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Leveraging Gamification Mechanics for Students' Learning Motivation in Higher Education

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ABSTRACT

The purpose of this paper was to analyze the effect of integrating gamification mechanics in Learning Management Systems (LMSs) for students' motivational learning experience in higher education institutions. The study was anchored on both Self-Determination theory and the theory of gamified learning. The target population was 162 respondents. Questionnaires and Modular Object-Oriented Dynamic Learning Environment (MOODLE) reporting logs were used for data collection. Descriptive and inferential techniques were used in data analysis. The results were presented in tables and figures. The results established that gamified LMS students were more motivated compared to the non-gamified LMS students. The study confirmed that the application of gamification had a positive influence on students' motivation. The investigation suggests that eLearning instructors receive training through workshops on gamification integration for their courses from the university management. Besides, the eLearning Directorate should create a precise guideline on how gamification tools might be integrated into the university course curricula to improve students' engagement and concentration in learning activities.

Keywords: Gamification elements, eLearning, Motivation, Learning management system

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1. INTRODUCTION

Gamification has been in existence for over one decade since its inception in education sector among other industries. The application of game features such as badges, awards, stages, feedback and levels in an educational setting is known as gamification. This is a new teaching and active learning pedagogy. This is believed to improve learners' behaviour and attitudes in learning processes. The reality of the use of eLearning systems in higher education was witnessed during the COVID-19 pandemic globally. This is when it was realized that these systems were lacking pertinent gamification features to reinforce students' motivational learning experience.

Gamification has gained a lot of momentum, particularly in the field of education where low students motivation is a persistent issue that prevents learners from completing their education (Barna & Fodor, 2018). It was stated that students had inadequate drive to finish the game's levels through self-study. Thus, eLearning students proposed that more gaming aspects be added to their learning programmes to make them more engaging and joyful. Lack of feedback and assistance, an excessive workload, unclear and irrelevant goals, technical difficulties, insufficient social contacts and a lack of personal connections all contribute to learning demotivation in students. In adopting these eLearning systems, literature revealed that students get demotivated due to lack of system engagement and interactivity, this was attributed to insufficient integration of gamification tools in LMSs.

Self-Determination Theory (SDT) and the theory of gamified learning that have been widely used to gamify instructions in higher education institutions, provided support for this research. The study adopted an experimental research design which generated quantitative data. The primary unit of analysis was the eLearning students drawn from the computing sciences Department. Questionnaires and MOODLE reporting logs were used for data collection. Data analysis involved the use of descriptive and inferential statistics.

Hypothetically, students may gain from gamified education in a variety of ways such as improved training procedures, enhanced learning performance and increased motivation among learners (Zainuddin *et*

al., 2020). The results of gamification remain inconsistent, and it is impossible to pinpoint the characteristics of learners that are utilized to customize gamified learning environments or the effects of gamification personalization on the learning outcomes and psychological states of students (Toda *et al*., 2017). This indicates that some research concerns remain unearth even though there have been some systematic studies on personalized gamification, like tailored gamification in education (Rodrigues *et al*., 2020). Out of these convictions, this study sought to look into the effect of integrating gamification in LMSs on students' motivation in learning.

In general, using gamification in education promotes students' learning motivation and engagement (Bai *et al*., 2020); but, in certain circumstances, it has the opposite impact, discouraging or negatively affecting some students' learning results (Kwon & Özpolat, 2020). A study conducted by Wilk *et al*. (2022) suggested a thorough analysis of the institutional, technological, and user support barriers to gamification integration in LMSs, along with the inclusion of other studies covering other issues not reported by the primary studies in gamified educational environments. To further help comprehend the link between gamification and motivation comprehensively, it is necessary to study the students' impressions of the incorporation of gamification in LMSs intervention using an experimental research approach.

Ofosu-Ampong *et al*. (2020), argues that developing countries have not yet thoroughly looked into the benefits of integrating gamification in eLearning platforms and how it might enhance students' engagement and performance in their learning activities. Thus, it is crucial to figure out the key factors employed in this research, that include the dependent variable of motivated learning experiences, the independent variable of integrating gamification in LMS. Motivational learning experiences is defined as an interaction approach that helps students focus and stay engaged while improving the caliber of the learner's skills. In this study, motivated learning experience is viewed as the result and gamification is assumed to be the cause.

Nonetheless, demotivation and disengagement account for 40% to 80% of eLearning students' typical dropout rates from online courses, and this may be related to insufficient concept development for the integration of gamification in LMSs (Luis *et al*., 2022). Claris *et al.* (2020) affirmed that, a lack of gamification, restricted social contacts, institutional and technological problems, a lack of feedback and assistance all contribute to demotivation among eLearning students. It was reported that, 76% of undergraduate respondents and 56% of graduate and professional respondents cited a lack of desire for eLearning as the largest obstacle. Consequently, the goal of this study was to examine how students see the incorporation of gamification features into LMSs in an effort to augment their motivational learning experiences. This paper is structured into various sections such as a review of related literature that informed the study, methods and materials, results of the study, discussion of the findings and conclusions of the study.

