



## Gamified Massive Open Online Course to Enhance Learner Engagement and Learning Outcomes

Rikky Ihza Pratama<sup>1\*</sup>, Astari Retnowardhani<sup>2</sup>

<sup>1,2</sup>Information Systems Management Department, Master of Information Systems Management, Bina Nusantara University, Jakarta, Indonesia

### Abstract

Received : July 28, 2025  
Revised : August 20, 2025  
Accepted : August 30, 2025

The use of Ruangguru app significantly increases learner engagement in the learning process. Ruangguru app uses gamification method in its learning design. In this app, there are features such as point system, rewards, and levels that are designed to increase learner motivation and engagement in the learning process. In addition, there are also game elements such as challenges, missions, and leaderboards designed to make the learning process more interesting and interactive. These features provide a more enjoyable learning experience for participants and encourage them to be more active in learning. Many MOOCs (Massive Open Online Course) use gamification methods in their learning design. A unique feature of Ruangguru app is the use of animated characters as learning guides. These animated characters are designed with local characteristics, so that participants can more easily identify and feel familiar with the characters. The method used in this research is quantitative method using data processing with SEM PLS software. The results showed that there was an influence of MOOC Gamification on participant engagement and there was also an influence between MOOC Gamification on participant learning outcomes.

### Keywords:

MOOC, Gamified MOOC, Learner engagement, Learning outcomes

(\*) Corresponding Author: rikky.pratama@binus.ac.id

**How to Cite:** Pratama, R. I., & Retnowardhani, A. (2025). Gamified Massive Open Online Course to Enhance Learner Engagement and Learning Outcomes. *JTP - Jurnal Teknologi Pendidikan*, 27(2), 707-729. <https://doi.org/10.21009/jtp.v27i2.56193>

## INTRODUCTION

The development of Massive Open Online Course (MOOC) in Indonesia has shown relatively good development, as a medium for organizing non-formal education to support educational development (Risdianto, 2021). The number of users and available content is increasing. However, there are still challenges in terms of optimal utilization and improving the quality of content. Many educational institutions, both public and private, have utilized MOOCs as an alternative in providing access to online learning (R. P. Nugroho et al., 2024; Papadakis, 2023).

The development of MOOCs in Indonesia creates new opportunities for the development of education and the improvement of the quality of human resources. Although the development of MOOCs in Indonesia shows great potential, some challenges in terms of optimal utilization and improvement of content quality remain issues that must be addressed (Mahardikha et al., 2023; Prawiyogi et al., 2021). In its development, MOOC has a gamification approach that incorporates game-like elements to engage users.



In MOOC learning system, participants can acquire knowledge and information, explore knowledge, and experience interaction with other participants. They can also take exams and obtain certificates upon completion (Wulandari et al., 2024). However, until now, learning through MOOC still faces challenges in encouraging participants to actively participate from the beginning to the end of learning (Borrás-Gené et al., 2019).

Based on Gabbay and Cohen's research, one of the problems associated with MOOCs as a free learning provider is the problem of completion rate (Gabbay & Cohen, 2022). While MOOCs have gained popularity due to their ability to provide educational access to anyone with an internet connection, the completion rate of many courses remains low, with many participants dropping out before completing the course. A study by Nugroho et al. explains that Reich's survey responses from HarvardX students amounted to only 22% of those who stated they had intended and successfully completed the course and obtained a certificate (A. W. Nugroho et al., 2019). The study identified several factors contributing to the low completion rate, including lack of structure and guidance in the MOOC, absence of feedback, and low motivation of participants.

Participant motivation can be improved if students are engaged in the learning process. Participant engagement is crucial in achieving the success of the learning process as it refers to the level of attention, curiosity, interest, optimism, and enthusiasm of participants during the learning process. This involvement will develop into learning motivation, because it is able to explore participants' perceptions of the learning being carried out so that participants are more eager to learn (Anjarwati & Sa'adah, 2021). Participant involvement is considered a motivator in achieving academic achievement, because participants who are heavily involved in the learning process will be more interested in learning so that they will devote more time and energy to participating in the learning process (Khaerani et al., 2023).

Pambudi & Wibawa (2020) explained that one of the effects of the impact of MOOC learning is student learning outcomes. The study explained that data were obtained with an average value of only (3.09). From these data it is concluded that only 60 students (28.2%) strongly agree that the use of the MOOC learning model can improve their learning outcomes.

Learning outcomes are shown by the cognitive and affective changes of participants in dealing with learning, especially in adapting technology in the learning process. Technology is needed in improving participants' learning outcomes because the use of technology allows for a more interactive and interesting learning process through the use of multimedia such as video, animation, images and audio. These various forms of learning will certainly help participants understand concepts better, especially for participants who have different learning styles. Learning using technology fosters higher curiosity, makes participants more effective in managing learning time, and develops into a more positive person. In addition, participants are not only dependent on the teacher because they can do the learning independently (Pambudi & Wibawa, 2020).

Several studies have explored the benefits of gamification in MOOCs (Massive Open Online Courses) in enhancing learners' engagement. A study conducted by Zainuddin et al. found that gamification elements in MOOCs

increased participants' motivation and engagement. This study was a systematic review of 46 empirical studies related to gamification in MOOCs. The findings not only highlighted that gamified learning is a significant factor in transforming the learning process and enhancing motivation, engagement, and user experience, but also identified key challenges and barriers associated with its implementation (Zainuddin et al., 2020).

The emergence of the Ruangguru application during the COVID-19 pandemic introduced a new perspective on online learning for students. Mia et al. and Munawwir and Nerizka reported that the majority of students perceived Ruangguru as a beneficial platform that could enhance their learning experience (Munawwir & Nerizka, 2021; Toruan et al., 2022). These studies also showed that students had a positive attitude toward using the Ruangguru application. They concluded that the use of Ruangguru had the potential to increase students' engagement and learning outcomes during the pandemic.

Permatasari and Soedarsono also explained that the use of the Ruangguru application significantly improved students' engagement in the learning process. The application incorporates gamification in its learning design. Features such as point systems, rewards, and levels are designed to increase students' motivation and engagement. Moreover, elements like challenges, missions, and leaderboards are embedded to make the learning process more engaging and interactive. These features offer a more enjoyable learning experience and encourage active participation among learners (Permatasari & Soedarsono, 2019).

Many MOOCs adopt gamification methods in their instructional design. A unique feature of the Ruangguru application is the use of animated characters as learning guides. These characters are designed with local cultural attributes, allowing students to more easily identify with and feel familiar with them. This makes the learning experience more enjoyable and relatable for users. Another unique feature of the Ruangguru application is its alignment with Indonesia's national curriculum. The application is specifically tailored for Indonesian students and adheres to the national curriculum standards (Chinmi & Marta, 2020), which facilitates the learning process by presenting materials that are directly relevant to the students' academic needs.

