

The Role of Intrinsic Motivation in Mediating the Relationship between Game-Based Learning and Student Engagement

Elsa Dahosa Emanuella Putri¹, Dudung Ma'ruf Nuris², Nia Mar'atus Solekah³

^{1,2}Universitas Negeri Malang, Department of Accounting, Indonesia

³SMK Negeri 2 Kota Kediri, Indonesia

Elsadahosa0592@gmail.com¹ email, dudung.maruf.fe@um.ac.id²,

niasolekah13@guru.smk.belajar.id³

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Abstract

This study was conducted to examine the effect of Game-Based Learning (GBL) on students' intrinsic motivation, behavioral engagement, and emotional engagement, as well as the mediating role of intrinsic motivation in these relationships. The study was prompted by the phenomenon of learning loss following the COVID-19 pandemic, which has led to a decline in motivation and engagement among students at SMKN 2 Kota Kediri. A quantitative approach using SEM-PLS analysis was employed, with a questionnaire serving as the data collection instrument. The theoretical framework used is Self-Determination Theory (SDT) by Ryan & Deci. The study found that GBL has a significant positive effect on intrinsic motivation ($f^2 = 1.328$), behavioral engagement ($f^2 = 0.382$), and emotional engagement ($f^2 = 0.109$). Intrinsic motivation was found to have a significant effect on emotional engagement, but not on behavioral engagement. Mediation analysis indicated that intrinsic motivation partially mediates the effect of GBL on emotional engagement, whereas on the behavioral engagement pathway, intrinsic motivation was not found to act as a mediator. These findings imply that GBL is a learning method considered effective in enhancing learners' motivation and engagement.

Keywords: Behavioral Engagement, Emotional Engagement, Game-Based Learning, Intrinsic Motivation

1. INTRODUCTION

The COVID-19 pandemic, which began in 2019, has had a prolonged impact on education systems worldwide, including in Indonesia. The shift to distance learning gave rise to a phenomenon known as learning loss, referring to the academic competencies students fail to acquire compared with normal, face-to-face instruction (Engzell et al., 2021). Their study reported that around 350,000 students in the Netherlands experienced school closures resulting in a loss of learning equivalent to one-fifth of an academic year, demonstrating that online learning during the pandemic could not fully substitute for face-to-face instruction. In Indonesia, the pandemic generated various educational problems, including reduced teacher-student interaction, limited formative assessment, and an overall decline in learning quality (Muzdalifa, 2022). Several studies also found that the issuance of Ministry of Education and Culture Circular Letter No. 4 of 2020 contributed to declining learning motivation and low levels of student engagement during the learning process (Alimuddin & Pratiwi, 2022; Hotmaidah Hasibuan, 2020). This situation has also given rise to challenges for the post-pandemic education system, requiring educational institutions to continuously develop adaptive learning methods that remain relevant to students' conditions and needs (Sari et al., 2024).

The impact of learning loss following the COVID-19 pandemic has encouraged innovation in education systems toward learning that is integrated with technology (Dahalan et al., 2024). Technology-based approaches are no longer merely supporting components but have developed into a primary pillar of modern instructional design. The rapid development of educational technology, such as advances in artificial intelligence, virtual reality, and various interactive digital learning platforms has generated substantial opportunities to produce learning methods that are more engaging and interactive (Chen & Tu, 2021; Leitão et al., 2022). One approach that has gained considerable attention among education practitioners is Game-Based Learning (GBL). GBL is a learning method that applies and adopts games with certain constraints to achieve specific learning objectives (Liana, 2024). Unlike conventional, teacher-centered learning, GBL is student-centered, positioning learners as active participants in the learning process. The use of GBL allows students to understand material in a more engaging and contextual manner, tending to create a classroom atmosphere that is interactive, enjoyable, and more challenging (Lozada Lozada, 2025).