2. RESEARCH METHOD

The research design adopted for this study was experimental. The method was quantitative in nature and was used to examine the cause-and-effect connections between the two variables. Ethically, the researcher wrote a letter to the Directorate of eLearning requesting for permission to set the experiment using the university's MOODLE LMS. The LMS did not have the required gamification plugins for the experiment. The technical team downloaded the plugins from Packback Inc. Software Company, installed and configured them upon requesting through writing. The plugins were added to the LMS as blocks.

Moreover, the researcher designed three learning activities for the experiment. The activities had multiple choice questions and short essay questions. These questions covered Bloom's Taxonomy instructional design framework concepts from lower order thinking to higher order thinking in students' cognitive processes for learning. Each of the activities aimed at testing a particular gamification plugin. The activity is designed, a particular gamification tool added to it and conditions as well as rules are set on how students can earn them. The eLearning students from the Department of Computing Sciences were identified as the participants in the experiment for the study. They were enrolled in the university's MOODLE LMS.

A consent form was integrated into the LMS and the participants were requested to sign to take part in the study. After consenting, participants (eLearning students) who were 162 were greeted, welcomed and given an overview of the experiment's procedures. Subsequently, each participant was systematically allocated to one of the two experimental conditions, which comprised of an LMS version that was either gamified (experimental)

or non-gamified (control). Both gamified and non-gamified LMS had 81 participants each. All the 81 participants were able to respond to all the activities on the LMS since conditional tracking control feature was enabled. Learners who earned themselves these various elements having met some set criteria, were able to see and download them in their course accounts. The experimental data was extracted by downloading it in form of CSV file format and cleaned it in preparation for the actual analysis.

Both gamified and non-gamified participants used the MOODLE LMS in accordance with their allocated conditions to study the learning materials uploaded on the LMS linked to the Database Systems unit. This unit was chosen since it offered students both practical and theoretical skills. The unit was offered in the Department of Computing Sciences at Kisii University. The only distinction between the two sets of learning materials is whether or not gamification was introduced to eLearning students according to the circumstances they were placed in. The two weeks that the learning assignment was performed in a computer lab included two experimental sessions, lasting for two hours each, for each of the three-course activities. The participants made use of smartphones, laptops and desktop PCs in the lab. Each session lasted, depending on the activity, around two hours. MOODLE system reporting logs and questionnaires were used to collect primary data for this investigation. The eLearning students who used the gamified LMS, responded to the questionnaire items to provide their opinion. The questionnaires were integrated as an activity into the LMS. This was the last activity to be done by the participants on the gamified LMS as post-experimental follow-up.

For data analysis, both inferential and descriptive statistics were employed. To compare whether there was a statistically significant difference in the means of course activity scores for the two groups that interacted with the gamified and non-gamified versions of the LMS, a paired samples t-test was also performed using the CSV data file format downloaded from the MOODLE LMS.

This study was anchored on both SDT and the theory of gamified learning. Research on gamification in higher education has been conducted using Self-Determination Theory's (Tandon, 2017). SDT addresses three main constructs of psychological needs namely: need for competence, need for autonomy and need for relatedness which are influential in learners' behaviour/attitude. Research on the investigation of certain motivating factors in the gamification of higher education institutions was conducted in Poland with funding from Kultura (2022). It was found that because the gaming world is so different from other environments, enforcing the rules required careful considerations. To begin with, whilst learning and working are often required, playing games is optional. The study suggests two fundamental guidelines for gamified programs: participants should feel free to try new things and fail, and no gamification-related activity should be forced upon them. They will mimic conventional learn-and-pass guidelines with extra "get-used-to" rules as a result of pressure to play instructional games.

One frequently discussed components of gamification is motivation, yet there are doubts regarding the validity of the empirical data linking increased motivation, particularly in the educational sector (Dichev & Dicheva, 2017). Regarding the idea of gamification in education, there are still conflicting outcomes and conclusions from various studies; some point to convergence, while others point to divergence (Gooch *et al*., 2016). The goal of gamification integration is to increase student involvement and focus, which will improve their behavioural abilities in turn.

Although SDT has significantly advanced the field of gamification in higher education, there are still several issues with the theory. The theory's disregard for technology features as behavior and motivational factors is one of its flaws. Furthermore, the notion has come under scrutiny for overemphasizing individualistic cultures while downplaying the role of technical components in improving students' interest in learning activities hence the need for the second theory to bridge this theoretical gap. The study also indicated that the gamified learning theory was useful. Baard *et al.* (2004) state that competence is linked to the drive to overcome obstacles and achieve success thus improving students' learning outcome. Further, they say that having the ability to pursue one's goals and accept responsibility for one's actions is a prerequisite for autonomy. They went on to explain that the demand for relatedness is tied to social standing and a bond with others that is built on reciprocity and dependency. Numerous individuals get satisfaction when their efforts are showcased on leaderboards inside the gamified setting, emphasizing the social component of relatedness Deci and Ryan (2008). Badges contribute to the development of traits like "self-competence and self-efficacy," both individually and socially.