Leaderboards are used to display top-performing users in a course. Students can view their rankings and compare their performance with others. Leaderboards foster a sense of competition and social interaction among learners.

Based on the above, the main research problem in the development of MOOCs in Indonesia, particularly through the Ruangguru application, is the low level of learner engagement and motivation, which contributes to low course completion rates. Although gamification has been implemented, the extent to which it improves student engagement and learning outcomes remains underexplored. Therefore, the objective of this study is to evaluate the influence of gamification features in the Ruangguru application on student learning engagement and learning outcomes. Specifically, this study tests the following hypotheses: (H1) gamification features positively affect student learning engagement; (H2) gamification features positively affect student learning outcomes.

## **METHODS**

The data collected in this research consists of both primary and secondary data. The primary data is obtained by distributing questionnaires to users of the Ruangguru MOOC platform. The data collection method used was a survey through questionnaires, which allows for efficient data collection from a large number of respondents within a relatively short period of time. The questionnaire items were developed based on established theoretical frameworks of gamification, learning engagement, and learning outcomes, adapted from relevant prior studies (Kulkarni et al., 2022; Rivera & Garden, 2021). To ensure content validity, the questionnaire was reviewed by two experts in educational technology and online learning who provided feedback on clarity, relevance, and alignment with the research constructs. In addition, a pilot test was conducted with a small group of respondents to evaluate the clarity of the items. Construct validity and reliability of the instrument were further examined using exploratory factor analysis (EFA) and the Cronbach's alpha coefficient. Items with low factor loadings were revised or removed, and reliability coefficients above 0.70 were considered acceptable.

### **SEM Method**

The research model developed by the researcher refers to the Structural Equation Modeling (SEM) analysis technique. This technique was chosen because the research involves Path Analysis with multiple relationship paths between variables (multivariate), including direct relationships between independent and dependent variables. The next steps in Structural Equation Modeling (SEM) involve evaluating the measurement model, which consists of three stages (Hamid & Anwar, 2019a):

#### **1. Outer Model**

This is the initial evaluation of the research model to assess validity and reliability through several tests, as follows:

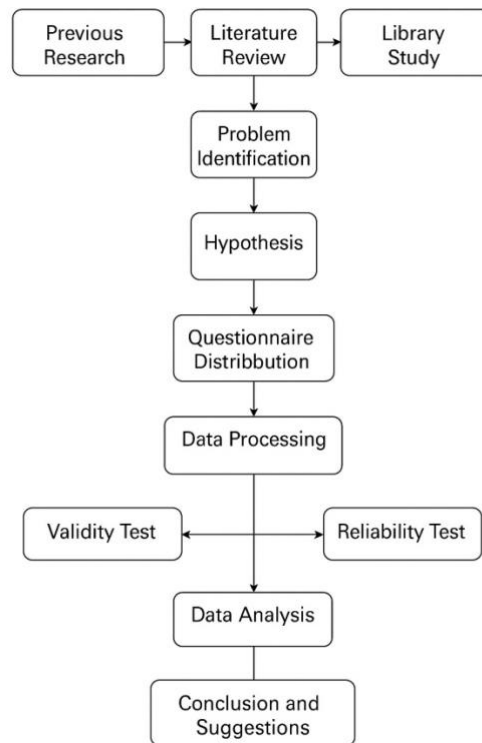
- a. Convergent Validity, which measures the correlation between constructs and latent variables. The test for convergent validity can be seen from the loading factor for each construct indicator. A loading factor value  $> 0.7$  is considered ideal, indicating that the indicator is valid in measuring the intended construct. In empirical research, loading factor values  $> 0.7$  are still acceptable (Furadantin, 2018). In this study, indicators with loading factor values below the acceptable threshold were either removed or revised to improve the model's measurement accuracy. The refinement process ensured that only indicators with strong correlations to their constructs were retained for further analysis.
- b. Discriminant Validity, which is tested using cross loading. An indicator is said to have good discriminant validity if its loading value on its construct is higher than its loading values on other constructs. This shows that each latent variable has strong discriminant validity, as evidenced by the higher values on its own block compared to others (Hamid & Anwar, 2019). In this research, items that showed cross-loading problems were carefully reviewed. Items that consistently loaded higher on unintended constructs were considered for removal to enhance discriminant validity.

- c. Composite Reliability, which tests reliability using both Composite Reliability and Cronbach's Alpha. Indicators are considered reliable if they have Composite Reliability and Cronbach's Alpha values equal to or greater than 0.7 (Furadantin, 2018). In this study, reliability testing was conducted after the refinement process, ensuring that only reliable items with satisfactory Composite Reliability and Cronbach's Alpha values were retained.

**2. Inner Model**

This is the second evaluation step in the research model, used to assess the strength of relationships between variables through several tests, as follows:

- a. R-Square Value, which measures the magnitude of the relationship between independent and mediating variables as a cause of change in the dependent variable. If the R-Square value exceeds 50%, the relationship is considered strong or good (Hamid & Anwar, 2019b).
- b. Path Coefficient, which is used to verify the significance of the relationship between independent and mediating variables, mediating and dependent variables, and direct relationships between independent and dependent variables. A hypothesis is accepted if the P-value is less than 0.05; otherwise, it is rejected. Based on the t-statistic, the reference value is the t-table. For instance, if the number of respondents is 100, the t-table value is 1.96. Hence, the hypothesis is accepted if the t-statistic is greater than the t-table value. Furthermore, the direction of the relationship (positive or negative) can be seen from the original sample output positive values indicate a positive distribution, and vice versa (Hamid & Anwar, 2019b).



**Figure 1.** Stages of Algorithm Implementation

In conducting this research, the researcher developed a conceptual framework consisting of several stages to address the identified problems. MOOC (Massive Open Online Course) needs to be positioned as an educational trend to enhance open-access resources that are available to anyone as an advanced form of education (Al-Rahmi et al., 2019). The presence of MOOCs as an educational model can offer three elements of the curriculum: the intended curriculum, the implemented curriculum, and the achieved curriculum (Risdianto, 2021b).

Gamification is a game-based learning approach that has become a popular trend in the field of education (Zainuddin et al., 2020b). This method incorporates game elements to promote desired behaviors and encourage learning outcomes. It is grounded in the constructivist learning approach, which emphasizes the importance of experiential learning through social interaction with the environment and peers.

The term "*game-based learning*" refers to the use of gamified content as an e-learning technique to achieve instructional goals (Zainuddin et al., 2020b). For example, word games can utilize semantic and phonological skills to help learners make meaningful connections between words, expand vocabulary, and enhance language skills. Furthermore, strategy-based and logic puzzle math playgrounds can help train learners' logical thinking skills. Through a gamification approach, learners are expected to become more actively engaged and experience improvements in their learning outcomes.

