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Elevating Student Motivation: Constructing a Gamified Massive Open Online Courses using the MARC Framework

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ABSTRAK

Pendidikan sedang mengalami revolusi besar di era teknologi digital saat ini, terutama karena penerapan Massive Open Online Courses (MOOCs). Kursus-kursus ini telah memfasilitasi aksesibilitas di seluruh dunia terhadap pendidikan dengan kualitas luar biasa, melampaui batasan geografis dan kelembagaan. Penelitian ini bertujuan untuk mengevaluasi penerapan gamifikasi dalam Massive Open Online Courses (MOOCs) untuk meningkatkan motivasi intrinsik siswa dan tingkat kelulusan. Menghadapi tantangan rendahnya tingkat kelulusan di MOOC, penelitian ini merancang dan mengimplementasikan platform Gamified MOOC (GMOOC) menggunakan kerangka gamifikasi baru, MARC. Melalui metode eksperimen, penelitian ini melibatkan 101 siswa dan pengumpulan data melalui angket berdasarkan Teaching Materials Motivation Survey (IMMS) dan Model ARCS. Data dianalisis menggunakan Structural Equation Modeling (SEM), dan hasilnya menunjukkan bahwa seluruh variabel MARC mempunyai reliabilitas yang tinggi dan berpengaruh positif terhadap motivasi intrinsik siswa, dengan variabel Otonomi yang mempunyai pengaruh paling signifikan. Studi ini menggarisbawahi pentingnya kerangka gamifikasi dalam meningkatkan motivasi dan tingkat kelulusan di MOOCs, serta pentingnya mempertimbangkan elemen desain dan komponen gamifikasi yang benar dalam pengembangan MOOCs. Studi ini memberikan implikasi yang signifikan untuk mengembangkan dan menerapkan MOOCs yang efektif dan menarik.

ABSTRACT

Education is undergoing a profound revolution in the current era of digital technology, primarily due to the implementation of Massive Open Online Courses (MOOCs). These courses have facilitated worldwide accessibility to education of exceptional quality, transcending geographical and institutional limitations. This study aims to evaluates the implementation of gamification in Massive Open Online Courses (MOOCs) to enhance students' intrinsic motivation and graduation rates. Facing the challenge of low graduation rates in MOOCs, this study designed and implemented a Gamified MOOC (GMOOC) platform using a new gamification framework, MARC. Through an experimental method, this study involved 101 students and collected data through a questionnaire based on the Instructional Materials Motivation Survey (IMMS) and ARCS Model. The data was analyzed using Structural Equation Modelling (SEM), and the results showed that all MARC variables have high reliability and positively impact students' intrinsic motivation, with the Autonomy variable having the most significant impact. This study underlines the importance of a gamification framework in enhancing motivation and graduation rates in MOOCs, as well as the importance of considering the correct design elements and gamification components in the development of MOOCs. This study provides significant implications for developing and implementing effective and engaging MOOCs.

1. INTRODUCTION

Education is undergoing a profound revolution in the current era of digital technology, primarily due to the implementation of Massive Open Online Courses (MOOCs). These courses have facilitated worldwide accessibility to education of exceptional quality, transcending geographical and institutional limitations. However, this is precisely why MOOCs encounter their greatest obstacle: sustaining consistent student engagement and motivation throughout the course. A prevalent obstacle that MOOCs often encounter is the issue of significant student attrition rates (Jenita & Ruby, 2022; Room et al., 2021; Yin et al., 2020)). The probability of a student discontinuing their studies is contingent upon their engagement with the educational platform and the specific characteristics of the course in which they are registered (Rawat S, Kumar D, 2021; W. Wang et al., 2023), along with their level of motivation towards successfully finishing the course (Borrás-Gené et al., 2019; Goopio & Cheung, 2020; Hasan et al., 2019; Rincón-Flores et al., 2020). To tackle the problem of elevated student attrition rates, a range of strategies have been suggested, including the utilisation of a gamification framework.