The four primary components of gamified learning theory are learning results, behavior/attitude, instructional content material and gamification features. Both a less direct moderating process and a more direct mediation process can occur when game factors influence learning. By adding fantasy, a game characteristic, student engagement, an attitude should rise in the Indiana University example (Tay, 2010), strengthening the connection between learning outcomes and instructional material. Using a gaming feature boosts player engagement, which modifies the link between learning objectives and instructional content. The fact that the moderator cannot affect the result construct apart from the causal construct is a significant implication of a moderating process. In this instance, if the instructional design was already good, adding a gaming aspect would not affect learning.

A variety of game features were employed in Landers and Callan's (2011) gamification study to motivate students to finish online practice exams. Based on studies indicating that practicing for exams will increase knowledge more than alternative memorizing strategies, such as focused conventional studying, the researchers put these examinations into practice (Roediger & Karpicke, 2006). The goal of gamification is to affect attitudes and behaviors associated to learning, such as autonomy, motivation, engagement, performance, connectivity, satisfaction and teamwork. But the nature of that concept determines how this behavior and results relate to each other. When an instructional designer aims to promote a behavior or attitude that will boost learning outcomes by improving pre-existing teaching in some manner, it is known as gamification, and it has a moderating effect on learning.

The basic needs for autonomy, competence and relatedness may be fully or partially satisfied, according to Van Roy and Zaman (2019), gamification elements like certificate customization, that promote feelings of autonomy, badges and achievements, which enhance feelings of competence, and social networks, which foster feelings of relatedness.

The theory of gamified learning and SDT were essential since they recognized the ways in which gamification components affect students' motivation in learning processes. Furthermore, these theories accept the causality hypothesis, which contends that adding gamification to LMSs enhances students' attitudes and behavior. They also benefit the main stakeholders in the research (eLearning students). The hypothesis that integrating gamification tools into the LMSs improves students' motivation to learn in higher education was developed with the assistance of these theories.

A study on virtual teaching and learning in higher education during the coronavirus pandemic conducted in Romania by Claudiu *et al.* (2020) found that 5.7% of students felt that they were not interacting with their teachers and 7.5% of them mentioned that they were not focusing or paying attention in the online environment. Furthermore, research indicates that the eLearning environment poses a number of challenges to instructors and students alike. Besides, there is a dearth of regional literature on the topic of student focus in an online learning environment.

Zainuddin *et al*. (2020) affirm that gamification and game-based learning contribute to a variety of learning outcomes (Sailer & Homner, 2020), most of which are rational in nature and whose goal is to improve students' learning engagement. Game design mechanics include badges, level up, points, leaderboards, quests, avatars, custom certificates, or social graphs. Moreover, cognition may be defined as a collection of methods and procedures by which various individuals use their perceptual and problem-solving abilities to understand the environment (Lamb *et al.*, 2018). From the ongoing aforementioned literature, gamification has been implemented using game tools like badges, level up, leaderboards but little is known with regard to the use of custom certificates. This instigated the urgency for carrying out this study.

The most popular game components, according to Alsawaier *et al*. (2018) investigations into the effects of gamification in higher education, were avatars, quests and challenges, badges, points, and level up. It was realized that the majority of research in higher education showed that gamification introduced game elements that increased students' motivation and engagement. Researchers need to look into and evaluate which significant combinations of game tools improve learning outcomes and have a good impact on motivation.

Nonetheless, studies by Buckley *et al*. (2019) and Alsawaier (2018) have also shown unfavorable results with the application of gamification elements. These investigations came to the conclusion that further empirical study was necessary to fully explore the potential and consequences of integrating gamification in LMSs. This means that the effect of using gamification is not clear since different scholars have had different

opinions, suggesting that more studies are required to shed more light on this issue. The conviction from various researchers could have emanated as a result of using different data collection tools and research designs, hence a methodological lacuna that calls for more inquiries to unearth more information. The current study used experimental research technique and the data collected was analyzed through paired-samples t-test, inferential and descriptive statistics.

Many different types of educational institutions are greatly impacted by gamification. It has been used in a number of ways to engage students in the learning process, but its effectiveness has not been without criticism (Khaleel *et al*., 2018). It is believed that it has the ability to improve learners' engagement, performance, productivity and focus. Conversely, it may also fall short of maintaining student engagement and encouraging involvement. Furthermore, some research shows contradictory findings regarding learning outcomes, indicating that cognitive learning outcomes are only beneficially associated with emotional and motivational outcomes when combined (Bai *et al*., 2020). The fact that this concept has been implemented in a number of different learning institutions, its impact on students' learning motivation has not been conclusive hence an issue that calls for more investigations.

Nonetheless, gamification is a persuasive technique for grabbing and holding learners' attention as well as engaging them with peers and activities to achieve the intended results Gok *et al*. (2016). Occasionally it is found to have a detrimental impact on learners' course outcome. Studies examining the methods and its outcomes through Massive Open Online Courses (MOOC) are few in number. The majority of studies concurred that it can boost motivation and engagement among eLearning students. It also has the potential to improve enjoyment and social relationships among students. While it uses a few game features like rewards, status, level up, points, badges, and others, game-based learning uses actual games to teach information and skills. Still, there seems to be a disputation of its effects when applied in education. Well, this calls for an in-depth knowledge on this subject through rigorous experimental research designs to unearth its impact when implemented properly on the LMS.