This research aims to examine the effectiveness of gamified MOOCs (X1) in increasing learner engagement (Y1) and learning outcomes (Y2). These indicators are used to address the research questions previously formulated. It is hypothesized that gamification in MOOCs has a significant relationship with learner engagement and learning outcomes. The data collected will be based on a questionnaire using a Likert scale measurement. The data will then be analyzed using the Partial Least Squares (PLS) method, which is used in regression analysis and structural equation modeling. In the hypothetical model diagram, the independent variable X1 is analyzed for its influence on the dependent variables Y1 and Y2. In the context of PLS, the main goal is to understand the influence of gamification elements on MOOC participants' engagement and learning outcomes.

After doing all the research as a whole, the last stage is drawing conclusions, where this conclusion is the answer to the problem that has been formulated.

## **RESULTS & DISCUSSION**

### **Results**

Based on the respondents' data, a measurement was conducted to identify the characteristics of the respondents. These measurements include the assessment of gender and education level. The following section presents the results of the respondents' characteristics.

#### **1. Respondent Characteristics Based on Gender**

The following is the sample data of respondents based on the gender table:

**Table 1.** Respondent Characteristics Based on Gender

No	Gender	Amount	Percentage
1	Male	43	41%
2	Female	63	59%
	Total	106	100%

Source: Processed Data, 2025

Based on Table 1, it is shown that the majority of respondents who completed the questionnaire were female, totaling 63 respondents or 59%, while male respondents amounted to 43 individuals or 41%. This result suggests that female students are more dominant in using the Ruangguru platform. One possible explanation is that female learners generally show a higher preference for structured and interactive learning media, which aligns with previous studies highlighting gender differences in technology-based learning adoption.

The relatively lower percentage of male respondents (41%) may indicate that male students are less likely to participate in MOOC-based learning, possibly because they prefer independent or non-structured learning activities. This gender difference suggests a potential correlation with learning engagement dimensions, where female respondents may report higher levels of motivation and consistency in completing online courses compared to their male counterparts.

Furthermore, this distribution reflects broader data trends in Indonesia's online learning adoption, where several studies have noted higher female participation in digital learning platforms. Thus, the gender imbalance observed in this study is not only descriptive but also indicates potential patterns in engagement and learning outcomes, which will be further examined in the analysis stage.

## 2. Respondent Characteristics Based on Last Educational Background

The following is the sample data of respondents based on the table of their last educational background:

**Table 2.** Respondent Characteristics Based on Last Educational Background

No	Last Education Level	Number	Percentage
1	Student	93	87%
2	Diploma	3	3%
3	Bachelor's Degree	8	8%
4	Postgraduate Degree	2	2%
	Total	106	100%

Source: Processed Data, 2025

Based on Table 2, it is shown that the majority of respondents who completed the questionnaire were undergraduate students, with a total of 93 respondents or 87%. This relatively high proportion can be explained by the fact that students are the main target users of MOOC platforms such as Ruangguru, which are designed to align with school and undergraduate curriculum standards. Students also tend to be more familiar with online learning environments and more active in adopting technology for academic purposes compared to other groups.

Meanwhile, the respondents with the lowest number were those in postgraduate programs, with only 2 individuals or 2%. The low participation rate from postgraduate students may be attributed to their preference for more advanced or specialized learning resources, as well as their higher likelihood of relying on formal academic courses or research-based learning rather than general MOOC platforms.

This distribution pattern suggests a potential correlation with the dimensions of learning engagement and outcomes. Since undergraduate students dominate the sample, they are more likely to demonstrate consistent patterns of engagement and responsiveness to gamification features, while postgraduate students may show lower engagement due to mismatches between MOOC content and their academic needs. These findings are consistent with broader trends in online learning adoption in Indonesia, where undergraduate students are the most active users of digital learning applications.

### 3. MOOC Gamification Variable

The MOOC Gamification variable consists of 31 statements presented to the respondents. The average score was 3.96. When rounded and interpreted according to the Likert scale score categories, it can be concluded that respondents' perceptions of the MOOC Gamification questionnaire statements were high. Thus, it can be inferred that the implementation of MOOC Gamification was positively perceived in terms of website-based technology, pedagogy, motivation, usability, content/material, learner support, assessment, future guidance, collaboration, and interactivity. The descriptive analysis based on the conducted research for the MOOC Gamification variable is presented in the following table:

**Table 3.** Frequency Distribution of MOOC Gamification Variable Items

Dimension	Indicator	SS	S	N	TS	STS	Mean
Web-Based Technology	MG1	32	49	23	1	1	4,04
	MG2	29	33	40	3	1	3,81
Pedagogy	MG3	27	43	32	3	1	3,87
	MG4	44	36	23	2	1	4,13
Motivation	MG5	39	44	19	3	1	4,10
	MG6	36	35	31	2	2	3,95
Usefulness	MG7	33	46	23	3	1	4,01
	MG8	27	37	35	4	3	3,76
Content/ Material	MG9	49	35	19	0	3	4,20
	MG10	38	40	23	1	4	4,01
Support for Participants	MG11	18	29	48	9	2	3,49
	MG12	45	46	12	2	1	4,25
Assessment	MG13	38	47	18	0	3	4,10
	MG14	35	47	22	1	1	4,08
Assessment	MG15	24	48	25	6	3	3,79
	MG16	27	42	28	6	3	3,79
Assessment	MG17	24	38	39	4	1	3,75
	MG18	35	47	22	2	0	4,08
Assessment	MG19	28	43	30	4	1	3,88

<b>Dimension</b>	<b>Indicator</b>	<b>SS</b>	<b>S</b>	<b>N</b>	<b>TS</b>	<b>STS</b>	<b>Mean</b>
	MG20	35	39	28	0	4	3,95
	MG21	33	38	27	4	4	3,87
Guidance for the Future	MG22	35	37	28	4	2	3,93
	MG23	41	41	20	2	2	4,10
	MG24	39	44	20	2	1	4,11
	MG25	33	47	21	3	2	4,00
Collaboration	MG26	41	37	23	3	2	4,06
	MG27	37	44	20	3	2	4,05
	MG28	22	39	39	4	2	3,71
Interactivity	MG29	43	36	21	4	2	4,08
	MG30	40	47	16	3	0	4,17
	MG31	24	42	32	5	3	3,75

**Source:** Processed Data, 2025

Based on Table 3, there are 31 statements related to Traditional MOOCs, encompassing ten dimensions: web-based technology, pedagogy, motivation, usability, content/material, learner support, assessment, future guidance, collaboration, and interactivity. According to the results, the highest score was obtained in the content/material dimension, specifically statement number 12, which states that the content or material delivered through the Gamified MOOC is relevant to school learning. This high score indicates that respondents perceive the course materials as directly aligned with their academic needs, which strengthens their motivation and supports higher engagement levels. The strong relevance of content to students' learning contexts may also explain the relatively high scores in related dimensions such as pedagogy and motivation.