By using games as a learning medium, students can participate more actively and increase their enthusiasm for learning. The GBL model integrates various game-design elements with learning content so that the learning process becomes more engaging, interactive, and systematic, and is able to foster students' learning motivation (Noor & Zubaidah, 2022). This suggests that an enjoyable learning method allows knowledge transfer to be absorbed optimally by learners. Empirical findings indicate that classpoint-based GBL has a significant effect on student activeness compared with the lecture method. The application of GBL is also considered to significantly affect student engagement. (V. Rahmawati et al., 2023) found a significant effect of GBL on student engagement in history learning at the senior high school level, while Raharjo et al. (2024) reported that GBL can enhance an interactive, enjoyable learning environment and student engagement (Raharjo et al., 2024; D. Rahmawati & Putra, 2022). Empirical studies further suggest that digital GBL (DGBL) can significantly increase student motivation and

engagement, which in turn enhances academic, social, and personal skills and fosters emotion and creativity in the classroom (Amzalag et al., 2024; Eltahir et al., 2021; Fonseca et al., 2023a). This is important for teachers to understand, since high learning motivation simultaneously improves the optimization of learning outcomes (Az Zahro & Setyowibowo, 2024).

On the other hand, preliminary observations conducted by the researchers at SMKN 2 Kota Kediri revealed problems that require immediate attention. Observation results indicated symptoms of low student engagement, particularly across two main dimensions. In terms of behavioral engagement, the researchers found low active student participation in classroom activities, a low task-completion rate, and low persistence in completing challenging tasks, along with minimal student contribution during group-based learning. In terms of emotional engagement, many students appeared listless and unenthusiastic at the start of learning sessions, openly expressed boredom toward conventional learning methods, showed minimal enthusiasm toward learning, and displayed a low sense of belonging toward their classroom groups. This phenomenon illustrates that the conventional learning methods applied at SMKN 2 Kota Kediri have been unable to fulfill students' psychological needs, resulting in stagnant motivation and a continuous decline in student engagement.

Although research on GBL and student engagement has developed considerably, a review of the literature reveals several research gaps that remain unaddressed. First, in terms of research context, several prior studies were conducted at the higher education level (Eltahir et al., 2021; Ferrer et al., 2022; Nadeem et al., 2023) or in general senior high schools (V. Rahmawati et al., 2023), whereas the present study focuses on vocational high school students majoring in Accounting and Institutional Finance. This is also supported by Dahalan et al. (2024), who emphasized the need for further research examining the effect of GBL when implemented in vocational education settings. Second, no study has yet explicitly examined the mediating role of intrinsic motivation in the relationship between GBL and student engagement. Mostly research test GBL effects on motivation or engagement as a single construct. Studies examining motivation emotion relations in GBL (Kiili et al., 2023) or a mediator of GBL effects (Nusairat et al., 2024) do not test intrinsic motivation as the transmitting mechanism for behavioral and emotional engagement separately. Third, many previous studies relied on qualitative literature reviews or small-scale quasi-experiments, so this relationship needs to be further verified through a quantitative approach using SEM-PLS analysis.

Based on this literature review, the present study proposes a conceptual model describing the relationship between Game-Based Learning as the independent variable, intrinsic motivation as the mediating variable, and Behavioral Engagement and Emotional Engagement as dependent variables representing the components of Student Engagement. This research model is grounded in Self-Determination Theory (SDT) by Ryan and Deci. Accordingly, this study aims to examine the direct effects of GBL on intrinsic motivation, behavioral engagement, and emotional engagement, the direct effects of intrinsic motivation on behavioral and emotional engagement, and the mediating role of intrinsic motivation in the relationship between GBL and both dimensions of student engagement among students of SMKN 2 Kota Kediri.

2. LITERATURE REVIEW

2.1. Self-Determination Theory

Self-Determination Theory (SDT), proposed by Ryan & Deci (2000), provides a comprehensive theoretical framework for explaining the interrelationships among the variables examined in this study. As a grand theory of human motivation developed by Edward L. Deci and Richard M. Ryan, SDT posits that three basic psychological needs must be fulfilled for intrinsic motivation to develop: autonomy, competence, and relatedness. These three dimensions are cumulative in nature, meaning that fulfilling only one dimension is insufficient to generate motivation; all three basic psychological needs must be satisfied simultaneously.

