Students' Motivation and Effective Use of Self-regulated Learning on Learning Management System Moodle Environment in Higher Learning Institution in Nigeria

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Abstract—**This study aims to apply the Motivated Strategies for Learning Questionnaire (MSLQ) established by Pintrich to determine the level of students' motivation and perception and expose them to a Moodle to test the successful use of Self-Regulated Learning on the Learning Management System Moodle Environment. Ninety-six undergraduates (48 in the experimental and 48 in the control group) took part in this quasi-experimental study. The instrument (MSLQ) was tested using Cronbach's Alpha with a reliability coefficient of 0.8 (80%). The data gathered through the MSLQ were analyzed using descriptive statistics. While the data through the achievement test were analyzed using an independent sample t-test. The findings revealed that utilizing Moodle as a learning management system enhances undergraduates' ability to learn independently and motivates them to work hard. It also said that the student's perception of the Learning Management System was positive.**

Index Terms—**Higher learning institution, motivation, moodle, learning management system, self-regulated learning.**

I. INTRODUCTION

Many educational institutions have used various technologies in their educational environments over the last decade to improve teaching and learning processes [1], [2]. In today's world, these institutions compete on the quality of technology they deliver to their learners. Many educational institutions use a Learning Management System (Learning Management System) to motivate and satisfy students and organizational needs, which is an example of advanced learning technology's effectiveness [3]. To support learning, Learning Management System can be implemented into various forms of students' learning activities [4], [5]. A learning management system (Learning Management System) is a computer program that assists and manages students during the educational process [6]. It can be recalled that an e-learning platform is one of the most essential and distinctive instruments for web-based distant learning [7]. Teachers, helpers, and students can use this technology to get all the materials they need to perform educational activities online [6]. It provides a variety of platform functions to aid the learning process, including the ability for teachers to host

multimedia educational content.

Furthermore, the Learning Management System aids students' self-regulated learning strategies in monitoring their capacity to utilize the given resources independently [7]. The Learning Management System provides instructional activities in a form that allows instructors and assistants to track students' progress [6]. As a result, higher education has adopted Learning Management System to provide these benefits to its students [8]. Several commercial Learning Management systems with a wide range of options and features have been established at high educational institutions to motivate students in the teaching and learning process [9]-[11].

Any undergraduate curriculum should aim at equipping students with the knowledge and skills they need to be independent, productive members of society who can contribute to the country's advancement. In Nigeria, face-to-face instruction, such as lectures with accompanying lecture notes, still dominates undergraduate education [9], [12]-[14]. With the introduction of technology-assisted instruction, switching from the prior approach to a technology-driven is crucial [15]. The recent Covid-19 pandemic has mainly inflicted several losses to the global and Nigerian educational foundations [16], [17]. The epidemic forced school closure for so many months, negatively impacting how teaching was carried out and the entire educational system in Nigeria.

Contrary to other countries around the world, where the necessary technological infrastructure has already been put in place, Nigeria's utilization of technology, such as the Learning Management System with effective use of self-regulated learning to improve undergraduates' knowledge, was inadequate even before the pandemic [14]. Therefore, Nigerian high education institutions must embrace Learning Management System to address the shortcomings to bridge the loss and prepare for future incidences. There is a need to shift from the continued use of traditional teaching methods, crammed lecture halls, pandemics, and resistance to change brought in by innovation presented by technology for teaching and learning, such as self-regulated learning strategy. This will go a long way in making the students independent learners by effectively using self-regulated learning strategies.

The application of innovation in e-learning, with the rise of new technology for teaching and learning, makes undergraduates of the 21st century capable of independently acquiring the cumulative required knowledge, life, and literacy skills [18]. The lecture mode of instruction, which is

highly prevalent among undergraduate courses in Nigeria and mainly encourages rote learning, should be replaced by the use of a learning management system to develop self-regulated learning strategies [18]-[20]. According to [3], [16], Learning Management systems are now self-evident and are being offered in many universities worldwide and are an integral part of teaching-learning.