Conversely, the lowest score was found in the usability dimension, particularly statement number 11, regarding the presence of feedback in learning on the edX platform. The low score suggests that learners perceive a lack of interactive or timely feedback, which can reduce their sense of support and hinder active engagement in the learning process. This weakness may also correlate with lower scores in the learner support and interactivity dimensions, as feedback is a crucial factor in sustaining engagement and improving learning outcomes.

Overall, the average score for the MOOC Gamification variable is 3.96, which falls within the "good" category. However, the discrepancy between the highest and lowest dimensions highlights an important trend: while strong content relevance enhances motivation and alignment with learning objectives, limitations in usability, particularly feedback mechanisms remain a challenge that could reduce the overall effectiveness of MOOC-based learning.

#### 4. Learner Engagement Variable

The Learner Engagement variable consists of six statements presented to respondents. The average score was 3.92. When rounded and interpreted based on the Likert scale score categories, it can be concluded that respondents demonstrated a high level of agreement with the questionnaire statements related to learner engagement. Therefore, it can be inferred that the learners' engagement

level was perceived as positive. The descriptive analysis based on the research findings for the learner engagement variable is presented in the following table:

**Table 4.** Frequency Distribution of Learner Engagement Variable Items

Dimension	Indicator	SS	S	N	TS	STS	Mean
Participant Engagement	KP1	30	38	32	4	2	3,85
	KP2	31	44	28	1	2	3,95
	KP3	32	51	22	0	1	4,07
	KP4	29	43	28	4	2	3,88
	KP5	30	43	28	4	1	3,92
	KP6	33	35	29	7	2	3,85

**Source:** Processed Data, 2025

Based on the table above, the highest score for the learner engagement dimension was found in statement three, which indicates that participants made an effort to complete assignments/quizzes. This result suggests that learners were motivated and showed responsibility toward course requirements, possibly because the assignments and quizzes were directly relevant to the material. The close alignment between content and assessments may have encouraged learners' effort, which also reflects a positive relationship with the motivation and content/material dimensions.

On the other hand, the lowest score was found in statement six, which indicates that participants were diligent in completing the quizzes. The low score may reflect challenges such as limited time, inconsistent motivation, or lack of feedback that reduces persistence. This issue is closely related to usability and learner support dimensions, as insufficient feedback and support can discourage learners from sustaining engagement. The contrast between the highest and lowest scores highlights that while learners are motivated to attempt tasks, maintaining consistency in completing all quizzes remains a key challenge.

## 5. Learning Outcomes Variable

The Learning Outcomes variable consists of ten statements presented to the respondents. The average score was 4.01. When rounded and interpreted based on the Likert scale score categories, it can be concluded that respondents showed a high level of agreement with the questionnaire statements regarding learning outcomes. Therefore, it can be inferred that the implementation of learning outcomes was considered good, as evidenced by the relatively high average score from the respondents. The descriptive analysis based on the research findings for the learning outcomes variable is presented in the following table:

**Table 5.** Frequency Distribution of Learning Outcomes Variable Items

Dimension	Indicator	SS	S	N	TS	STS	Mean
Learning Outcomes	HB1	28	57	16	4	1	4,01
	HB2	29	46	24	4	3	3,89
	HB3	33	47	19	6	1	3,99
	HB4	45	41	15	2	3	4,16

**Source:** Processed Data, 2025

Based on Table 5, there are four questions regarding learning outcomes. The lowest scores were found in statements two and three, which indicate that participants were able to manage their study time effectively and were able to solve problems encountered during the learning process. The relatively low scores in these aspects may suggest that many participants struggled with time management and independent problem-solving, which are common challenges in MOOC environments where self-regulation is required. This trend is also consistent with earlier findings on learner engagement, showing that while students are willing to attempt tasks, maintaining consistent discipline and independent learning strategies remains difficult. These results point to a correlation between learning outcomes and engagement dimensions, particularly in persistence and learner support.

Meanwhile, the highest score was found in statement four, which reflects that participants understood learning ethics by complying with applicable learning rules. This high score indicates that learners were able to follow course requirements and demonstrate positive attitudes toward academic integrity. The strong results in this dimension may be influenced by the clear rules and structured learning environment provided by the MOOC, which are easier to adhere to compared to self-directed tasks such as time management or problem-solving. Overall, the average score for the learning outcomes variable was 4.01, indicating a high level of learning achievement. However, the contrast between the high compliance with rules and the lower ability in independent learning skills highlights an important pattern: students perform better in structured aspects of MOOCs but still face challenges in self-regulated learning behaviors.

Based on this research, the data presentation and hypothesis testing calculations were conducted using data analysis through Partial Least Square (PLS) analysis.

#### a. Convergent Validity Test Results

Convergent validity is used as a measure of the strength of the correlation between indicators and latent variables, which is determined by the loading factor values. Convergent validity can be observed from the loading factor results. The following are the loading factor values from this study:

**Tabel 6.** Loading Factor Values

	<b>MOOC GAMIFIKASI</b>	<b>PARTICIPANT ENGAGEMENT</b>	<b>LEARNING OUTCOMES</b>
MG1	0,809		
MG10	0,718		
MG11	0,730		
MG12	0,787		
MG13	0,738		
MG14	0,796		
MG15	0,720		
MG16	0,708		
MG17	0,716		
MG18	0,726		
MG19	0,721		

	<b>MOOC GAMIFIKASI</b>	<b>PARTICIPANT ENGAGEMENT</b>	<b>LEARNING OUTCOMES</b>
MG2	0,748		
MG20	0,749		
MG21	0,794		
MG22	0,746		
MG23	0,744		
MG24	0,739		
MG25	0,811		
MG26	0,736		
MG27	0,734		
MG28	0,757		
MG29	0,737		
MG3	0,735		
MG30	0,764		
MG31	0,723		
MG4	0,747		
MG5	0,722		
MG6	0,728		
MG7	0,712		
MG8	0,713		
MG9	0,761		
KP1		0,742	
KP2		0,825	
KP3		0,778	
KP4		0,787	
KP5		0,828	
KP6		0,804	
HB1			0,759
HB2			0,841
HB3			0,797
HB4			0,783

**Source:** Processed Data, 2025

The research results table above shows that each indicator of the variables in this study has a loading factor value greater than 0.70. This means that the indicators of each variable have met the criteria for convergent validity, as they have loading factor values higher than 0.70.

b. Reliability Test

In PLS, the reliability test is conducted by examining the composite reliability values. The following are the results of the reliability test:

**Tabel 7.** Reliability Test Results

	<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>	<b>Average Variance Extracted (AVE)</b>
Learning Outcomes	0,807	0,873	0,632
Participant Engagement	0,884	0,911	0,632