In this study, the GBL model functions as a framework that fulfills the three basic psychological needs proposed by SDT. The fulfillment of autonomy is reflected in students' freedom to choose the strategies they use to obtain the highest score, which increases their willingness to face challenges. The fulfillment of competence is reflected in a tiered difficulty system that ensures challenges remain within the boundaries of students' existing knowledge, while instantly awarded points generate a sense of accomplishment upon successfully answering questions. The fulfillment of relatedness is reflected in the collaboration formed among group members and the healthy competition between groups to obtain the highest score during the learning process. This confirms that GBL can function as a medium for fulfilling students' basic psychological needs and, in turn, enhance intrinsic motivation (Nadiah & Niarrofah, 2024).

2.2. Intrinsic Motivation and Behavioral Engagement

Intrinsic motivation arising from the GBL experience is expected to increase students' behavioral engagement. SDT explains that behavioral engagement is an outcome of autonomous motivation, whereby students are intrinsically motivated to voluntarily and actively participate in the learning process without external coercion. Behavioral engagement refers to students' ability to actively contribute during the learning process, encompassing persistence, effort, attention, and active interaction in classroom learning (Nurrindar & Wahjudi, 2021). Y. Li et al. (2024) found that active behavior serves as a bridge between the GBL experience and positive learning outcomes.

2.3. Intrinsic Motivation and Emotional Engagement

In addition to behavioral engagement, intrinsic motivation is also expected to increase students' emotional engagement. Emotional engagement refers to students' affective responses to the learning process, including feelings of enjoyment, enthusiasm, a sense of belonging, and other positive emotions (Rachmad, 2022). Students with high intrinsic motivation tend to experience satisfaction when successfully solving problems, enthusiasm in facing new challenges, and positive emotions during learning (Ferrer et al., 2022). Similarly found that students with high intrinsic motivation display stronger emotional engagement.

This study focuses on two dimensions of Student Engagement (Behavioral Engagement and Emotional Engagement) based on theoretical and contextual considerations. First, according to SDT, intrinsic motivation directly influences both dimensions. Second, the problems identified through observation at SMKN 2 Kota Kediri

specifically concern low behavioral and emotional engagement, namely passive students, incomplete task submission, and feelings of boredom and low enthusiasm toward learning. Prior studies also suggest that these two dimensions are the most affected by the learning method applied. The focus on these two dimensions is therefore both theoretically justified and contextually relevant to the conditions found at SMKN 2 Kota Kediri.

2.4. Hypotheses Development

Based on the conceptual model described above, the following hypotheses are proposed:

- H1: Game-Based Learning has a positive and significant effect on the Intrinsic Motivation of students at SMKN 2 Kota Kediri.
- H2: Intrinsic Motivation has a positive and significant effect on the Emotional Engagement of students at SMKN 2 Kota Kediri.
- H3: Intrinsic Motivation has a positive and significant effect on the Behavioral Engagement of students at SMKN 2 Kota Kediri.
- H4: Intrinsic Motivation mediates the relationship between Game-Based Learning and Behavioral Engagement of students at SMKN 2 Kota Kediri.
- H5: Intrinsic Motivation mediates the effect of Game-Based Learning on Emotional Engagement of students at SMKN 2 Kota Kediri.

3. RESEARCH METHODOLOGY

3.1. Research Design

This study employs a quantitative approach, classified as explanatory research, which aims to determine the causal relationships among variables through statistical hypothesis testing. The research design uses a survey with mediation-based data analysis, in which intrinsic motivation acts as the mediating variable between the independent variable, Game-Based Learning, and the dependent variable, student engagement (comprising behavioral and emotional engagement), among Grade X students majoring in Accounting and Institutional Finance at SMKN 2 Kota Kediri.