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As a remedy for the high attrition rates in MOOCs, gamification has been proposed (Klemke et al., 2018, 2020; Nesterowicz et al., 2022; Rohan et al., 2021). In order to engage individuals, inspire action, facilitate learning, and resolve issues, gamification is a process and paradigm shift that employs game mechanics in non-game contexts (Alsaad & Durugbo, 2021; Conlin & Santana, 2022; Klemke et al., 2020). Gamification is believed to increase learners' motivation and engagement, leading to sustainable usage scenarios. By implementing gamification mechanisms in MOOCs, such as providing regular feedback and utilizing badges, student engagement and activity can be heightened (Jarnac de Freitas & Mira da Silva, 2023; Khalil et al., 2017). Gamification strategies, including rewards for learning activities, leaderboards, and badges, have been demonstrated to be effective in motivating students to complete assigned learning activities in MOOCs (Aparicio et al., 2019; Rohan et al., 2020). Gamification effectively enhances the learning experience and outcomes in MOOCs (Cheng, 2022; Karsen et al., 2022). Extensive research has underscored the favorable effects of gamification on many MOOC-related dimensions—including learner engagement, performance, and motivation. The capacity of gamification in MOOCs to boost learner motivation is crucial. Incorporating gamification components, including leaderboards, points, and badges, offers learners explicit objectives and constructive criticism, bolstering their intrinsic motivation and stimulating their active engagement in the curriculum. (Antonaci et al., 2019; Aparicio et al., 2019). Gamification additionally leverages learners' intrinsic motivation towards achievement and competition, thereby generating an atmosphere of excitement and difficulty that reinforces their involvement (Khaldi et al., 2023; Romero-Rodriguez et al., 2019).

Nevertheless, many gamification endeavors have failed due to substandard design, and prior investigations concerning gamification in education have neglected to adequately consider the design component (An, 2020; Manzano-León et al., 2021). One of the reasons for the failure of gamification initiatives in education is the adoption of gamified platforms that are not flexible or customizable for educational purposes (Ofosu-Ampong, 2020; Swacha et al., 2020; Vanduhe et al., 2020). These platforms may not align with educational institutions' specific needs and goals. Additionally, the lack of a systematic approach to the introduction of gamification and the ignorance of the characteristics of the team and players can contribute to the failure of gamification designs (Lester et al., 2023; Popova et al., 2023). Another factor that can lead to the inability of gamification in education is the poor design of gamified learning experiences (An, 2020; Bigdeli et al., 2023). Unclear objectives and a lack of understanding of the context of educational institutions or user backgrounds can hinder the effectiveness of gamification (Bigdeli et al., 2023; López et al., 2021; Ofosu-Ampong, 2020). It is essential to design gamification experiences that are personalized and tailored to the learners' needs, preferences, and characteristics (Imran, 2023; Nasni Naseri et al., 2023). Furthermore, the implementation of gamification in education should be accompanied by careful and thorough experimental evaluation. Many current studies lack rigorous assessment and are limited to specific domains or age groups, making it difficult to generalize the findings (Ruiz-Alba et al., 2019; T. Alshammari, 2020). It is crucial to conduct research that isolates gamification from other pedagogical interventions or methodologies to understand its true impact (Banerjee et al., 2023; Klein, 2021; Legaki et al., 2019).

In addition to design, it is necessary to identify appropriate gamification components to enhance the efficacy of MOOC design, particularly in professional MOOC development. Consequently, the MARC framework has been introduced to guide how to create a MOOC that can sustain student motivation in completing the course (Chernbumroong et al., 2019; Saputro et al., 2019). Constructed upon the MARC Framework, GMOOC is a gamification-driven MOOC platform designed to boost students' motivation to complete the course. The MARC framework, a multifaceted framework that combines four distinct approaches, is a proposed framework tested by experts in previous research (Saputro et al., 2019, 2022). The MARC gamification framework includes learning techniques that aim to modify behavioral and cognitive aspects, motivational support that upholds intrinsic motivation, social learning, and interactive learning environments.