Alomari *et al.* (2019) have demonstrated that gamification in eLearning uses a variety of techniques, such as points (75%), badges (68%), leaderboards (63%) and level up (38%). It was discovered that gamification techniques such as avatars, challenges, progress bars, awards and feedback were seldomly employed. Notwithstanding these investigations, conflicting results about the ability of gamification to support students' learning in various contexts have been documented in the literature. It was reported that students have negative attitudes about game-based learning, it may not have an impact on improvements in instructional outcomes (Landers & Armstrong, 2017). This means that further research be encouraged but with different game tools to reveal what their effects are.

Rajput *et al.* (2022) addressed an improved learning strategy that uses gamification in blended learning to increase student motivation, engagement, and learning; however, they neglected addressing students' focus, which is a crucial component of any teaching and learning environment. As supported by Metwally *et al.* (2020), gamification in education often aims to increase students' focus, engagement, and performance as well as minimize their dissatisfaction and demotivation in learning environments. Compared to learners who employed traditional techniques, students exposed to gamification and game-based learning had considerably superior academic accomplishment and attitudes toward learning. Well-crafted instructional games improved students' focus, trial-and-error skills and engagement (Partovi & Razavi, 2019). It is against these aforementioned literature inconsistencies that this study was set to analyze the effect of integrating the various gamification elements such badges, level up and custom certificates into the LMS for students' motivational learning experience.

There are significant technological barriers to eLearning application in Indonesia. In consonance with a previous study by Anggraeni and Sole (2018), poor content design, technological proficiency, administrative assistance and internet accessibility are some of the constraints associated with eLearning. In fact, as maintained by Kaunang and Usagawa (2017), students lacked sufficient eLearning knowledge. This implies that eLearning is marred with a number of challenges that have to be addressed first before understanding how to integrate this active pedagogical paradigm of gamification.

Prior research has indicated that students' inexperience with the gamification strategy is the primary cause of their failure to complete the learning tasks (Butler & Bodnar, 2017). Furthermore, it was shown that certain

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students in the gamified learning activity needed extra time to infer the gamification process (Ding *et al*., 2017). Instead of focusing just on quantitative components like points and awards, gamification can make greater use of quality-based examples, such as students evaluating and commenting on each other. Dominguez *et al.* (2013) confirm that while gamification has a limited impact on the cognitive components of educational content, it may nonetheless greatly motivate students to learn by altering the structure and design of the information to make it more enjoyable. This indicates that eLearning students need to be introduced to gamification mechanics and the effect they are likely to have on their learning behaviours and attitudes consequently their learning outcomes.

Out of the 10 universities that were evaluated, "only the University of Dar Es Salaam (UDSM)" had an eLearning platform in place. A minor application of eLearning was included in the basic ICT infrastructure of several universities, including Mzumbe University, Open University of Tanzania (OUT), and Sokoine University of Agriculture (SUA). A poor view of eLearning as a result of a lacuna of capability analysis prior to implementation, frequent power outages and insufficient ICT setup for eLearning platform were among the obstacles to its acceptance in Tanzanian colleges Makhaya and Ogange (2019). This indicates that eLearning challenges are all over and for gamification to be integrated seamlessly, the constraints have to be dealt with in advance.

A research conducted in Zimbabwe revealed that 97.5% of the instructors leading Open, remote and eLearning (ODeL) had no prior experience with remote learning (Mpofu *et al.,* 2012). The main obstacles to eLearning's widespread acceptance in these schools, in line with this study, are severe technological and infrastructural difficulties as well as staff and student attitudes against it. Lack of energy and Internet access were two of the infrastructure problems (Kasse & Balunywa, 2013). Despite these obstacles, "new virtual universities are opening up. The success of University of South Africa (UNISA), one of the continent's top providers of distance education, has amply demonstrated the potential impact of eLearning on educational delivery."

As demonstrated by some research, university eLearning system adoption is poor because of inadequate assistance for working areas, technical support and Internet connectivity. Gamifying courses may be difficult in Departments where eLearning procedures are not owned. A few lecturers also mentioned that they had trouble juggling their workloads between in-person instruction, online learning and other responsibilities (Ogange *et al*., 2018). It is evident how much the total infrastructure required to start the process would cost in capital. The high level of ongoing expenditures connected to the efficient use of ICT is a bit less evident. Thus, the purpose of this study is to investigate the effect gamification elements have on students' motivational learning experience.

3. RESULTS AND DISCUSSION

Paired-samples t-test was conducted to investigate the effect of integrating a badge gamification element in the LMS for students' motivational learning experience. Table 1 shows the results of paired-samples t-test between activity one on a non-gamified LMS and the same activity on a gamified LMS.

