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The Impact of Learning Management System on Student Academic Performance of Computer Science Department of Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author SC was involved in the design and coding of the platform. Meanwhile the site setup was done by both authors. Authors UNI and SC was involved in the design of the questionnaire. Collection of data, the statistical analysis and drafting of the manuscript was done by author UNI. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: This study is aimed at exploring the impact of a Learning Management System (LMS) on the academic performance of the Computer Science Department, Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria.
Study Design: We adopted a hybrid of reliability test study and questionnaire.
Place and Duration of Study: Higher National Diploma (HND) in Computer Science Department,

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Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria for 1st semester of 2021/2022 academic session.

Methodology: The study was conducted with 60 students, which is made up of 34 males and 36 females. This respondent was given a test at the commencement of the course and was also tested after using the LMS for learning, their pretest and posttest scores were recorded. Furthermore, out of the 60 questionnaires that were served to the participants and 53 numbers were retrieved, 88.30% of the response. Out of the remaining 7 respondents, 4 were not retrieved and 3 were not correctly filled. The questionnaire has questions to which participants are expected to respond on a measure of five-point Likert scale. The Likert scale was assigned numerical values of 1,2,3,4, and 5 respectively from the negative judgment to the positive opinion.

Results: From our reliability test on the data, it showed that the students had an average gain score of 12.5. This signifies that, on average, the participants who used the LMS platform had 12.5 points higher during the posttest than they had during the pretest. This reliability test score for the student measures their consistency on both tests. A score of 1 was used to indicate reliability while 0 is not reliable. From our data, it showed test score reliability for students to be above 0.95, indicating that student scores were consistent. Meanwhile, on the respondent's thoughts and feelings about the LMS, With LMS, the student can understand clearly the important learning goal with 4.06, with LMS students who say they are aware of important course during for completion of the course 3.81, 3.77 can easily be guided on the course title while using LMS and 3.92 can easily get abreast of how the task is to be performed to enable the student to learn. The LMS's impact on students' social interaction, showed that the new system has assisted student-teacher relationships and has made them communicate and ask questions freely from people in their area of study. It also showed that students' confidence and interaction with their peers have grown and their online discussion horizon has improved their social interaction.

Conclusion: The LMS has improved the academic performance of students of the Computer Science Department, Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria. Their scores were higher compared to what they used to be and meanwhile, the duration of the study also significantly improved. They are now aware of the reason for collaborative and academic study.

Keywords: Learning Management System (LMS); student; academic; performance.

1. INTRODUCTION

The fallout from Covid 19 pandemic changed the way of life of people in the world. And educational institutions such as Federal Polytechnic Kaura Namoda were totally closed down without any academic activities since every student vacated the institution. Globally, teaching and learning are shifting from face-to-face communication to virtual classes. The Federal institution in Nigeria was worsted affected in the country which has necessitated the government in preparing to equip all federal institutions with virtual classes facilities. This is because the student of that session was very poor, as they stayed at home for months without any academic activities.

In the framework of this paper, Learning Management System (LMS) is a platform that facilitates teaching and learning towards improving the student experience. [1] sees LMS as a virtual space where student manages their registered courses. They further assert that it includes the management, learning, and teaching of students. LMS galvanizes the communication between students, teachers and the resource materials usually facilitated by Internet services [2]. The LMS is an application software that helps in the administration, documentation, tracking, course registration, learning, and developmental programs to improve user activities [3].

Generally speaking, LMS avails teachers the platform to prepare and teach the student at the same monitor their participation and performance [4]. They went further to list some of the interactive features like threaded discussion, discussion forums, and video conferencing as the basic LMS features. Learning Management System makes its entrance in the late 1990s, and the pandemic in 2020 really accelerated its adoption by every institution of learning. Although LMS started in the educational sector, most organizations have started using it for professional training and marketing of products. LMS is an online classroom that offers teachers and learners an opportunity to interact without face-to-face communication [5]. He emphasized

that the structure promotes professional training, collaboration, and discussions for effective knowledge delivery. The use of LMS permits the learner and teachers an independent experience [6].

LMS is a learning model that depends on Internet technology for teaching and learning to take [7]. They affirmed that we have reached the point when every institution of learning will have to adopt LMS which provides teachers and learners with tools for improving the teaching and learning experience. This LMS offers the teachers to avail their learning resource to students, who are in their comfort zone access these materials. Furthermore, LMS provides an interactive features such as teaching, learning sharing of files, and tracking of students' performance.

