence teachers' usage of the Moodle platform?

This research question tends to examine how technical affordance influences teachers' usage of the Moodle platform. The findings of this research question are presented in Table 2.

Table 2: Technical Affordances of Moodle Usage of Teachers

Variable	Odds ratio	Std. Err	Z	p>(Z)
Teacher is able to upload my profile for my students	1.542038	1.122814	0.59	0.552
Moodle helps teachers to teach large number of students effectively	0.6630051	0.757337	-0.36	0.719
I was able to upload my course outline to the Moodle platform so my students could get access to it.	5.804976	6.391277	1.60	0.110
Moodle helps teachers to provide students with additional information	0.046571	0.0502921	-2.84	0.005
I was able to give assignments and project works to my student easily through the use of Moodle.	17.59464	14.03304	3.60	0.000
I was able to grade my students at the end of the Course easily using Moodle.	2.603778	2.349784	1.06	0.289
Moodle usage provides an easy way of providing additional materials to my students	19.4939	18.05993	3.21	0.001
Moodle usage provides teachers with an easy way of giving prompt feedback to my students.	0.5565693	0.5791984	-0.56	0.573
Moodle helps teachers to assess students' academic performances	1.026449	0.9143865	0.03	0.977
Constant	0.2221504	0.0994035	-3.36	0.001
Goodness of fit of the model				
Number of Observations				200
LR Chi^2 (9)				105.33
Prob > Chi^2				0
Pseudo R^2				0.4998
Log likelihood				-52.717
Number of Groups				5
Hosmer-Lemeshow chi^2 (3)				8.77

Source: (Field Data, 2021)

https://www.eajournals.org/ https://doi.org/10.37745/bje.2013

The results of the logistic regression model in Table 2 presents the technical affordances of Moodle usage among Teachers. Firstly, responses obtained from teachers being able to provide their students with additional information, a positive effect was obtained on the technical affordance of Moodle usage at a statistical significance of 0.5%. This implies that teachers who were able to provide their students with additional information had a higher probability or odd ratio (0.046) of technical affordance of Moodle usage than those who were not able to provide additional information to their students. Also, the results on the ability of SHS teachers to give additional materials to their students easily through the use of Moodle also showed a positive effect on the technical affordances of Moodle usage at a statistical significance of 0.1%. This result implies that, SHS teachers who were able to give additional materials to their students using Moodle had a higher probability or odd ratio (19.49) of technical affordance than those who were not able to use the Moodle platform to give additional information to their students. The findings of the study confirm the findings Collis and Moonen (2001), Goodyear *et al.* (2001), Marra (2002) and Salmon (2000), that the use of Moodle help teachers to get access to most recent documents, information and add additional information for their students easily. Again, findings from teachers' ability to give assignments and project work to students on time through the use of Moodle also had a positive influence on the technical affordance of teachers. This is supported by an earlier study by Hogan (2009) and Taylor and Maor, (2000) who came out with the findings that technology offers numerous academic benefits to its users and most institutions and this include teachers in the various institutions' ability to give more assignments and project works as well monitor users in the proper engagement in a dynamic learning environment. To ground this to a teaching philosophy, Taylor and Maor (2000) through constructivist survey called the "Constructivism Online Learning Environment Survey" confirms that some tools found on the Moodle platform designed enables and affords instructors to conduct effective assessment and monitor users that is students in a proper engagement in dynamic learning environments. In contrast to these findings, Marra (2002) is of the view that very little exercises and assignments are given in the context of online learning.

Research Question 3: How can social affordance influence teachers' usage of the Moodle platform?

This research question tends to examine how social affordance influences teachers' usage of the Moodle platform. The findings of this research question are presented in Table 3.

Table 3: Social Affordance of Moodle Usage of SHS Teachers

Variable	Odds ratio	Std. Err	Z	p>(Z)
In my teaching via Moodle platform, users' participation among themselves encouraged me to deliver effectively	2.38475	1.3715	1.51	0.131
The instruction I gave to my students on how to use the Moodle platform facilitated their discussions in my group and helped me to accomplished their tasks	0.323698	0.25118	-1.45	0.146
I was able to connect with my students outside the classroom at any time and everywhere	0.690929	0.425859	-0.60	0.549
In my group, we agreed on how to work together	1.217855	0.724529	0.33	0.740
I enjoyed online discussions with my students	0.956467	0.481475	-0.09	0.930
Constant	5.484341	3.210086	2.91	0.004
Goodness of fit of the model				
Number of Observations				200
LR Chi^2 (5)				4.58
Prob > Chi^2				0.4697
Pseudo R^2				0.0217
Log likelihood				-103.093
Number of Groups				3
Hosmer-Lemeshow ch^2 (1)				3.47

Source: (Field Data, 2021)

The results of the logistic regression model in Table 3 presents the influences of social affordance of Moodle usage of SHS teachers. From the Table 4, it can be fund that, results on teachers' ability to teach effectively as a result of users participating actively on Moodle platform affected the social affordance of teachers positively at a statistical significance of 10%. This implies that, teachers who were able to deliver effectively had a higher probability or odd ratio (2.385) of social affordance than those who were not able to deliver effectively. Again, instructions given to students on Moodle usage had positive effects on the social affordance of teachers at a statistical significance level of 10%. This implies that, as compared to teachers who were not able to give instructions on Moodle usage to students, a higher probability or odd ratio (0.324) of social affordance was obtained.

CONCLUSION AND RECOMMENDATIONS

This study shows that there are three types of Moodle affordances that SHS teachers need to exhibit some degree of competencies in order to ensure effective and efficient use of the Moodle platform. It can be deduced from the findings that majority of the SHS teachers use online learning platforms to teach their courses during the COVID-19 era but Moodle usage dominated the online learning platforms used by SHS teachers in the Greater Accra region of Ghana. From the logistic regression model, there was no statistically significant influence of SHS teacher's pedagogical affordance on Moodle usage in the Greater Accra region. Moreover, the findings showed a statistical significance influence on SHS teacher technical affordance and Moodle usage specifically on SHS teachers being able to provide their students with additional information as well as SHS teachers are able to give assignments and project works to student easily through the use of Moodle. It is recommended that frequent in-service training and refresher courses on the pedagogical aspect of the Moodle platform should be organized for Senior High School teacher to enable them gain mastery and competencies in pedagogical aspect of Moodle usage. Furthermore, the National Council for Curriculum and Assessment should orient teachers on the use of Moodle to enable SHS teachers make quality instructional decisions and choices regarding the use of Moodle platform in facilitating teaching and learning.

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