The framework consists of several critical approaches, supplemented by their respective sub-supports, which can promote the creation of MOOCs that provide a unique learning experience compared to other standard MOOCs. The social learning approach further encourages student autonomy and motivates them to pursue the courses offered actively. As a result, students are anticipated to exhibit greater interest and participation in each series of the methods provided. The MARC framework, a comprehensive model for gamification applications, comprises four fundamental domains, which require careful consideration in their implementation. Each part has been carefully evaluated to determine the appropriate game elements to be incorporated in GMOOC. Gamification can be applied to the GMOOC platform based on the MARC framework. Furthermore, the GMOOC platform is designed using UML (Unified Modeling Language). UML is a standard modeling language used to specify, visualize, build, and document the components of software systems (Siau & Cao, 2001; Sunguk Lee, 2012). UML includes common diagrams for setting, illustrating, and visually mapping or modeling the design and structure of a software system. These diagrams include a use case diagram, class diagram, sequence diagram, state chart diagram, activity diagram, component diagram, and distribution diagram. With UML, all charts were designed to make it easier for programmers to understand all the flows and processes in GMOOC.

The urgency of the research lies in the need for effective online learning platforms, particularly in the context of MOOCs, to enhance learners' intrinsic motivation and address the high dropout rates in such courses. The research aims to fill the gap in existing online learning platforms by incorporating gamification elements to support learners' intrinsic motivation. The urgency is further emphasized by the fact that current gamification approaches in MOOCs are still developing and immature, often failing to consider theoretical and empirical principles. The research contributes to the field by providing a new gamification framework, called the MARC gamification framework, which can guide MOOC platform developers in implementing effective gamification strategies. By designing and developing a Gamified MOOC (G-MOOC) platform, the research aims to enhance learners' motivation and engagement, ultimately improving the completion rates and overall learning outcomes in online courses.

2. METHOD

This study will investigate the impact of gamification elements derived from the four domains of the MARC framework on the intrinsic learning motivation of students enrolled in MOOCs. This is quantitative research, in which data collection and analysis methods are implemented in the form of statistics and numbers to test hypotheses and answer research inquiries. The objective of this study is to objectively measure variables, establish cause-and-effect connections, and derive generalizations that apply to the larger population (Cresswell, 2009). The participants for this study were selected from the population of students enrolled in the Game Programming course, a component of the third-year undergraduate curriculum at Universiti Teknikal Malaysia Melaka, using a purposive sampling technique. A lecture titled "Introduction to Computer Game Programming" was presented to 101 students via a gamified MOOC. A comprehensive representation of student data, classified by gender on a specific platform, is presented in Figure 1. The data acquired from the testing procedures was subjected to a meticulous and comprehensive analysis, focusing specifically on assessing the efficacy and efficiency of the Gamified MOOCs as learning aids. The assessment approach also considers the degree of customer contentment with the platform and the difficulties or obstacles encountered.