MOOC	0,973	0,975	0,555
GAMIFIKASI			

Source: Processed Data, 2025

Based on the table above, the composite reliability results of this study can be considered reliable. This is because the composite reliability values for each variable are above 0.70. Additionally, the table shows that the Cronbach's alpha values for each construct are also greater than 0.70. This indicates that each variable in the study has positive reliability.

c. Coefficient of Determination or Goodness ( $R^2$ ) of Gamified MOOC

The  $R^2$  results are used to determine the extent of influence that the independent variables have on the dependent variables. The  $R^2$  value ranges from 0 to 1, where a value closer to 1 indicates a better fit. An  $R^2$  value above 0.75 is considered strong, between 0.50 and 0.75 is moderate, and between 0.25 and 0.50 is weak. The following are the results of the  $R^2$  test:

**Tabel 8.**  $R^2$  Test Results

	R Square	R Square Adjusted
Learning Outcomes	0,508	0,503
Participant Engagement	0,439	0,434

Source: Processed Data, 2025

Based on the table above, it can be seen that the  $R^2$  value for the learning outcomes variable is 0.508, meaning that the learning outcomes variable can be explained by Gamified MOOC by 50.8%, while the remaining 49.2% is explained by other variables outside this research model, which falls into the moderate category. The  $R^2$  value for the participant engagement variable is 0.439, meaning that the participant engagement variable can be explained by Gamified MOOC by 43.9%, while the remaining 56.1% is explained by other variables outside this research model, also falling into the moderate category, although close to the lower boundary.

d. Hypothesis Testing

The hypothesis testing in this research was conducted by examining the T-statistic values obtained from bootstrapping results, which were then calculated with the degrees of freedom to produce the P-value (significance value). The original sample value is used to determine the direction of the hypothesis test; if the original sample value is positive, it indicates a positive direction, and if negative, a negative direction. The following are the results of the hypothesis test:

**Tabel 9.** Hypothesis Testing Results – Path Coefficients

	Original Sample (O)	P Values
MG -> HB	0,713	0,000
MG -> KP	0,663	0,000

Source: Processed Data, 2025

## **6. The Effect of Gamified MOOC on Learning Outcomes**

Gamified MOOC has a significant effect on learning outcomes, as evidenced by the p-value of 0.000, which is less than 0.05. Therefore, the null hypothesis (H<sub>0</sub>) is rejected and the alternative hypothesis (H<sub>a</sub>) is accepted. This means that the better the Gamified MOOC, the more it positively influences the balance of students' learning outcomes. Based on the original sample result, the positive value indicates a positive direction of the effect.

## **7. The Effect of Gamified MOOC on Participant Engagement**

Based on the hypothesis test results above, Gamified MOOC has a significant effect on participant engagement, as shown by the p-value of 0.000, which is less than 0.05. Hence, the null hypothesis (H<sub>0</sub>) is rejected and the alternative hypothesis (H<sub>a</sub>) is accepted. This indicates that the better the Gamified MOOC, the more it positively influences participant engagement. The original sample result shows a positive value, meaning the effect is in a positive direction.

These findings suggest that gamification elements such as points, rewards, levels, challenges, and leaderboards play an important role in sustaining learners' motivation and active participation throughout the course. For MOOC developers, this result implies the need to continuously refine gamified features to ensure that they align with learning objectives while remaining engaging for diverse learners. For teachers and instructional designers, integrating gamification can serve as a strategy to reduce dropout rates, improve persistence, and create a more interactive learning environment. In practice, this means designing activities that not only reward participation but also encourage deeper cognitive engagement, such as problem-solving tasks and collaborative challenges. By doing so, MOOCs can become more effective in supporting long-term learning outcomes and reducing the issue of low completion rates often found in online courses.

## **Discussion**

Gamified MOOC also has a positive and significant impact on participant engagement. MOOCs with gamification elements can create a more engaging and competitive learning atmosphere, which indirectly increases active participant involvement. Gamification not only strengthens the desire to complete learning modules but also encourages participants to interact more frequently and complete more learning activities. This reflects that gamification is capable of fostering sustained engagement, not just momentary involvement. The positive value in the original sample also indicates a consistent relationship, meaning that the higher the quality of the Gamified MOOC, the higher the level of participant engagement.

Learning engagement is an important concept in understanding how various elements support one another to create an effective learning process. Within this context, learning is not viewed as an isolated activity but rather as the result of complex interactions between internal and external factors of learners. Factors such as motivation, learning environment, instructional media, teaching strategies, and social interaction among participants all play interrelated roles that reinforce each

other. When all these elements work harmoniously, the learning process tends to run smoothly and becomes meaningful for the participants.

One of the most frequently studied factors related to learning engagement is motivation. Research conducted by DeRobertis (2017) indicates that intrinsic motivation, such as curiosity, the desire for self-development, and satisfaction derived from the learning process itself, has a significant positive influence on learners' engagement levels. Learners with high levels of motivation tend to be more focused, persistent, and resilient when facing challenges in the learning process. The findings of this study align with DeRobertis's results, as participants in the gamified MOOC also demonstrated increased effort and persistence when engaged with interactive and playful tasks. However, unlike DeRobertis's emphasis on intrinsic motivation alone, this study shows that the extrinsic motivational elements provided by gamification (e.g., points, rewards, and leaderboards) further enhanced learner engagement. This suggests that a combination of intrinsic and extrinsic motivators may be particularly effective in sustaining participation in gamified MOOC environments.

A supportive learning environment is also a crucial element that cannot be overlooked. Both physical and psychological environments affect comfort and enthusiasm for learning. Relevant and engaging instructional media, as well as varied teaching strategies tailored to participants' needs, enrich the learning experience. Furthermore, social interactions with instructors and fellow participants alike provide opportunities to share ideas, ask questions, and collaborate, indirectly enhancing understanding and information retention. The creation of a learning environment within Gamified MOOCs has a notably positive impact; when learners feel left behind at certain levels, other participants are motivated to catch up to maintain a sense of shared progress in the learning material. This is part of cultivating a positive environment.

Learning engagement is the result of synergy among various supporting components. The stronger and more aligned the relationships between these elements, the greater the likelihood that participants will experience a meaningful and sustainable learning process. This highlights the importance of a holistic approach in designing learning systems including online platforms such as Gamified MOOCs in order to fully accommodate participants' needs.

Technology-based learning media have become one of the essential instruments in enhancing student engagement and participation in the learning process. Innovations such as interactive videos, gamification, and Massive Open Online Courses (MOOCs) offer a more dynamic, engaging, and adaptive learning experience compared to traditional approaches. When these media are designed with consideration of the learners' needs and characteristics such as through appealing material visualization or the use of contextual storytelling the learning process becomes not only more enjoyable but also easier to understand. This directly impacts the increase in students' engagement with the learning they are undertaking.