Table 1.
Activity one and Badges

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Activity1Badge - Activity1	3.23	9.68	1.08	1.09	5.37	3.002	80	.004

The results in Table 1 established that there was a significant increase in activity one scores of the students on a non-gamified LMS from (M=14.34, SD=6.63) to gamified LMS (M=17.57, SD=8.34), t (80) = 3.002, p

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= .004 (two-tailed). The mean increase in activity one score was 3.23 with a 95% Confidence Interval (CI) ranging from 1.09 to 5.37. This indicates that the increase in the mean was statistically significant since the CI range did not cross a zero and $p < .05$. The Cohen's *d* statistic value was .362, indicating a moderate effect size. Figure 2 shows a sample of MOODLE screenshot for the students who earned badges for successfully completing activity one and met some specified criteria.

Date issued	
Wednesday, 11 October 2023, 10:58 AM	View Issued Badge
Wednesday, 11 October 2023, 10:58 AM	View Issued Badge
Wednesday, 11 October 2023, 10:57 AM	View Issued Badge
Wednesday, 11 October 2023, 10:57 AM	View Issued Badge
Wednesday, 11 October 2023, 10:56 AM	View Issued Badge
Tuesday, 10 October 2023, 8:32 PM	View Issued Badge
Tuesday, 10 October 2023, 8:30 PM	View Issued Badge
Tuesday, 10 October 2023, 8:30 PM	View Issued Badge
Tuesday, 10 October 2023, 8:29 PM	View Issued Badge
Tuesday, 10 October 2023, 8:28 PM	View Issued Badge
Tuesday, 10 October 2023, 8:27 PM	View Issued Badge

Fig 2. Sample Moodle Screenshoot for Students who Earned Badges

Figure 2 shows a sample MOODLE screenshot for the list of 81 students who were awarded badges having satisfactorily completed course activity one and met the set conditions. The condition could be an activity completion or even the course activity score among others. The students who were then awarded these electronic badges accessed and downloaded them from their eLearning course accounts. Paired-samples t-test was also conducted to investigate the effect of integrating of a level up gamification element in the LMS for students' motivational learning experience. Table 2 shows the summary of the test findings.

Table 2.
Activity Two and Level Up Gamification Element

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Activity2LevelUp-Activity2	2.85	9.887	1.099	.67	5.04	2.595	80	.011

The results in Table 2 disclosed that there was a statistically significant increase in the course activity two scores of the students on a non-gamified LMS from (M=5.69, SD=5.98) to gamified LMS (M=8.55, SD=8.64), t (80) = 2.595, p = .011 (two-tailed). The mean increase in the course activity scores was 2.85 with a 95% CI ranging from .67 to 5.04. The Cohen's *d* statistic value was .29, demonstrating a small effect size.

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Figure 3 shows a sample of a gamified MOODLE screenshot for the 81 students who were awarded Experience Point (XP) after meeting some experimental conditions in activity two. MOODLE LMS does not come with level-up gamification plugin, this was installed by the Directorate of eLearning upon request by the researcher through writing. Shown in Figure 3 is a sample screenshot providing a list of students who were competing in undertaking the second activity.