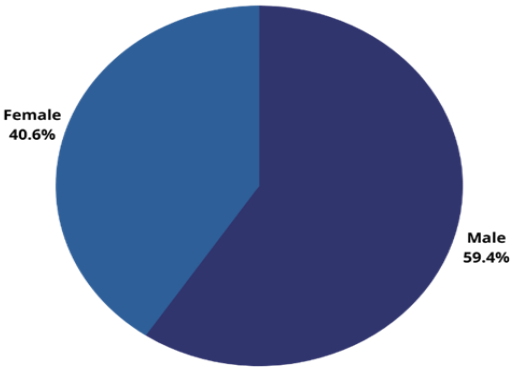

Figure 1. Number of Population Samples

According to the data presented in Figure 1, the enrollment figures for the Gamified MOOCs platform course indicate that 60 male students and 41 female students participated. The system was provided as additional content and comprised 88 instructional videos organized into five weekly sessions. Furthermore, the curriculum included four quizzes and three discussion forums as integral components of the educational exercises. Notably, the instructor did not oversee the course attendance process, instead opting to present students with a general introduction to the learning management system (LMS). The students were neither compelled nor given any incentives to enroll in the course or demonstrate proficiency in the subject matter. The students were expected to actively participate in the platform based on their interests and preferences. The dependent variable was assessed using an Instructional Materials Motivation Survey (IMMS) questionnaire utilizing the ARCS Model (Keller, 2010; Suryapranata et al., 2023). Several researchers have used IMMS to measure students' motivation in learning. This is done by previous study who developed a group-based assessment game for a gamified flipped classroom experience and used the IMMS to measure motivation (Durrani et al., 2022). Likewise, other researched using visual novels for gamification in chemistry learning and found that this increased student motivation (Suryapranata et al., 2023). The reliability and validity of the Instructional Materials Motivation Survey (IMMS) make it a suitable tool for assessing motivation in learning contexts. The IMMS, which measures motivation for instructional materials, is based on the ARCS paradigm, which comprises four primary elements: attention, relevance, self-confidence, and satisfaction. The ARCS model provides a comprehensive framework for instructional design. The

instructional process encompasses essential components, including engaging students' interests, establishing practical applicability, cultivating self-assurance, and facilitating a gratifying educational encounter. The instrument IMMS is represented in Table 1 using the ARCS model.

Table 1. IMMS Based on ARCS

Code	Description
Attention	
At1	At the outset of this course, something intriguing captured my attention.
At2	These materials are visually appealing.
At3	The caliber of the writing facilitated the maintenance of my interest.
At4	This course is so theoretical that I had to exert considerable effort to maintain my interest (Reverse).
At5	The pages of this course are unappealing and parched (Reverse).
At6	The arrangement of the information on the pages assisted in maintaining my interest.
At7	There are aspects of this course that piqued my interest.
At8	Occasionally, I became bored with this course due to the excessive repetition. (Reverse)
At9	I gained knowledge of a few things that were unexpected or surprising.
At10	A diverse range of materials, including reading passages, exercises, and illustrations, effectively sustained my interest throughout the course.
At11	The writing style is tedious (Reverse).
At12	The quantity of words present on each page is sufficiently perplexing (Reverse).
Relevance	
Rv1	The correlation between the subject matter of this material and what I am already cognizant of is readily apparent.
Rv2	Through anecdotes, images, and illustrations, I was shown how this material might be significant to some individuals.
Rv3	I needed to complete this course successfully.
Rv4	This material contains information pertinent to my interests.
Rv5	This course provides explanations and examples of how the material is applied.
Rv6	The writing style and subject matter of this course create the perception that its material is valuable to comprehend.
Rv7	This course was superfluous to my requirements as most of its material was already familiar to me. (Reverse)
Rv8	The subject matter covered in this course applies to situations, actions, or thoughts I have encountered in my personal life.
Rv9	I will profit from the material covered in this course.
Confidence	
Cn1	When I first viewed this course, I assumed it would be simple.
Cn2	I found this material to be more difficult to comprehend than I had anticipated. (Reverse)
Cn3	Upon perusing the introductory materials, I acquired a sense of assurance that I was acquainted with the intended content of this course.
Cn4	Numerous pages contained excessive information, requiring considerable effort to discern and retain the key points. (Reverse)
Cn5	I could succeed in this course as I diligently studied the material.
Cn6	It was necessary for the exercises in this course to be more feasible. (Reverse)
Cn7	After studying this course, I felt confident in my ability to pass a test.
Cn8	I require assistance in comprehending a substantial portion of the content covered in this course. (Reverse)
Cn9(IV)	The proficient arrangement of the content instilled in me a sense of assurance that I would successfully comprehend the material.
Satisfaction	
St1	Upon finishing the exercises in this course, I experienced a profound sense of fulfillment and achievement.
St2	I experienced a gratifying sense of accomplishment upon finishing the exercises in this course.
St3	Upon finishing the exercises in this course, I experienced a profound sense of fulfillment and achievement.
St4	In this course, the wording of comments and feedback following exercises contributed to my sense of being rewarded for my efforts.
St5(IV)	It was gratifying to finish this course.
St6(IV)	It was an honor to contribute to developing this meticulously planned course.