For this reason, several colleges and universities have increased their usage of learning management systems [21] [22]. The social cognitive and interactive theories enhance the interactive learning environment, both of which emphasize student-centred learning [22], [23]. Many studies show that adopting digital technology with the Internet, or other growing technology, does guarantee academic advancement or enhanced learning [3].

The relevance of students' self-regulated learning techniques (Self-Regulated Learning) in teaching and Learning cannot be over-emphasized. The e-learning content must be engaged in different ways [24]-[26], which enhances Self-Regulated Learning. The ability for Self-regulated Learning is an essential factor in student achievement, especially in an e-learning environment [27]; because students will be an effective learner by establishing specific goals, choosing and adapting pedagogical approaches, and providing feedback on their effectiveness themselves [22], [26], [27]. Thus, Self-Regulated Learning refers to the processes and active acts used to obtain an individual's essential information and abilities to attain their objectives [13]. Self-Regulated Learning has also been identified as a process that students use across various domains and settings [13]. This means self-regulated Learning is the ability to set goals, instruct themselves, and reinforce themselves regularly. Learners can design, monitor, and control their Learning [2], [28].

Multiple empirical studies have examined how specific Self-Regulated Learning constituents may alter due to contextual variances [2], [28]. Different outcomes were achieved when comparing fields of research and Self-Regulated Learning levels.

Self-Regulated Learning is reported to have a favourable impact on Student's academic achievement [29]. Previous findings have concluded that students' motivation and Self-Regulated Learning have a positive association [28], [30]. A student with a higher Self-Regulated Learning may have a more significant academic achievement [31], [32]. Hence, applying technological-driven approaches to learning with self-regulated learning strategies used in modern trends could positively enhance learner motivation and learning achievement compared to traditional face-to-face courses teaching in Nigerian high learning institutions.

The current study evaluates motivation and Self-Regulated Learning approaches to address this gap across two academic fields. This study examines the students' basis and effective use of Self-Regulated Learning in a learning management system that helps them achieve their educational goals.

II. LITERATURE REVIEW

According to research, students' attitudes toward teaching-learning, as well their perceptions of the learning management system environment, motivation to study, and use of learning strategies such as Self-Regulated Learning, play a critical role in aspiring to learning situations, particularly in an online environment [22], [23], [33], [34]. As a result, students' levels of motivation and learning styles may vary depending on the course. To seek help in fixing a problem, students also require more synchronous and asynchronous participation. Other systems, on the other hand, may not require teamwork or support tactics because students enjoy learning successfully and require more motivational drive. Other methods, however, are centred on various instructional goals, such as problem-based learning and research-based projects, which appear to increase motivation and allow learners to display diverse learning styles.

A. The Status of Higher Institutions of Learning in Nigeria

The 21st century has brought about tremendous changes and improvements in higher education thanks to new technology and its hybrid pedagogical approaches that support teaching and learning in the classroom [13]. However, this revolution has not been fully utilized in higher education, particularly in Nigeria and other developing nations [4], [18]. More specifically, the ongoing use of a teaching strategy that does not promote undergraduate students' motivation has hurt the students and the way of delivery. As a result, traditional teaching methods in higher education are frequently criticized for their ineffectiveness and lack of enthusiasm. As a result, educational institutions all around the world have thought of a variety of instructional methods to boost undergraduate students' motivation [35]-[37].

Because it can assist students in acquiring the principles of teaching criticism, it might affect their motivation to ensure good teaching and learning delivery [23]. To improve motivation and self-regulated learning among undergraduate students using learning management systems, facilities like computers and high-speed Internet connectivity should also be made available for teaching and learning processes [3], [38], [39].

Nevertheless, some issues make it difficult for underdeveloped nations to establish learning management systems incorporating a learner-centred approach. [12], [13], [40] it is contended that barriers to adopting new technologies in the classroom in many developing nations include a lack of financial resources, infrastructure, support for human capital management, a lack of digital literacy, and behavioural and environmental factors. Creating an environment in the classroom that fosters student motivation and self-regulation of learning in the teaching-learning process can go a long way toward encouraging learning [28], [39]. Similarly, it is vital to utilize a learning management system that encourages student-centred approaches, online learning, and integrated classroom teaching technologies to increase students' enthusiasm. This is because Nigeria's high institutions are overcrowded.