3.2. Participants of the Study

The population of this study consists of all Grade X students who experienced learning using the Game-Based Learning method in the Basic Accounting subject. Since the GBL-based learning activities were implemented by the researchers in two classes during a teaching internship program, both classes were designated as the population as well as the sample of the study. The sampling technique used was saturated sampling (total sampling), in which the entire population is used as the research sample. The final sample consisted of two classes that participated in game-based learning, totaling 71 respondents.

3.3. Instruments

Data were collected using a questionnaire completed directly by respondents based on their individual experiences. The questionnaire was developed using a five point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree),

which has been shown to be valid and reliable in previous studies (Ferrer et al., 2022; Hamari et al., 2016; Nurrindar & Wahjudi, 2021; Soriano-Sánchez et al., 2026). The questionnaire consisted of four main sections developed based on adaptations of validated instruments from prior research and the Intrinsic Motivation Inventory (McAuley, Duncan, 1987).

3.4. Data Analysis Techniques

Data were analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS) with the assistance of SmartPLS version 4.0. The analysis was conducted in two stages. The first stage involved outer model testing to examine the relationships between latent variables and their indicators, assessed through convergent validity, discriminant validity, and construct reliability. The second stage involved inner model testing to examine all proposed hypotheses through bootstrapping analysis, which was used to estimate path coefficients and standard errors, expressed as T-statistics and P-values.

4. RESULTS

4.1. Outer Model

The outer model evaluation comprises three main tests: convergent validity, discriminant validity, and construct reliability.

Convergent Validity. Outer loading estimates were obtained by measuring the correlation between each indicator score and its corresponding construct. An indicator is considered valid if its loading value reaches 0.70. The first-stage convergent validity test found that four GBL items (0.696, 0.680, 0.692, 0.683), four Intrinsic Motivation items (0.460, -0.391, -0.532, 0.392), five Behavioral Engagement items (0.691, 0.621, 0.679, 0.587, 0.667), and five Emotional Engagement items (0.593, 0.600, 0.356, 0.625, 0.668) fell below the 0.70 threshold. Following common practice, all items with loading values below 0.70 were removed and the model was re-tested (Nurrindar & Wahjudi, 2021).

Table 1. Second-Stage Convergent Validity Results

Intrument	Game Based Learning	Intrinsic Motivation	Behavioral Engagement	Emotional Engagemet	Result
GBL1	0.722				Valid
GBL5	0.842				Valid
GBL6	0.828				Valid
GBL7	0.793				Valid
MI1		0.753			Valid
MI2		0.804			Valid
MI4		0.788			Valid

MI7	0.716		Valid
MI8	0.796		Valid
MI9	0.717		Valid
BE2		0.841	Valid
BE3		0.761	Valid
BE7		0.832	Valid
EE2		0.763	Valid
EE4		0.834	Valid
EE8		0.845	Valid
EE9		0.908	Valid
EE10		0.725	Valid

The second-stage results show that all remaining items for Game-Based Learning, Intrinsic Motivation, Behavioral Engagement, and Emotional Engagement have loading values above 0.70. Accordingly, all items are considered valid and confirm that the indicators used in this research model are able to measure their respective constructs (Rajput et al., 2022).

Discriminant Validity. Cross-loading results indicate that every indicator has a higher correlation with its own construct than with other constructs, confirming adequate discriminant validity for all four variables (Table 2).

Table 2. Discriminant Validity (Cross-Loading) Results

<i>Instrument</i>	<i>Behavioral Engagement</i>	<i>Emotional Engagement</i>	<i>Game Based Learning</i>	<i>Intrinsic Motivation</i>	<i>Result</i>
BE2	0.841	0.332	0.563	0.421	Valid
BE3	0.761	0.488	0.579	0.526	Valid
BE7	0.832	0.340	0.587	0.424	Valid
EE10	0.425	0.725	0.482	0.487	Valid
EE2	0.393	0.763	0.551	0.513	Valid
EE4	0.326	0.834	0.536	0.566	Valid
EE8	0.374	0.845	0.528	0.532	Valid