The independent variable utilized in this study is derived from the Intrinsic Motivation Inventory (IMI) proposed by (Ostrow & Heffernan, 2018). The four domains that are delineated in the MARC framework are inclusive of the IMI. Utilizing the Intrinsic Motivation Inventory (IMI) to evaluate intrinsic motivation is beneficial. Four distinct categories of intrinsic motivation are assessed by the Intrinsic Motivation Inventory (IMI): interest/enjoyment, perceived competence, effort/importance, and value/utility. By understanding these domains, educators can cultivate active engagement in learning and augment students' intrinsic motivation. The testing tools utilized to assess the hypotheses in the present inquiry are detailed in Table 2.

Table 2. IMI Based on Marc

Independent Variables	Indicators	Question Items	Dependent Variable
MLI Dimension	Heroes Journey	1-2	Instructional Materials Motivation Survey
	Virtual Map	3-4	
	Clear Objective and Goals	5-6	
AT Dimension	Multiple paths	7	
	Learn from failure (quiz repetition)	8-9	
	Skill trees	10-11	
RS Dimension	Provide positive feedback	12	
	Sense of altruism	13	
	self-expression/avatar	14-15	
	Competition	16	
CM Dimension	Leaderboards	17-18	
	Social Status /Armour	19-20	

In this research, the researchers employed Structural Equation Modelling (SEM) analysis to examine the association among the variables. Using structural equation modelling (SEM) allows for the examination and evaluation of hypotheses about both direct and indirect associations among study variables. Additionally, SEM enables the assessment of the adequacy of proposed models in terms of their fit to the data (Hair et al., 2017). Some researchers also use SEM analysis to measure the influence of gamification on various topics, such as behavioural change, acceptance in education, continued usage of MOOCs and brand engagement (Ourdas & Ponis, 2023; Wulandari et al., 2022). In order to assess the relationship between variables in this research, inner and outer model analysis techniques were implemented using Smart PLS version 3.33. Validity and reliability assessments, the path coefficient for the equation model, and the coefficient of model determination are utilized to evaluate the model (Rohan et al., 2021; Tamrin et al., 2022).

3. RESULT AND DISCUSSION

Result

Validity Test

The initial phase consists of a validity test. The loading factor and Average Variance Extracted (AVE) values were examined to determine the outcome of the Convergent Validity test. The loading factor and AVE must be greater than or equal to 0.7 and 0.5, respectively. The first step in obtaining this value is connecting the two variables (X1 and Y) using the Smart PLS software and then calculating the value using the PLS Algorithm. The Fornell-Larcker criterion value is subsequently evaluated. The correlation value between two variables must be higher than between other variables. Table 3 presents the AVE and Fornell-Larcker values about the four MARC dimensions.

Table 3. AVE Value of Variables X and Y

Variables	(AVE)	Fornell Lacker Criterion	
		X	Y
X_1 MLI	0.719	0.848	
Y Learning Intrinsic Motivation	0.617	0.618	0.786
X_2 A	0.671	0.819	
Y Learning Intrinsic Motivation	0.618	0.662	0.786
X_3 R	0.678	0.823	
Y Learning Intrinsic Motivation	0.618	0.657	0.786
X_4 C	0.751	0.866	
Y Learning Intrinsic Motivation	0.618	0.630	0.786

After the loading factor value of each indicator and the AVE value of each variable are deemed reliable, it is possible to conclude, according to Table 3, that the AVE value of the two variables is valid since it is more significant than 0.5. Similarly, the correlation between the variable and itself is more significant than the correlation with other variables, as determined by the Fornell-Larcker Criteria. As a result, it is possible to deduce that all validity test criteria have been fulfilled.