Therefore, integrating in-person and online learning, such as the flipped classroom, is widespread in educational technology [40], [41]. Through self-directed learning, learners can be motivated to use mixed learning frameworks [3], [39]. Students will become more creative if they

participate in a learning environment that combines in-person and online learning at their convenience [22]-[43]. According to another study, the learning environment is crucial to the learning process because it gives students the resources, they need to instruct others in the classroom. Because it is believed that students will play a large part in establishing the learning environment in our classrooms, the role of a student in mixed learning in the school is essential [44].

Since Self-Determination Theory (SDT) plays an important role on students' motivation. The Effective use of self-regulated learning, a component of sociocultural motivation theory has been widely used in schools to improve evidence-based practice for teachers. It states that meeting three basic psychological requirements for relationships, skills, and autonomy positively affects students' motivation to participate in classroom-based learning activities. SDT has proven to be a practical theory for explaining why certain primary classroom-based activities and variables have a more significant impact on student participation than others [45]-[47]. The Self-Determination theory emphasizes the instructor's support and structure in developing flexible learning and improving motivation and quality outcomes [48]. Instructors must also realize the essentials and applicability of their studies to the current situation, according to the notion [21], [27]. On the other hand, teachers have been noted to play an essential role in inspiring students to use Learning Management Systems by supporting their technological efficacy, promoting material comprehension, encouraging collaborative learning, and motivating them to overcome technical difficulties [30], [36].

B. Effectiveness of Self-Regulated Learning on the Use of Learning Management System Moodle

Self-regulated learning has been more popular among students over the last century, with students at higher education institutions being observed practicing self-monitoring and reflecting on their academic progress. Students' desire to acquire knowledge and continuous learning leads to self-regulated learning.

In this regard, a Learning Management System can play an essential role in providing students with a platform where knowledge is freely available, and people can engage in various self-regulation processes to be educated. Self-regulation, according to [49], is a desire among students that leads to the acquisition of new knowledge, but it cannot be carried out without sufficient guidance. Moodle, a learning management system, is one such platform where students may obtain help with their studies. This platform, on the other hand, allows students to select their subject of study and groom themselves through virtual mentoring. Teachers also assist them in developing self-control.

C. Learning Management System Moodle Influences Students' Motivation and Use of Self-Regulated Learning Strategies

One of the most important parts of achieving success in a higher institute of learning educational background is self-regulated learning. In the learning process, self-regulation relates to students' ideas about their abilities to achieve something and taking the appropriate action, as well

moderating behaviours that may help them reach academic goals [48]. Students are frequently observed doing self-monitoring and reflecting on their academic achievement in this area. Students' desire to acquire knowledge and continue learning leads to Self-Regulated Learning. Another component that drives students to learn online is "Self-Regulated Learning" (Self-Regulated Learning), which, together with online motivation and time, has been shown to enhance student attrition in online learning environments.

Furthermore, Self-Regulated Learning's studies in traditional contexts has consistently shown that learners who frequently employ self-regulated learning strategies perform better academically, as stated by [16]. Self-regulated learners are classified as "motivational," "behaviourally," and "metacognitively" active students in their own learning process, according to him, he also discussed the importance of Self-Regulated Learning and the advantages of employing actual learning behaviour-related measurements instead of basic frequency measures. Students can be free in this regard, and people can engage in various self-regulation processes to be educated. Self-regulation is an urge among students that leads to learning new knowledge, according to [49], yet it cannot be carried out without sufficient direction. Moodle, a learning management system, is one such platform where students may obtain help with their studies. This is an example of a platform where students can select their subject of study and nurture themselves with virtual supervision. Teachers also assist them in developing self-control.