Research by El-Sabagh (2021) demonstrates that learning engagement significantly increases when learning media are tailored to individual learning styles. For instance, students with a visual learning style are more attracted to, and better comprehend, material presented through animations or infographics, whereas

kinesthetic learners benefit more from simulation-based approaches or educational games. The findings of this study support El-Sabagh's argument, as the use of gamified MOOCs that integrate multimedia elements—such as videos, animations, and interactive quizzes—was also found to enhance engagement among participants. However, this study extends El-Sabagh's results by showing that engagement was not only influenced by the alignment with learning styles but also by the motivational aspects of gamification, such as rewards and competition through leaderboards. This indicates that gamified MOOCs may simultaneously address both learner preferences and motivational needs, thereby providing a more comprehensive strategy for sustaining engagement.

Besides the media factor, a conducive learning environment is also key to strengthening students' learning engagement. A supportive environment is not limited to physical aspects such as classroom comfort but also includes a safe and inclusive psychological climate. In the context of online learning, this can be realized through a user-friendly platform with minimal technical disruptions, supported by open communication between participants and instructors. Such an environment enables students to express themselves, ask questions, and experiment without fear of judgment, ultimately enhancing emotional involvement.

Social interaction with peers and teachers plays a significant role in increasing learning engagement, both emotionally and cognitively. Collaboration through group discussions, peer reviews, or joint projects allows students to learn socially, exchange viewpoints, and develop critical thinking skills. Teachers who actively provide feedback and foster warm communication also create a sense of being valued and cared for among learners. The combination of technology, a supportive learning environment, and positive interpersonal relationships creates a learning ecosystem capable of enhancing student participation and engagement comprehensively.

Learning style is an important factor in determining how individuals receive, process, and internalize information. Studies have shown that when learning strategies are adjusted to individual learning styles such as using animations and infographics for visual learners or verbal explanations and discussions for auditory learners learning engagement tends to increase significantly. This adjustment allows learners to feel more comfortable and efficient in understanding the material because the approach matches their cognitive preferences. It strengthens both the emotional and cognitive engagement of participants with the learning material delivered.

In the context of gamified MOOC learning, especially following the pandemic period, the role of learning styles has become increasingly prominent. Online learning platforms that lack flexibility or focus solely on a single mode of content delivery tend to fail in meeting the diverse needs of participants. Therefore, it is essential for organizers of gamified MOOC courses to offer various content formats such as videos, audio, text, interactive quizzes, games, and discussion forums that can accommodate different learning styles. Current research highlights that the success of online learning is determined not only by the content but also by the users' comfort in accessing and interacting with the platform.

Learning engagement in online learning is highly influenced by the clarity of the material, an intuitive interface, and the availability of interactive support.

Learners who find the content easy to understand and have easy access to instructors or tutors when encountering difficulties feel more personally and academically connected to the learning process. This sense of connection fosters confidence and motivation to remain engaged in learning activities.

The alignment of learning strategies with individual learning styles, as well as comfort and support within the gamified MOOC system, directly contributes to increased learning engagement. This underscores the importance of an adaptive and personalized approach in designing learning experiences, especially in today's digital era. Such an approach not only helps participants better understand the material but also maintains enthusiasm and sustained participation throughout the learning process.

Feedback is a critical component of an effective learning process, particularly in creating sustained learning engagement. Feedback that is timely, accurate, and constructive provides clear guidance to learners about what they have mastered and which areas need improvement. Learners who receive regular feedback feel noticed and valued by teachers or instructors, which in turn enhances their motivation and participation in learning activities. This sense of being valued builds a positive emotional connection between learners and the learning process, thereby strengthening and sustaining learner engagement.

Furthermore, the effectiveness of feedback also depends on its delivery method. Constructive feedback not only critiques but also provides opportunities for learners to correct mistakes and learn from their experiences. This strengthens learners' confidence and nurtures a growth mindset, encouraging them to keep trying and not give up easily. In the context of gamified MOOC learning, features such as instructor comments, grade notifications, and responses to participants' questions in discussion forums are vital forms of feedback that help maintain learning engagement.

Participant engagement is influenced not only by learning factors but also by external conditions such as socioeconomic background, personal interests, and learning readiness. Learners coming from supportive family or social environments tend to have better access to learning resources, sufficient study time, and emotional support, all of which contribute to higher engagement. Conversely, those facing challenges such as lack of learning facilities, economic pressure, or insufficient parental support are more vulnerable to disengagement in the learning process.

Personal interest in the subject matter also plays a crucial role. Participants who perceive the topic as relevant to their interests and goals are more likely to connect emotionally and intellectually with the learning. Similarly, learning readiness which includes basic skills, mental attitude, and prior knowledge affects the extent to which learners can effectively follow the learning process. Therefore, to create equitable learning engagement, it is important for educators to recognize the background of participants and provide support tailored to individual needs.

Learning engagement encompasses not only cognitive and behavioral dimensions but also an affective dimension, which refers to the emotional aspects experienced by learners during the learning process. This affective dimension includes feelings of enjoyment, interest, comfort, and safety that arise when students interact with the material, teachers, or classmates. Educational studies show that when learners experience positive emotions toward learning activities,

they tend to demonstrate greater enthusiasm, active participation, and perseverance in completing tasks or understanding the material. Enjoyment in learning not only enriches the learning experience itself but also strengthens the emotional engagement that is crucial for long-term learning.

Research by Sengsouliya et al. (2020) finds that learning engagement is one of the strongest predictors of academic success, as higher levels of engagement increase learners' likelihood of understanding material, retaining information, and applying knowledge in real-life contexts. The results of this study are consistent with Sengsouliya et al., since participants who engaged actively with the gamified MOOC demonstrated stronger persistence and responsibility toward their learning tasks, which in turn positively affected their perceived achievement. However, this research adds further nuance by showing that engagement can be intentionally fostered through gamification strategies, rather than being treated as a naturally occurring learner trait.

Similarly, Cheng (2024) confirms that gamified MOOCs have a significant impact on learning outcomes, particularly through the use of badges, leaderboards, points, challenges, and rewards that enhance learners' intrinsic motivation. The findings of this study align with Cheng's argument, as gamification was also observed to sustain both cognitive and emotional engagement among participants, leading to improved persistence until course completion. Nevertheless, this study extends Cheng's results by demonstrating that the impact of gamification is not only on learning outcomes but also on strengthening learners' sense of accountability and time management, dimensions closely linked to engagement. This comparison highlights that gamified MOOCs can provide a more holistic improvement in both engagement and learning outcomes than previously emphasized.

Learning outcomes refer to the final achievements of learners after undergoing the learning process, whether in the form of academic grades, conceptual understanding, skills, or changes in attitude. Research related to learning outcomes often focuses on quantitative measures that reflect students' cognitive achievements. Studies show that initial cognitive ability, learning interest, and learning strategies of learners have a significant influence on learning outcomes. Learners with critical thinking skills and active learning strategies tend to achieve higher results.