Reliability Test

The reliability assessment involves examining the composite reliability and Cronbach alpha values. Each of the values must exceed 0.7. Table 4 presents the Cronbach's Alpha and Composite Reliability values.

Table 4. Cronbach's Alpha and Composite Reliability

Variable	Cronbach's Alpha	Composite Reliability
X_1 MLI	0.921	0.939
Y Learning Intrinsic Motivation	0.958	0.963
X_2 A	0.877	0.910
Y Learning Intrinsic Motivation	0.958	0.963
X_3 R	0.881	0.913
Y Learning Intrinsic Motivation	0.958	0.963
X_4 C	0.889	0.923
Y Learning Intrinsic Motivation	0.958	0.963

All Cronbach's Alpha and composite reliability values for each variable are more significant than 0.7, as shown in Table 4. Once the validity and reliability tests have been completed, the inner model test examines the interrelationships among variables.

Structural (Inner) Model Test

This examination assesses the R_2 value, path coefficient, T-statistics, predictive relative, and model fit. R_2 can be determined by examining the value of R Square. R square value is show in Table 5.

Table 5. R Square Value

Variable	R Square	R Square Adjusted
Y Learning Intrinsic Motivation (X_1-Y)	0.382	0.374
Y Learning Intrinsic Motivation (X_2-Y)	**0.438**	**0.432**
Y Learning Intrinsic Motivation (X_3-Y)	0.431	0.425
Y Learning Intrinsic Motivation (X_4-Y)	**0.397**	**0.390**

Base on Table 5, R Square values of 0.67, 0.33, and 0.19, respectively, satisfy the criteria for "strong," "medium," and "weak." The Adjusted R Square value for variable Y is 0.374, corresponding to 37% in Table 6.7. This indicates that the influence of variable X_1 on variable Y is moderate, at 38%. Following this, the R Square for variable Y in the second row is 0.438, or 43%. This indicates that variable X_2 influences variable Y by 43%. The R Square value for variable Y in the third row is 0.431, corresponding to 43%. This indicates that variable X_3 influences variable Y by 43%. In contrast, the R Square value for variable Y in the fourth row is 0.397, corresponding to 39.7 percent. This indicates that variable X_4 exerts a 39.7 percent influence on variable Y. Other factors or variables influence the remainder.

Next, the value of the path coefficient is examined. A path coefficient is deemed positive when its value is more significant than zero and less than one. Additionally, consider the T statistical value greater than 1.96 to signify a positive impact on the variable. Furthermore, it assesses the degree to which the observation value and model value are possessed by examining the pertinent prediction value (Q_2) greater than zero. Meanwhile, the NFI value indicates how accurately the model describes the data. The more closely these values approach 1, the more effectively the model fits the data. Path coefficient and t statistics is show in Table 6.

Table 6. Path Coefficient and T Statistics

Path	Path Coefficient	T Statistics	Q^2	NFI
X1 MLI	0.618	9.513	0.224	0.789
X2 A	0.662	10.226	0.264	0.784
X3 R	0.657	10.487	0.261	0.788
X4 C	0.630	10.145	0.237	0.792

It can be deduced from Table 6 that each variable positively influences students' intrinsic motivation. Additionally, a preliminary examination of the partial tests performed on each motivation variable in conjunction with intrinsic learning motivation yielded the following results: among the four motivation variables, autonomy has the highest adjusted R-squared percentage (43.2 percent), followed by relatedness (42.5 percent), competency towards mastery (39 percent), and meaningful learning (37.4 percent). On this basis, it is possible to conclude that Autonomy exerts the most influence of all factors. Table 7 contains a summary of the examination of MARC variables' effect on students' intrinsic motivation.