EE9	0.438	0.908	0.579	0.610	Valid
GBL1	0.565	0.380	0.722	0.537	Valid
GBL5	0.643	0.531	0.842	0.591	Valid
GBL6	0.513	0.609	0.828	0.666	Valid
GBL7	0.551	0.555	0.793	0.610	Valid
MI2	0.369	0.555	0.547	0.804	Valid
MI4	0.420	0.472	0.540	0.788	Valid
MI7	0.426	0.537	0.611	0.716	Valid
MI8	0.547	0.410	0.584	0.796	Valid
MI9	0.403	0.600	0.530	0.717	Valid
MI1	0.408	0.460	0.634	0.753	Valid

Construct Reliability. All Cronbach's alpha values exceed 0.70, indicating that all constructs possess good reliability (Rajput et al., 2022).

Table 3. Construct Reliability Results

Variable	Cronbach's alpha	Result
<i>Behavioral Engagement</i>	0.740	Reliabel
<i>Emotional Engagement</i>	0.874	Reliabel
<i>Game Based Learning</i>	0.808	Reliabel
<i>Intrinsic Motivation</i>	0.856	Reliabel

4.2. Model Fit

Table 4. Model Fit Results

Fit Index	Estimated Value	Result
SRMR	0.086	Fit
d_ ULS	1.272	Fit
d_ G	0.664	Fit
Chi-square	244.568 > 27.587	Fit
NFI	0.704	Fit
GoF	0,571	Fit

The SRMR value of 0.086 is below the 0.10 threshold, indicating an acceptable model fit. The d-ULS value of 1.272 suggests that the structural model

does not exhibit meaningful deviation. The d-G value of 0.664, higher than the 0.05 reference point, further supports adequate model fit. The Chi-square value of 244.568 exceeds the critical value of 27.587, confirming the model's capability to represent the relationships among variables. The NFI value of 0.704 indicates an acceptable degree of fit, while the GoF value of 0.571, exceeding the 0.36 threshold, indicates a strong overall model fit in representing the relationships among the latent variables.

4.3. Inner Model

R-Square testing was conducted to assess the extent to which the independent variables explain the variability of the dependent variables.

Table 5. R-Square Results

Dependent Variable	R-square	R-square adjusted
<i>Behavioral Engagement</i>	0.507	0.492
<i>Emotional Engagement</i>	0.497	0.482
<i>Intrinsic Motivation</i>	0.570	0.564

The R-Square value for Behavioral Engagement is 0.507, indicating that 50.7% of its variance is explained by the independent variables in the model, while the remaining 49.3% is explained by factors outside the model. For Emotional Engagement, the independent variables explain 49.7% of the variance, with 50.3% attributable to factors outside the model. For Intrinsic Motivation, the R-Square value of 0.570 indicates that 57% of its variance is explained by the model, while 43% is explained by other factors. Overall, all three R-Square values fall into the moderate category, indicating that the model is able to explain a substantial proportion of the variance in each dependent variable, although other contributing factors remain unaccounted for (Rajput et al., 2022).

Hypothesis Testing (Direct Effects). Bootstrapping analysis was used to estimate path coefficients and determine the significance of the relationships among latent variables.

Table 6. Direct Effect Bootstrapping Results

Path	Original Sample (O)	Sample Mean (M)	Standard Dev.	T - statistics (O/STDEV)	P-values	Result.
GBL - Behavioral Engagement	0.662	0.671	0.127	5.230	0.000	Supported
GBL - Emotional Engagement	0.358	0.355	0.157	2.283	0.011	Supported
GBL – Intrinsic Motivation	0.755	0.761	0.060	12.630	0.000	Supported

Intrinsic Motivation - Behavioral Engagement	0.064	0.056	0.156	0.410	0.341	Not Supported
Intrinsic Motivation - Emotional Engagement	0.394	0.407	0.162	2.432	0.008	Supported