Innovative teaching methods such as flipped classroom, blended learning, and project-based learning have attracted attention in the education field due to their effectiveness in improving student learning outcomes. In the flipped classroom, for example, students first study the material independently outside the classroom through videos or digital learning materials, allowing classroom time to be used for discussion, questions and answers, and active application of concepts. This approach enables students to learn at their own pace while receiving direct guidance from the teacher during class. Blended learning, which combines face-to-face and online learning, also offers flexibility and a variety of learning methods that make students more interested and better able to understand the material. Meanwhile, project-based learning encourages students to actively participate in completing real tasks or case studies that require collaborative problem-solving, thereby enhancing critical thinking skills and knowledge application.

The role of the teacher in the context of these innovative methods is crucial for successful learning. Teachers transform from mere content deliverers to facilitators who guide, motivate, and direct students in the active learning process. Effective teachers are able to create a conducive learning environment, provide constructive feedback, and optimally utilize digital technology and learning media. Thus, the teacher's role as a facilitator is key to ensuring that these innovative methods are properly implemented and have a positive impact on student learning outcomes.

Furthermore, advances in digital technology also contribute significantly to improving student learning outcomes. The use of interactive digital media, such as instructional videos, online quizzes, simulations, and learning applications like Ruang Guru or Zenius, provides a more engaging and personalized learning experience. These digital media allow students to access materials anytime and anywhere, accelerate conceptual understanding through clear visualization, and develop their skills through interactive exercises. Research shows that the combination of interactive digital media with active learning methods significantly enhances students' understanding and retention of material. Therefore, integrating technology into teaching not only enriches the learning process but also maximizes students' potential to achieve optimal learning outcomes.

Research by Kulasegaram & Rangachari (2018) shows that the regular implementation of formative assessments such as quizzes, reflections, and short tests significantly contributes to improved learning outcomes, as these activities allow learners to revise and strengthen their understanding before summative evaluations. The findings of this study align with their argument, since participants in the gamified MOOC also benefited from frequent quizzes and challenges that reinforced comprehension. However, while Kulasegaram and Rangachari emphasized the cognitive benefits of formative assessments, this study adds that the gamified format of such assessments further increases learner enjoyment and persistence, which indirectly enhances outcomes.

Similarly, research by Hafizoglu and Yerdelen (2019) indicates that motivation often acts as a mediator between the learning process and final outcomes, meaning that motivated learners are more likely to engage deeply and achieve better results. The current findings support this view, as gamification elements not only motivated participants but also strengthened the relationship between engagement and learning outcomes. Unlike Hafizoglu & Yerdelen (2019), who highlighted motivation primarily as an internal psychological factor, this study demonstrates that motivation can also be externally stimulated through instructional design choices such as rewards and leaderboards. This comparison underscores the dual role of gamification in supporting both formative assessment practices and motivational mechanisms that drive effective learning.

External factors play a crucial role in determining students' learning outcomes. One of the main factors is adequate school facilities, such as comfortable classrooms, technological resources, libraries, and laboratories. Schools that provide comprehensive facilities tend to create a conducive learning environment, enabling students to learn more focused and effectively. Additionally, family support is also a significant external factor. When families provide attention, encouragement, and assistance in the learning process, students feel more motivated

and confident in facing academic challenges. A positive classroom climate, characterized by harmonious relationships between teachers and students as well as among peers, further strengthens the sense of safety and comfort in learning, thereby impacting improved learning outcomes.

In the context of a competency-based curriculum, learning outcomes are measured not only by exam scores but also through the achievement of competencies encompassing attitudes, skills, and knowledge in a comprehensive manner. This shifts the evaluation paradigm from merely the ability to recall or understand material to the ability to apply knowledge and demonstrate appropriate attitudes in real-life situations. Therefore, a comprehensive assessment approach is essential to accurately measure students' success in mastering the expected competencies.

Research by Vlachopoulos (2025) advocates for the use of authentic assessment as a more representative method for evaluating students' learning outcomes, as it involves real-world tasks such as projects, presentations, portfolios, or simulations that require practical application of knowledge and skills. The findings of this study partially align with Gulikers et al., since the gamified MOOC also incorporated interactive tasks and challenges that encouraged learners to apply concepts rather than passively consume content. However, while Gulikers et al. emphasized real-world applicability through project-based tasks, this study shows that gamified quizzes and missions, though less complex can still foster engagement and strengthen competency development. This suggests that gamification may serve as a complementary approach to authentic assessment by providing frequent, motivating, and process-oriented evaluations.

In addition, Ochieng & Gyasi (2021) highlight disparities in learning outcomes across regions, social groups, or gender, influenced by factors such as access to resources, teacher quality, and social support. The results of this study support their claim to some extent, as gender and educational background were also found to influence levels of engagement and achievement in the gamified MOOC. Nevertheless, this research extends their findings by demonstrating that gamification features, such as leaderboards and point systems may help reduce certain disparities by motivating learners across diverse groups to remain engaged. Furthermore, consistent with recent studies emphasizing workforce readiness, this study indicates that meaningful learning outcomes in gamified MOOCs not only concern achievement scores but also involve the development of soft skills such as persistence, accountability, and collaboration, which are essential in real-world contexts.

## **CONCLUSION**

Based on the results and discussion, this study concludes that gamified MOOCs have a positive and significant effect on both participant engagement and learning outcomes. The integration of gamification elements such as badges, leaderboards, points, challenges, and rewards was found to create a more engaging and competitive learning atmosphere, encouraging participants to complete modules, interact more frequently, and maintain consistent involvement in the

learning process. These elements also enhanced learners' intrinsic motivation, strengthened both emotional and cognitive engagement, and supported persistence until course completion, thereby improving comprehension and retention of the material.

Theoretically, the findings provide empirical support for the role of gamification as a mediator between learning engagement and outcomes in MOOC environments. They also extend existing theories of motivation by showing that extrinsic motivators, when carefully designed, can complement intrinsic drivers to sustain long-term participation. Practically, the results suggest that MOOC developers, teachers, and instructional designers should integrate gamification features not only as reward mechanisms but also as tools to encourage deeper cognitive engagement, such as collaborative challenges or problem-based learning activities. These strategies can help reduce dropout rates and increase the effectiveness of online learning, especially in diverse learner populations. Despite its contributions, this study has several limitations. The reliance on self-reported questionnaire data may introduce response bias, and the focus on a single MOOC platform (Ruangguru) limits the generalizability of the findings. Future research is recommended to employ longitudinal and experimental designs to assess the long-term causal impact of gamification, as well as to explore how different gamification features affect learners with varying backgrounds, learning styles, and levels of digital literacy.