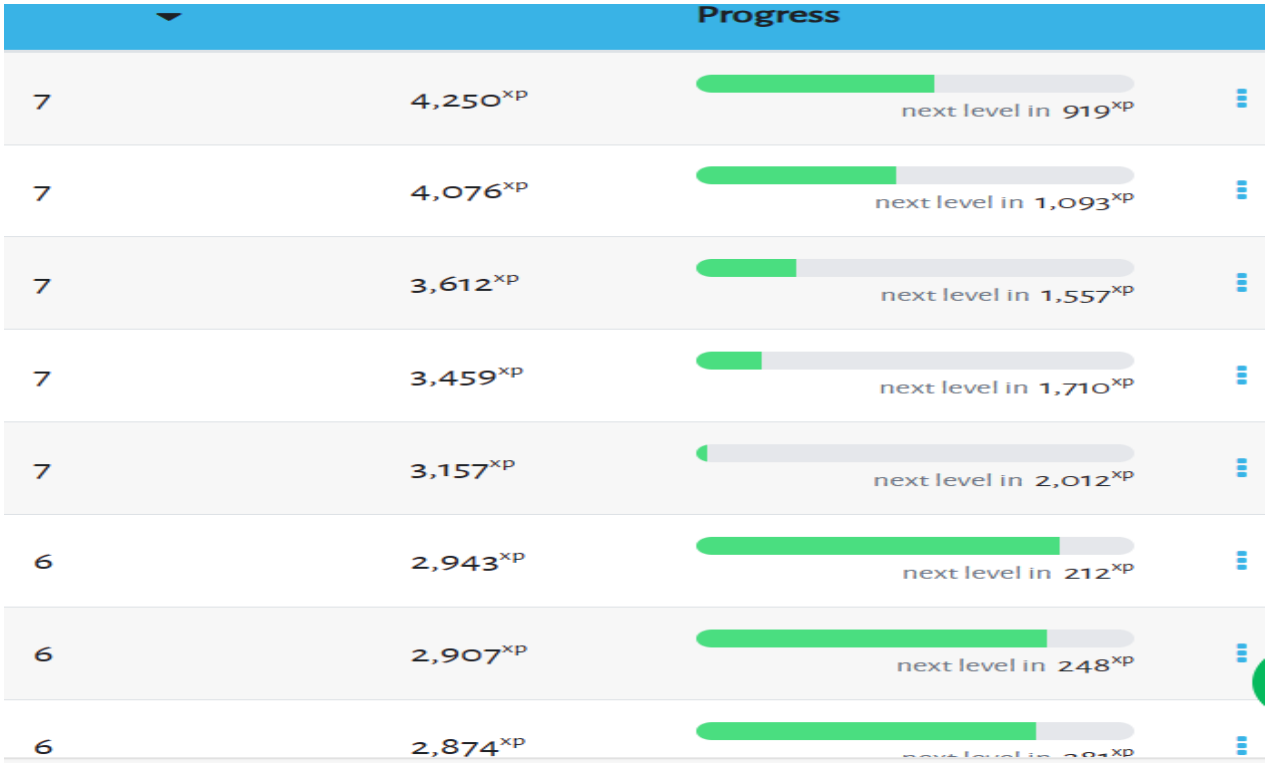


Fig 3. Sample Moodle Screenshot for Students Awarded Experience Points (XPs)

Figure 3 shows various levels such as 7, 6 among others for students who participated in the level up experiment. The leader in activity two had earned 4,250 XPs and to move to the next level, the student needed 919 XPs. Level up illustrates progress and consequently improves students' completion in the activity. This is a good gamification plugin that motivates learners with more fun. This element helps to increase user engagement in the learning process. Level up gamification element enables students to gain XPs for participating in an activity within a course. They also retain the learner through increasing engagement and participation by motivating learning experience to progress towards the next level. Further, they also trigger students' competition.

Further, paired-samples t-test was carried out to investigate the effect of integrating of a custom certificate gamification element in the LMS for motivational learning experience. Table 3 shows the summary of the test findings.

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Table 3.
Activity three and Custom Certificates Gamification Element

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	CustCert - Activity3	3.747	15.300	1.703	.358	7.136	2.201	80	.031

The results in Table 3 show that there was a significant increase in course activity three scores of the students on a non-gamified LMS from (M=8.71, SD=9.24) to gamified LMS (M=12.46, SD=11.33), t (80) =2.20, d = .25, p = .031 (two-tailed). The mean increase in the course activity scores was 3.75 with a 95% CI ranging from .36 to 7.14. The Cohen's d statistical value was .25, thus signifying that there was a small effect size. Figure 4 shows a sample custom certificate awarded to a student.



Fig 4. Sample Custom Certificate Awarded to a Student

Figure 4 shows a custom certificate awarded to a student having met the requirements of activity three on a gamified MOODLE LMS. The certificate can have a number of details as the case may be such as the student's full name, the unit name for which the certificate was awarded, the date when the award was done, the lecturer who awarded the certificate and the unique code generated by the computer for every certificate. The unique code improved the authenticity of the certificate generated by MOODLE LMS. However, not all the mentioned learner personal details were shown on the certificate in Figure 4 for anonymity reasons.

Further, descriptive statistics were also used to get students' opinions on the application of gamification in LMSs. This allowed the audience to understand the effect of integrating gamification elements in LMS for students' motivational learning experience in higher education. After the experiment, the 81 respondents who were the participants of a gamified Moodle LMS were required to provide their opinion based on the Likert

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scale of: 5=Strongly Agree (SA), 4=Agree (A), 3=Not Sure (NS), 2=Disagree (D), 1=Strongly Disagree (SD). Table 4 summarizes the findings of the analysis based on mean and standard deviation.

Table 4.
Gamification Elements and Motivational Learning Experience

Integration of Gamification Elements	N	Mean	Std. Deviation
Gamification in LMS increases students' understanding compared to traditional teaching methods.	81	4.40	.931
Gamification in LMS motivates eLearning students.	81	4.11	.851
Gamification in LMS provides students with a better learning experience.	81	4.02	1.151
Gamification in LMS provides instant feedback.	81	3.62	.982
Gamification in LMS enhances students' academic performance.	81	3.69	1.020
Gamification in LMS permits students the freedom to fail so that they can learn from failure.	81	2.64	1.297
Students get excited to participate in gamified learning activities	81	3.84	1.054
Being in competition, keeps students' learning morale alive.	81	4.28	.898
A gamified presentation of the lesson makes the course process more enjoyable and fun.	81	4.12	1.065
Gamification is an innovative technique that improves students' learning interests.	81	3.98	1.084
Overall Results	81	3.87	1.033

Scale Range: 1.0-1.80=Strongly Disagree, 1.81-2.60=Disagree, 2.61-3.40=Neutral, 3.41-4.20=Agree, 4.21-5.0=Strongly Agree.