Table 7. Effect of Variable X On Y

Variables	R2 Adjusted	Hypothesis results
X1 MLI -> Y Learning Intrinsic Motivation	0.374	$H0_1$ rejected $H1_1$ accepted
X2 A -> Y Learning Intrinsic Motivation	0.432	$H0_2$ rejected $H1_2$ accepted
X3 R -> Y Learning Intrinsic Motivation	0.425	$H0_3$ rejected $H1_3$ accepted
X4 C -> Y Learning Intrinsic Motivation	0.390	$H0_4$ rejected $H1_4$ accepted

Discussion

Gamification encourages students to learn and is essential in online learning. It can be used to cultivate intrinsic motivation in students. Poorly designed gamification strategies may cause decreased motivation and incomplete courses. Sophisticated designs through frameworks are necessary to avoid these issues. A study was conducted on the success rate of the GMOOC platform constructed based on the MARC framework. Four motivation variables were analyzed, and their effects on intrinsic learning motivation were determined. Meaningful learning has an insignificant influence, autonomy has a significant impact, relatedness has a negligible effect, and competence toward mastery has little influence on intrinsic learning motivation. The existing findings align with the results of previous research, demonstrating consistency in the significance of autonomy in enhancing intrinsic motivation through gamified platforms. This was in line with previous studies emphasized the vital role of autonomy in increasing student interest in learning, which is consistent with the findings that autonomy is the most influential factor in students' intrinsic motivation on the GMOOC platform (Aunola et al., 2013; Li & Chu, 2021). Similarly, other study highlighted that autonomy through gamified platforms or software can encourage users' intrinsic motivation, aligning with the consistent emphasis on the importance of autonomy in promoting intrinsic motivation (Bowser et al., 2013; Mitchell et al., 2018). Furthermore, there also studies by all support the notion that autonomy, facilitated through gamified platforms (Qiao et al., 2022; Rakhmanita et al., 2022; T. Wang et al., 2021), enhances intrinsic motivation (Bitrián et al., 2020; Du et al., 2020; Mertasari et al., 2023). These findings are in line with the implications of autonomy through gamified platforms, emphasizing its role in enhancing users' intrinsic motivation and engagement (Gupta et al., 2022; Nicolaidou et al., 2022; Peng & Fu, 2021).

However, it is essential to acknowledge the limitations of autonomy in gamified platforms, as highlighted by (Skok, 2022). The potential for certain gamification elements to undermine engagement and the need to consider individual preferences for autonomy are consistent with the limitations of autonomy in gamified platforms. This aligns with the need to be mindful of the potential restrictions on autonomy and the importance of considering individual differences in the effectiveness of autonomy in gamified platforms (Hamza & Tóvölgyi, 2022; Mominzada et al., 2021; Seiffert-Brockmann et al., 2018).

The consistent findings across various studies and the alignment with previous research underscore the significance of autonomy in enhancing intrinsic motivation through gamified platforms. The literature consistently supports the idea that providing users with autonomy, such as the freedom to make choices and engage in optional activities, enhances their inherent motivation to use gamified platforms or software (Arora & Razavian, 2021; Parnabas et al., 2023; Schaper et al., 2022). By understanding these implications and limitations, developers and educators can design gamified platforms that leverage autonomy to promote engagement and motivation (Bitrián et al., 2023; Mustafa et al., 2023; Zhang & Shao, 2021).

4. CONCLUSION

This study emphasises the significance of gamification frameworks, including the MARC framework, in enhancing student motivation and MOOC pass rates. The results of this research demonstrate that integrating the MARC framework into a Gamified MOOC platform has a beneficial impact on the intrinsic learning motivation of students. In the MARC framework, the Autonomy variable exerts the most influence on intrinsic learning motivation. This study makes a scholarly contribution to the field by introducing the MARC framework, a novel gamification structure designed to assist developers of MOOC platforms in implementing successful gamification tactics. Online learning platforms have the potential to mitigate the substantial attrition rate observed in MOOCs and enhance learners' intrinsic motivation by integrating gamification components grounded in the MARC

framework. The conclusions of this study have implications for various online learning platforms and massive open online courses (MOOCs), offering valuable guidance on the creation and enhancement of practical gamified courses that enhance both completion rates and overall learning outcomes.

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