Meanwhile, notwithstanding the importance of LMS, it does not come without any cons. The implementation of LMS is very expensive, from design to implementation. Even the maintenance of this facility is costly because there is a need to ensure it is kept running on the internet on the side of management. And at the part of the student, there is a need constantly subscribe to internet services which are expensive in this part of the world since these facilities are not provided. Thus, for satisfactory usage of the LMS, both the teacher and learner of the Computer Science (CS) Department Federal Polytechnic Kaura Namoda should be provided with high-speed internet to assist the LMS for efficient productivity. Considering these barriers is to ensure the full usage of this system after implementation because if not used after its implementation, the system will be considered a failure.

The need to develop LMS for the Computer Science Department is a welcoming development since the institution does not have such a structure. The Web-based interactive tool like LMS will be applauded by the student as it is fun to work and surf the internet. So, it creates an opportunity for those students who do not ask questions in the class to do so thereby following up with the courses [8].

Furthermore, [9] proposed a customized web-based LMS called KKUMEDX which they submitted that it is user-friendly. useful for the student, and has improved the quality of learning for the student. In another hand, [10] examines the implication of LMS on Islamic higher education, although they admitted that LMS is needed for improving student performance, they admitted that there is a weakness on student's part since they could not be able to access the uploaded course contents due to poor network. Learning Management System gave the student a satisfactory measure of both the usability and performance of both the student and educator [11]. Lack of confidence and independence is also some of the problems identified by [12], and [13] confirm that the learning system also supports the management of lecture delivery, tracking virtual learning, and planning and examination management respectively. It was observed [14] that students can easily study on their own using the LMS which has encouraged their learning capabilities. [15] and [16] after their investigation highlighted the advantages and disadvantages of using online learning in higher education towards achieving the educational goal.

2. MATERIALS AND METHODS

2.1 Research Design and Set up

For efficient data collection of this project, we adopted a hybrid of reliability test study and questionnaire with the student of Computer Science Department Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria with a population of about 330. This provides opportunity for both face-to-face interview and online interview in case of distance and time.

2.2 Participants

These are persons who contributed during the questioning and their responds recorded as part of data for analysis. This study was conducted with 60 students from HND1 and HND2 respectively. This group of students are in first semester of the institution 2021/2022 academic calendar, the Table 1 describes these participants more.

2.3 Data Sources and Data

The resource through which the researcher collected data which forms the bases for his study is data source. These include primary and secondary sources from both online administered questionnaires and face-to-face questioning of respondents. Ethically, the participants were rightly notified through face-to-face chat in a class room. It is important since some of the participants are still under 18 years who are still under the guardians of their parent. Meanwhile, the respondents were promised that their information is confidential and protected by us.

Table 1. Demography of respondents

Variable	Features	Frequency	Percentage (%)
Gender	Male	34	56.67
	Female	26	43.33
Age	16 – 24	18	30
	25 – 30	38	63.33
	31 and Above	4	6.67
Participants	Cs Student	60	100

The design of the questionnaire was based on the effectiveness, attitudes towards the LMS, satisfactory test, perceived usefulness and ease of usage. The constructed instrument for data collection is based on the following; user interface, online (classes, registration, quizzes, and examination respectively). Meanwhile, each of the classes: HND1 and HND2 students were allowed to use the LMS to study, do assignments, write quiz, and final exams which are all objective questions for just 2 course each. These subjects include COM 311 (Operating System I) and COM 312 (Database Design I) for HND1; COM 412 (Project Management) and COM 413 (Compiler Construction) for HND2 respectively. Each lecture topic allows the student a minimum 3 hours study which is about 70% access completion of the topic. The quiz is made of 40 objective questions, while the exams have 60 questions. For a student to pass the course, he most score 40% of both the quiz and final exams. There are 6 topics for each of the courses available for the student to complete making a minimum of 18 hours study. The resource materials are basically text which do not consume much band weight for upload and downloads.

Furthermore, the collection of data base on their experience during LMS usage, the questionnaire was designed. The total number of 60 questionnaires were served to the participants and 53 numbers were retrieved, being 88.30% of the response. Out of the 7 respondents, 4 were not retrieved and 3 were not correctly filled. The questionnaire has questions where participants are expected to respond on a measure of five-point Likert scale ranging from Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA). The Likert scale were assigned numerical value of 1,2,3,4, and 5 respectively from the negative judgement to positive opinion.