D. Perception of Undergraduate Students on Learning Management System Moodle in Promoting Their Motivation on the Use of Self-regulated Learning

Self-regulated learning is used by students to organize and govern their mental capacities into task-related learning skills [45]. A continuous process of self-monitoring and self-direction toward a learning characterized by self-regulated learning. This continuing process includes self-checking progress, self-reflection on outcomes, and the ability to limit attempts at failure. To be self-regulated, students must be aware of their mental processes and be motivated to participate in their learning process [45]. Self-directed learning approaches can be used to achieve this. cognitive, metacognitive, behavioral, and motivational components of self-regulated learning techniques. It enables people to actively engage with themselves and their environment. Self-regulated learning processes include planning, critical thinking, peer learning, effort regulation, and goal orientation. Self-regulation is desired because students who utilize self-regulated learning strategies outperform those who do not in digital learning [21].

Another component that drives students to learn online is "Self-Regulated Learning" (Self-Regulated Learning), which, together with online motivation and time, has been shown to enhance student attrition in online learning environments. Furthermore, as mentioned earlier, Self-Regulated Learning studies in traditional contexts have consistently shown that learners who frequently employ self-regulated learning strategies perform better academically. Self-regulated learners are classified as "motivational," "behaviorally," and "metacognitively" active students in their own learning

process, according to him [5]. The usefulness of Self-Regulated Learning was demonstrated in his work, as well as the advantages of employing actual learning behavior-related metrics rather than basic frequency measures.

III. OBJECTIVES OF THE STUDY

The objectives of the study are to:
1) Determine the effectiveness of learning management system and Moodle (Learning Management System) on Self-regulated learning.
2) Determine the extent to which Learning Management System influences students' motivation and use of Self-Regulated Learning strategies.
3) Determine how undergraduate students perceived learning management system and Moodle in promoting their motivation on the use of self-regulated learning.

IV. METHODOLOGY

The research methodology employed quasi-experimental design. The study included 96 students from Borno State University's faculty of Art and Education at the 300 level. The students were divided into two groups, each with 48 students, and studied in a mixed learning environment that included both online and traditional face-to-face instructions. The experimental and control groups were allocated 48 participants to each at random. The experimental group was exposed to treatment whereas the control group was given traditional face-to-face instruction supplemented with Facebook learning. Two instruments were employed. Paul Pintrich's (1993) Motivation Strategies for Learning Questionnaire (MSLQ) with reliability coefficient (Cronbach's Alpha) of 0.8 (80%) and an achievement test was adapted as research instruments in this study. A pre-test and post-test were given before and after the intervention. The MSLQ is made up of 27 Self-Regulated Learning items with a 5-point Likert scale. Independent sample t-test was used to analyze level of achievement for using self-regulated learning. While descriptive statistics was used to analyze the students' levels of motivation of the learning management system.

V. RESULTS

Paul Pintrich's Motivation Strategies for Learning Questionnaire (MSLQ) was utilized in this study to collect data on self-regulated learning from the participants. The information gathered was evaluated with descriptive statistics. The MSLQ is made up of 27 Self-Regulated Learning items that are rated on a 5-point Likert scale. Descriptive statistics and an independent sample t-test were used to collect and

analyze data. The data is summarized in the table below by Mean, Standard Deviation, and Percentage.

Table I shows undergraduate students' responses based on self-regulated learning when exposed to Learning Management System Moodle. The result revealed that most respondents had a positive perception of using the Learning Management System Mood, as indicated by the grand mean of 3.50, which is about 70%.

TABLE I: INDEPENDENT SAMPLE T-TEST OF PRETEST AND POSTTEST OF CONTROL AND EXPERIMENTAL GROUPS IN SELF-REGULATED LEARNING AMONG THE UNDERGRADUATE STUDENTS AT BORNO STATE UNIVERSITY