The results in Table 4 demonstrated that majority of respondents agreed that gamification in LMS increases students' understanding compared to traditional teaching methods (M=4.40, SD=.931), gamification in LMS motivates eLearning students (M=4.11, SD=.851), gamification in LMS provides students with a better learning experience (M=4.02, SD=1.151), gamification in LMS provides instant feedback (M=3.62, SD=.982), gamification in LMS enhances students' academic performance (M=3.69, SD=1.020), students get excited to participate in gamified learning activities (M=3.84, SD=1.054), being in competition, keeps students' learning morale alive (M=4.28, SD=.898), a gamified presentation of the lesson makes the course process more enjoyable and fun (M=4.12, SD=1.065), gamification is an innovative technique that improves students' learning interest (M=3.98, SD=1.084). However, a small number of respondents confirmed neutrality that gamification in LMS permits students the freedom to fail so that they can learn from failure (M=2.64, SD=1.297).

In general, the results confirmed that the majority of respondents agreed (M=3.87, SD=1.033) that students were of the opinion that the integration of gamification elements in LMS had an impact on motivational learning experience. This means that the standard deviation of 1.033 indicates that the individual responses, on average, were just slightly over one point away from the overall mean. Furthermore, the study also carried out a correlation analysis to determine whether there was a relationship between the integration of gamification in LMS and motivational learning experience. Table 5 shows the findings of the study.

Table 5.
Gamification Elements and Motivational Learning Experience

		LearningMotivation	Gamification Elements
LearningMotivation	Pearson Correlation	1	.759**
	Sig. (2-tailed)		.000
	N	81	81

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Gamification Elements	Pearson Correlation	.759**	1
	Sig. (2-tailed)	.000	
	N	81	81

**. Correlation is significant at the .01 level (2-tailed).

Table 5 confirms that there was a strong relationship (r = .759) between gamification elements and motivational learning experience. Besides, the result also shows that there was a statistically significant (p < .001) relationship between gamification elements motivational learning experience variables. The study also carried out a simple regression analysis to confirm the degree of the effect of integrating gamification elements on motivational learning experience. The result was shown in Table 6.

Table 6.
Gamification Elements on Motivational Learning Experience

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.759[a]	.576	.571	.049	.576	107.329	1	79	.000

a. Predictors: (Constant), GamificationElements

a. Dependent Variable: LearningMotivation

b. *. p is significant at the 0.05 level (2-tailed).

In Table 6, r provides the correlation coefficient for the analysis. It confirms a strong degree of positive correlation (r = .759) between gamification elements and motivational learning experience. The R-square of .576 measures part of motivational learning experience which was explained by gamification elements. It revealed that approximately 57.6% of the variation in motivational learning experience was attributed to variation in gamification elements. The adjusted R-square provides an idea of how the model may be generalized. It should be as close to R-square as much as possible if not the same. In this regard, the difference for the final model is small such as .5%.

This means if the model was derived from the population rather than a sample, definitely it would have accounted for approximately .5% less variance in students' motivational learning experience. The overall model was statistically significant (F=107.329, p < .05). Therefore, gamification elements had a positive impact on motivational learning experience. Un-standardized coefficient values were used to construct the regression equation. The Beta coefficient for gamification elements was .759 (p < .05) and was statistically significant. Table 6 and model 1 illustrates the optimum regression equation showing the relationship between gamification elements and motivational learning experience. This optimum regression equation followed a general form of $Y=\beta_0+ \beta_1\chi_1+ \beta_2\chi_2+\ldots \beta_n\chi_n+\varepsilon_0$, where:

Y= Dependent variable,

β_0 = Intercept term,

$\beta_1 \ldots \beta_n$ = Coefficients of independent variables,

$\chi_1 \ldots \chi_n$ = Independent variables,

ε_0 = Model's unique term,

n = Number of observations.

$$Y=0.210+0.099\ \chi_1 \quad (1)$$

Where,

Y = Motivational learning experience,

χ_1 = Gamification elements,

Coefficient of gamification elements =.099,

Intercept term =.210

Regression model 1 had a strong degree of positive correlation (r = .759) between gamification elements and motivational learning experience. The simple regression analysis model was 57.6% by the variation in gamification elements and was statistically significant ($p < .05$).

The general results of the experiment indicated that the integration of gamification elements in LMSs had a statically significant t (80) = 10.45, $p < .05$ (two-tailed) effect on students' motivational learning experience. This was the result of the paired samples t-test. Similarly, the results of the questionnaire data confirmed that the integration of gamification elements in LMS positively influences students' motivational learning experience. The result of the overall model was statistically significant (F=107.329, $p < .05$). This suggests that the results of both the experiment and the questionnaires positively converged in answering the objective of this research. Subsequently confirming a statistically significant ($p < .05$) hypothesis of the investigation that integration of gamification elements enhances students' motivational learning experience.

This study sought to investigate the effect of integrating gamification elements in LMSs for learners' motivational learning experience in higher education. Their study found that when students are immersed in an engaging learning environment, their involvement and engagement levels rise, which in turn improves their academic performance and learning outcomes. The findings of this study reaffirm the theory of gamified learning that by incorporating fantasy (a Game Characteristic), student engagement (an attitude) should increase, making the relationship between instructional content and learning outcomes stronger hence motivation. The use of a game characteristic increases engagement, which moderates the relationship between instructional content and learning outcomes. This supports the hypothesis of the study that integration of gamification elements in LMSs enhances students' motivational learning experience in higher education.