3. DATA ANALYSIS

3.1 Pretest and Posttest Data

The data used for this analysis is in two parts, the first is pre-test and post-test data. While the former is data collected from the participant before the start of the course and the latter is collected after the student has completed the course using LMS. Our reliability test on the data showed that the students had an average gain score of 12.5. This signifies that, on average, the participants who used the LMS platform had 12.5 points higher during the posttest than they had during the pretest. This reliability test score for the student measures their consistency on both tests. A score of 1 was used to indicate reliability while 0 is not reliable. From our data, it showed test score reliability for students to be above 0.95, indicating that student scores were consistent. This implies that the reliability is high and that LMS is a reliable system for learning in CS students at Federal Polytechnic Kaura Namoda.

3.2 Outcome of the LMS on Student

During the collection of data to test for the effect of LMS on students, the questionnaire data in Table 2 depicts their feelings. It shows that an average of 3.87 agrees that LMS ensures students understand and can interact on important course topics to enable them to agree and disagree on it, LMS enables students to keep participating in productive discussions with an average of 3.89, with 3.83 saying that they can clearly comprehend and interact on important course topics. It is shown that 4.25 students can easily comprehend the instructions on how to use LMS, 3.91 can focus on the important discussion to assist them to learn using LMS, and the student is encouraged to make use of LMS for better understanding of the new concepts with 3.45 average. With LMS, the student can understand clearly the important learning goal with 4.06, with LMS students who

say they are aware of important course during for completion of the course 3.81, 3.77 can easily be guided on the course title while using LMS, and 3.92 can easily get abreast of how the task is to be performed to enable the student to learn. From above, the LMS is an effective tool as the student had the full support of the system and this was revealed through their feelings as displayed by the table.

3.3 Student Social Interaction among Peers and Instructors

Table 3 depicts the social interacting effect of using the newly developed LMS by students of Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria. It showed that 3.49 opine that, the new LMS have assisted their relationship with their teachers, 4.15 accepts that the system has made them communicate and ask then feel free to ask questions and get understandable answers from people in their area of study. Meanwhile, their confidence and interaction with other student have grown with an average of 4.11 and 3.64 agreed that their online discussion horizon have improved their social interaction, 3.94 accepted that the LMS have assisted them in online discussion making them gain a sense of association, while 4.23 agreed that their social discussants have really increased.

Table 2. Result of LMS on student

Questions	SA (5)	A (4)	N (3)	SD (2)	D (1)	Total	Mean
I can identify areas of agreement and disagreement title of the course to assist students learn	12	27	11	1	2	205	3.87
The system assists in engaging students to keep participating in a productivity discussion	11	28	12	1	1	206	3.89
I can clearly comprehend and interact with important course titles	9	31	10	1	2	203	3.83
I can easily understand the instruction on how to use LMS	21	27	3	1	1	225	4.25
I can focus on important discussions in a way it assists me to learn using LMS	11	31	8	1	2	207	3.91
I encourage the student to make use of the LMS for a better understanding of new ideas	12	28	7	3	3	183	3.45
I can comprehend more clearly the vital learning goal	16	26	9	2	0	215	4.06
I am aware of the important course during for completion	9	32	7	3	2	202	3.81
I can easily be guided on the course title for clarity	11	29	7	2	4	200	3.77
I can easily get abreast of how the task is to be performed to enable me to learn	14	26	9	3	1	212	3.92

Table 3. Result of social effect of LMS on student

Questions	SA (5)	A (4)	N (3)	SD (2)	D (1)	Total	Mean
Does the system assist your relationship with your teacher	10	23	8	8	3	185	3.49
Did LMS make you feel free to communicate with people	21	24	4	3	1	220	4.15
Did LMS provide confidence in interactions and communication with other students	18	25	8	2	0	218	4.11
Did you think that online communication is best for social interaction	15	24	9	5	0	193	3.64
Does LMS assist you in the online discussions to give a sense of association	12	29	10	1	1	209	3.94
Would you say you have more discussants using LMS	20	29	2	1	0	224	4.23

4. CONCLUSION

The paper has explored the impact of the Learning Management System on the academic performance of students of the Computer Science Department, Federal Polytechnic Kaura Namoda, Zamfara State by performing a reliability test using the pretest and posttest which showed a significant increase in the learner's experience after the use of the LMS. Meanwhile, the student was able to understand the course topics and focused on them have that they can stay for a longer period on the platform than they can stay in the classroom. It has also improved their collaborative instinct which is one of the tools for academic excellence. In our further work, we are going to be looking at other effects of the LMS experience on students and teachers.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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