Self-Regulation Learning	Descriptive statistics		
	M	SD	%
During class time I often miss important points because I'm thinking of other things.	3.54	1.232	70.72
When reading for this course, I make up questions to help focus my reading.	3.40	1.326	68.00
When I become confused about something I'm reading for this class, I go back and try to figure it out.	3.50	1.354	70.00
If course materials are difficult to understand, I change the way I read the material.	3.48	1.389	69.52
Before I study new course material thoroughly, I often skim it to see how it is organized	3.57	1.316	71.44
I ask myself questions to make sure I understand the material I have been studying in this class	3.45	1.261	68.96
I try to change the way I study in order to fit the course requirements and instructor's teaching style.	3.48	1.206	69.52
I often find that I have been reading for class but don't know what it was all about	3.47	1.186	69.36
I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.	3.49	1.190	69.84
When studying for this course I try to determine which concepts I don't understand well.	3.56	1.212	71.20
When I study for this class, I set goals for myself in order to direct my activities in each study period.	3.54	1.199	70.80
If I get confused taking notes in class, I make sure I sort it out afterwards.	3.55	1.225	71.04
I usually study in a place where I can, concentrate on my course work.	3.51	1.239	70.24
I find it hard to stick to a study schedule.	3.50	1.135	70.08
I have a regular place set aside for studying.	3.56	1.144	71.20
I make good use of my study time for this course.	3.51	1.213	70.24
I make sure I keep up with the weekly readings and assignments for this course.	3.64	1.242	72.72
I attend class regularly.	3.59	1.186	71.84
I often find that I don't spend very much time on this course because of other activities.	3.39	1.264	67.84
I rarely find time to review my notes or readings before an exam.	3.42	1.330	68.32
I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.	3.41	1.259	68.24
I work hard to do well in this class even if I don't like what we are doing.	3.40	1.232	68.00
When course work is difficult, I give up or only study the easy parts.	3.38	1.290	67.52
Even when course materials are dull and uninteresting, I manage to keep working until finish.	3.39	1.235	67.84
When studying for this course, I often try to explain the material to a classmate or a friend.	3.51	1.213	70.24
I try to work with other students from this class to complete the course assignments.	3.64	1.244	72.88
When studying for this course, I often set aside time to discuss the course material with a group of students from the class	3.54	1.232	70.72
GRAND MEAN	**3.50**		**70.0%**

Table II below indicates the independent sample t-test of control and experimental groups in two separate categories of pretest (control and experimental groups) and post-test (control and experimental groups) based on the number of students exposed to the experimental. The data on the table are the number of participants, Mean, SD, t, df and p-value.

TABLE II: SELF-REGULATED LEARNING

GROUP		N	Mean	SD.	t	df	p-value
Pretest	Control	48	13.8333	2.32775			
	Experimental	48	14.1667	2.43497	-0.686	94	0.495
Posttest	Control	48	22.5000	2.77527	-18.418	94	0.000
	Experimental	48	35.8542	4.18706			

$$(t = -18.418, df = 94, p = 0.000),$$

$$(t = -0.686, df = 94, p = 0.495)$$

Table II shows the result of the independent sample t-test of pretest and post-test of control and experimental groups in motivation. The result revealed no statistically significant difference in the pretest result between the experimental and control groups in basis among undergraduate students. The effect size (Cohen's d) of 0.14 indicated no difference between the two groups. The result also revealed a statistically significant increase in the Post-test development between the experimental and the control group in motivation. The effect size (Cohen's d) of 3.76 indicated a difference between the two groups.

The result further revealed that the experimental group outperformed the control group (mean – experiment = 35.85, mean – control = 22.50. This indicates that the learning management system Moodle has motivated undergraduate students to practice self-regulated learning strategies in their learning and areas considered during the teaching-learning process in an online class, such as discussion forums, chatrooms, and messages on the Moodle platform.

Table III shows the analysis findings, which revealed that the experimental and control groups of Self-Regulated Learning performed independent sample t-tests of pretest and post-test. The results demonstrated no statistically significant difference in motivation for self-regulated learning among undergraduate students between the experimental and control groups in the pretest results (t=-0.900, df=94, p=0.370). The effect size (Cohen's d) of 0.183 indicated no difference between the two groups. The analysis also revealed that the experimental and control groups of Self-Regulated Learning had statistically significant differences in the post-test outcome (t=-20.875, df=94, p=0.000). The effect size (Cohen's d) of 4.26 indicated a considerable difference between the two groups. According to the findings, the experimental group outperformed the control group (mean-experimental=35.79, mean-control=20.29). The study's findings revealed that those in the intervention groups outperformed those in the control group who did not receive such treatment. As a result, using Self-Regulated Learning methods with undergraduate students improve their learning experience and motivation.