In comparison to non-gamified experiences, the results show that the gamified experience also enabled appropriate academic performance as well as greater learning outcomes and ratings to be reached. These findings are consistent with the results published by Wigfield *et al.* (2019). This suggests that gamification used in a virtual setting helps students feel more in control, independent and creative while they are engaged in educational activities.

According to a German study on the motivational effects of gamification, Michael *et al.* (2022), an experimental investigation into how particular game design components affect satisfaction of psychological needs revealed that the set of game design elements with badges, leaderboards and performance graphs (experimental condition 1) promoted competence and independence in carrying out learning tasks. When students take on and manage their own learning autonomy, it activates their higher order cognitive talents and skills, particularly those connected to metacognition and self-regulated learning. This indicates that increasing students' confidence to engage in their learning activities is dependent on these two SDT components. This is consistent with the current study's findings which are supporting SDT and the theory of gamified learning. These theories postulate that integration of gamification elements when used appropriately, they impact students' behaviour/attitude in a learning environment.

This study's results support those of Rajesh *et al*. (2023), who studied the university students in Australia. In their study, the partial mediation results showed that students' perceptions of lecturers' proactive support in gamified activities influenced their psychological needs as well as their satisfaction with their level of autonomy, competence and connectedness. This ultimately led to increased students' engagement. The results also shed light on the advantages of student participation and give educators more confidence to include gamification into their lesson plans.

Another study by Van Roy and Zaman (2018) found that the need for competency among online learners was not much raised by badges. Other research also revealed that badges had a non-significant influence on the satisfaction of competence needs. This was contradictory to the findings of the current study. The badges' inability to give learners constructive feedback about their performance and mastery while completing learning modules and passing module tests in TalentLMS may be the cause of their inability to meet the study's competency requirements.

Another explanation may be that the badges did not give participants the impression that their abilities or knowledge had improved enough to meet the need that learners in this brief online course had competency in the developed material (Ryan & Deci, 2020). The outcome may not have been statistically significant based on the kind of learning activities and the badge regulations. In a similar vein, the demographic of learners may

have also had an impact on these outcomes. This result further contradicts the present study's findings. Hence, depending on how gamification tools are used and how users view and understand them in that particular learning environment, they may either be intrinsically or extrinsically motivating for certain users. Contrary to the present study's findings, this investigation produced inconsistent results.

Mekler *et al.* (2017) discovered that because the majority of students were not familiar with the gamification protocols, gamification did not significantly increase students' grades. There are some issues that need to be resolved in spite of the benefits that the adoption of gamification tools in education has shown to have on students' behavioral and learning outcomes, including focus, motivation, engagement and performance (Bovermann & Bastiaens, 2018).

4. CONCLUSION

The goal of the study was to look into the effect of infusing gamification mechanics in LMSs in improving students' motivational learning experiences. The results confirmed that the integration of gamification elements in LMS had a positive influence on students' motivational learning experience. The individual gamification elements like badges revealed a moderate effect size on the course activity scores and the level up as well as custom certificates confirmed a small effect size on course activity scores.

These findings are linked with the theory of gamified learning which reasserted that gamification elements influence learners' behaviour/attitudes and so was the SDT in explaining students' psychological needs through need for autonomy, competence and relatedness. Studies of this nature may improve regions, nations and even how the integration of gamification can be effectively implemented to benefit eLearning students in higher education institutions. Besides, it will significantly influence higher education community, practice and policy formulation on gamified eLearning management systems that will facilitate the attainment of the fourth sustainable development goal on quality education to learners.

The experimental part for this research was limited to three gamification tools (badges, level up and custom certificates) and their significant results on the performance of students' course activity scores may not be valid for other gamification elements. The data used in this exploration were collected using a cross-sectional approach. It is opined that longitudinal studies be conducted in future research to collect participants' data in order to better understand how the integration of gamification elements influence students' motivational learning experience in higher education sector. Data was collected from students as main stakeholders. However, the study recommends that future studies of this nature involve lecturers too.

Future researchers can use different gamification mechanics such as avatars, exabis, timers, quests among others besides the ones employed in this study to determine whether they will be having an effect on students' motivational learning experience or otherwise. This can also be done on other learning management systems like Schoology, Canvas, Desire2learn, Blackboard, Brightspace. This will enrich the existing domain of eLearning knowledge database in the world of integration of gamification in LMSs for higher education institutions. Similar research can be carried out in future however, by employing different methodology approaches that are distinct from the ones that were used in this research. Finally, the study suggests to future scholars to apply structural equation modelling and factor analysis in determining the weight of the loadings for various sub-constructs of the study. This will ensure that only the latent variables which matter will be retained in the integration of gamification in LMSs depending on the outcome of the exploratory and confirmatory factor analysis.

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