## REFERENCES

- Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., Aljarboa, N. A., Alturki, U., & Aljeraiwi, A. A. (2019). Integrating technology acceptance model with innovation diffusion theory: An empirical investigation on students' intention to use E-learning systems. *Ieee Access*, 7, 26797–26809.
- Anjarwati, R., & Sa'adah, L. (2021). Student Learning Engagement in The Online Class. *English Journal of Merdeka*, 6(2), 104–114. <https://doi.org/10.26905/enjourme.v6i2.6128>
- Borrás-Gené, O., Martínez-Núñez, M., & Martín-Fernández, L. (2019). Enhancing fun through gamification to improve engagement in MOOC. *Informatics*, 6(3), 28.
- Cheng, Y.-M. (2024). What makes learners enhance learning outcomes in MOOCs? Exploring the roles of gamification and personalization. *Interactive Technology and Smart Education*, 21(2), 308–330.
- Chinmi, M., & Marta, R. F. (2020). RuangGuru as an Ideation of Interaction and Education Revolution during COVID-19 Pandemic in Indonesia. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12(2Sup1), 118–129. <https://doi.org/10.18662/rrem/12.2sup1/297>
- DeRobertis, E. M. (2017). *The phenomenology of learning and becoming: Enthusiasm, creativity, and self-development*. Springer.
- El-Sabagh, H. A. (2021). Adaptive e-learning environment based on learning styles and its impact on development students' engagement. *International Journal of Educational Technology in Higher Education*, 18(1), 53.
- Furadantin, N. R. (2018). Analisis data menggunakan aplikasi smartpls v. 3.2. 7 2018. *Jurnal Manajemen*, 1(1), 1–18.

- Gabbay, H., & Cohen, A. (2022). Investigating the effect of automated feedback on learning behavior in MOOCs for programming. *Proceedings of The 15th International Conference on Educational Data Mining*, 376–383, .
- Hafizoglu, A., & Yerdelen, S. (2019). The Role of Students' Motivation in the Relationship between Perceived Learning Environment and Achievement in Science: A Mediation Analysis. *Science Education International*, 30(4), 251–260.
- Hamid, R. S., & Anwar, S. M. (2019a). *Structural Equation Modeling (SEM) Berbasis Varian*. Jakarta Pusat: PT. Inkubator Penulis Indonesia.
- Khaerani, N. S., Lintangari, A. P., & Gayatri, P. (2023). EFL Students' Learning Engagement in The Post Pandemic Era. *Journal of English Education and Linguistics Studies*, 10(1), 119–148.
- Kulasegaram, K., & Rangachari, P. K. (2018). Beyond “formative”: assessments to enrich student learning. *Advances in Physiology Education*, 42(1), 5–14.
- Kulkarni, P., Gokhale, P., Satish, Y. M., & Tigadi, B. (2022). An empirical study on the impact of learning theory on gamification-based training programs. *Organization Management Journal*, 19(5), 170–188.
- Mahardikha, S. K., Yusuf, M., & Musdad, A. A. (2023). Development of Learning Media Based on Gamification of Hijayyah Letters in Elementary Schools. *JTP - Jurnal Teknologi Pendidikan*, 25(1), 29–41. <https://doi.org/10.21009/jtp.v25i1.34554>
- Munawwir, A., & Nerizka, D. (2021). Analysis of The “Ruangguru” Application in Improving Children's Creativity in The Era of Covid 19 Pandemic. *International Journal of Educational Research & Social Sciences*, 2(1), 1–8. <https://doi.org/10.51601/ijersc.v2i1.14>
- Nugroho, A. W., Santosa, P. I., & Fauziati, S. (2019). Pemanfaatan Gamifikasi pada Massive Open Online Course (MOOC). *Seminar Nasional Teknologi Komputer & Sains (SAINTEKS)*, 71–74.
- Nugroho, R. P., Soepriyanto, Y., & Wedi, A. (2024). Development of Learning Management System with Gamification Approach for Project-Based Learning. *JTP - Jurnal Teknologi Pendidikan*, 26(3), 794–806. <https://doi.org/10.21009/jtp.v26i3.40873>
- Ochieng, V. O., & Gyasi, R. M. (2021). Open educational resources and social justice: Potentials and implications for research productivity in higher educational institutions. *E-Learning and Digital Media*, 18(2), 105–124.
- Pambudi, M. B., & Wibawa, S. C. (2020). Pengaruh Model Pembelajaran Massive Open Online Courses Terhadap Hasil Belajar Peserta Didik. *Jurnal IT-EDU*, 5(1), 294–302.
- Papadakis, S. (2023). *MOOCs 2012-2022: An overview*. *Advances in Mobile Learning Educational Research*, 3 (1), 682–693.
- Permatasari, D. P., & Soedarsono, D. K. (2019). PENGARUH PENGGUNAAN FITUR RUANGBELAJAR TERHADAP TINGKAT PEMAHAMAN SISWA PENGGUNA APLIKASI RUANG GURU. *Progress in Retinal and Eye Research*, 561(3), S2–S3.
- Prawiyogi, A. G., Aini, Q., Santoso, N. P. L., Lutfiani, N., & Juniar, H. L. J. (2021). Blockchain Education Concept 4.0: Student-Centered iLearning Blockchain Framework. *JTP - Jurnal Teknologi Pendidikan*, 23(2), 129–145. <https://doi.org/10.21009/jtp.v23i2.20978>
- Risdianto, E. (2021a). MOOCs SEBUAH TREN PENDIDIKAN MASA DEPAN. *Prosiding Seminar Nasional ...*, July, 7–12.
- Rivera, E. S., & Garden, C. L. P. (2021). Gamification for student engagement: a framework. *Journal of Further and Higher Education*, 45(7), 999–1012.
- Sengsouliya, S., Soukhavong, S., Silavong, N., Sengsouliya, S., & Littlepage, F. (2020). An investigation on predictors of student academic engagement. *European Journal of Education Studies*.

- Toruan, R. M. L. L., Asmara, S., & Zulkarnain, I. (2022). Effectiveness of Ruangguru Application as Communication Medium in Online Tutoring among HighSchool Students in Medan. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, 5(1), 899–908.
- Vlachopoulos, D. (2025). AUTHENTIC ASSESSMENT: BRIDGING HIGHER EDUCATION AND REAL-WORLD SKILLS THROUGH DIVERSE METHODOLOGIES. *INTED2025 Proceedings*, 2225–2234. <https://doi.org/10.21125/inted.2025.0628>
- Wulandari, Sutimin, L. A., & Santosa, E. B. (2024). Developing a Gamified Digital Learning Media to Cultivate Singing Skills for Junior High School Students. *JTP - Jurnal Teknologi Pendidikan*, 26(1), 108–120. <https://doi.org/10.21009/jtp.v26i1.43936>
- Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020a). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, 30(March 2019). <https://doi.org/10.1016/j.edurev.2020.100326>