TABLE III: INDEPENDENT SAMPLE T-TEST OF PRETEST AND POSTTEST OF CONTROL AND EXPERIMENTAL GROUPS IN MOTIVATION AND THE USE OF SLR AMONG THE UNDERGRADUATE STUDENTS OF BORNO STATE UNIVERSITY

GROUP		N	Mean	SD.	t	df	p-value
Pretest	Control	48	13.8750	2.78006			
					-0.900	94	0.370
	Experimental	48	14.3750	2.66279			
Posttest	Control	48	20.2917	2.63332			
					-20.875	94	0.000
	Experimental	48	35.7917	4.41929			

VI. DISCUSSION

Students' motivation and successful usage of Self-Regulated Learning on the Learning Management System Moodle Environment employing Motivated Strategies were investigated in this study. The Self-Regulated Learning techniques that are crucial in improving students' motivation to learn were considered in the study [4], [22], [46]-[49]. Chats, forums, quizzes, and messages are among the aspects that most learners frequently use, whereas the learners use wikis, blogs, and workshops the least after the intervention. These findings were supported by [44], [50]-[57], who found a similar composition of Learning Management System traits employed by participants in their respective investigations. This means the learners are actively engaged in elements that enhance self-regulated learning, as reported in most studies reviewed [13], [21], [36], [44], which concluded that these elements are essential for improving learners' Self-Regulated Learning. It may interest you to note that most of the participants hitherto extensively used other social media platforms such as Facebook, and WhatsApp, which may have aided their perception, motivation, and general achievement, as confirmed by studies of [13], [21], [36], [44]. Integrating WhatsApp and Facebook into the Learning Management System platform significantly increased the involvement among study participants. This is consistent with [48], which found that social media platforms in a learning Moodle could improve learners' learning experiences. Furthermore, the participants reported regularly using instructional video clips and PowerPoint Slides in the Management System. This means there is sufficient involvement among the cohorts using video clips. Meaning there is participant-participant interactivity.

On the participants' levels of motivation and perception, it can be deduced from the result of this study that the Self-Regulated Learning strategies increase participants' motivation. This suggests that incorporating Self-Regulated Learning strategies into Moodle features encourages participants to develop an interest in the continuous use of the Learning Management System. This finding goes with how [36], [40], [48], [49] described the effective use of Learning Management System elements during instructions could lead to the successful deployment of an online learning environment. Therefore, a well-designed learning Moodle could help learners improve all aspects of 21st-century learning skills, such as creativity, critical thinking, collaboration, and communication [6], [9], [50]-[52]. In general, it may align with the current reality of promoting the connectivism theory of learning (George Siemen, 2005), in which learners would build self-regulated learning skills. To portray support these findings, [1], [13], [25], [53]-[57], it has been discovered that using Self-Regulated Learning can help learners accept the reality that a learning environment can improve their learning experiences in terms of interaction, cooperation, and Moodle engagement. This shows that the learning management system Moodle used has motivated

participants to effectively use self-regulated learning strategies in their learning, which are considered during the teaching-learning process in an online class, such as the Moodle platform's discussion forum, chatroom, and message as frequently used by the participant's.

VII. CONCLUSION

The study concludes that Self-Regulated Learning methods for undergraduates using the learning management system Moodle tend to improve learning experiences. From the results, using Self-Regulated Learning strategies promotes autonomous learning using a learning management system, especially by incorporating some of the essential elements of Moodle frequently used, such as Chatroom, quizzes, and messages, which trigger interactive and collaborative learning. The study also concludes that using self-regulated strategies while using Moodle seems to have increased students' affective filter. Motivation, and perception Therefore, the study recommended that the use of Learning Management system Moodle should be incorporated into the Higher Institutions of Learning as against the use of the current practice of face-to-face approaches in Nigeria. In addition, similar research in related fields is recommended to explore the effectiveness of the use of self-regulated learning in various contexts.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

The first author, Alhaji Modu Mustapha did the data analysis and collection and wrote the main construction of the paper; all authors read and agreed on the final work. The correspondence author, Hassan Abuhassna, has proofread, edited, and finalize the report. Also, he did all communication with the journal.

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