The effect of GBL on Behavioral Engagement is highly significant ($\beta = 0.662$; $T = 5.230$; $p = 0.000$), supporting H1's counterpart direct path and indicating that more intensive implementation of GBL corresponds to higher behavioral engagement. The effect of GBL on Emotional Engagement is also significant ($\beta = 0.358$; $T = 2.283$; $p = 0.011$), reflecting a moderate positive relationship. The effect of GBL on Intrinsic Motivation is the strongest in the model ($\beta = 0.755$; $T = 12.630$; $p = 0.000$), confirming H1. The effect of Intrinsic Motivation on Behavioral Engagement is not significant ($\beta = 0.064$; $T = 0.410$; $p = 0.341$), so H3 is not supported. The effect of Intrinsic Motivation on Emotional Engagement is significant ($\beta = 0.394$; $T = 2.432$; $p = 0.008$), supporting H2.

Hypothesis Testing (Indirect Effects). The mediating role of Intrinsic Motivation was examined through indirect-effect bootstrapping.

Table 7. Indirect Effect Bootstrapping Results

Path	Original Sample (O)	Sample Mean (M)	Standard Dev.	T - statistics (O/STDEV)	P -values	Result
GBL – Intrinsic Motivation - Behavioral Engagement	0.048	0.041	0.121	0.399	0.345	Not Supported
GBL - Intrinsic Motivation - Emotional Engagement	0.298	0.312	0.133	2.237	0.013	Supported

The indirect effect of GBL on Behavioral Engagement through Intrinsic Motivation is not significant ($\beta = 0.048$; $T = 0.399$; $p = 0.345$). Since the direct effect of GBL on Behavioral Engagement is significant ($T = 5.230$; $p = 0.000$) while the indirect effect through Intrinsic Motivation is not, the mediation criteria are not met; H4 is therefore not supported. This suggests that behavioral engagement is driven more directly by the game mechanics, challenges, and competition embedded in GBL itself, rather than through the pathway of intrinsic motivation.

The indirect effect of GBL on Emotional Engagement through Intrinsic Motivation is significant ($\beta = 0.298$; $T = 2.237$; $p = 0.013$). Because both the direct effect ($T = 2.283$; $p = 0.011$) and the indirect effect are significant, Intrinsic Motivation is confirmed to partially mediate the effect of GBL on Emotional Engagement, supporting H5. This indicates that GBL enhances emotional engagement both directly and through the pathway of intrinsic motivation, meaning that game-based learning experiences simultaneously evoke positive affective responses and cultivate an internal drive to learn, which further strengthens students' emotional engagement.

4.4. Effect Size

Effect size (f^2) testing was conducted to evaluate the specific contribution of each independent variable to its corresponding dependent variable, based on changes in R^2 when a given predictor is excluded from the model.

Table 8. Effect Size (f^2) Results

Path	f^2	Category
Game-Based Learning - Behavioral Engagement	0.382	Large
Game-Based Learning - Emotional Engagement	0.109	Small
Game-Based Learning - Intrinsic Motivation	1.328	Large
Intrinsic Motivation - Behavioral Engagement	0.004	Very small
Intrinsic Motivation - Emotional Engagement	0.133	Small

The f^2 value for GBL on Behavioral Engagement (0.382) exceeds 0.35, indicating that GBL makes a substantial contribution to encouraging student behavioral engagement during learning. The f^2 value for GBL on Emotional Engagement (0.109) falls into the small-effect category, suggesting that although the effect is statistically significant, its practical contribution is comparatively limited, implying that emotional engagement is also shaped by other factors not examined in this model. The f^2 value for GBL on Intrinsic Motivation (1.328) is the largest in the model, confirming GBL as the primary predictor driving students' intrinsic motivation. The f^2 value for Intrinsic Motivation on Behavioral Engagement (0.004) is very small, consistent with the non-significant path coefficient reported earlier. The f^2 value for Intrinsic Motivation on Emotional Engagement (0.133) falls into the small-effect category, indicating a relatively limited, though still meaningful, practical contribution, and suggesting the presence of other supporting variables that could optimize this effect.

5. DISCUSSION

The findings of this study indicate that Game-Based Learning has a strong and significant direct effect on students' intrinsic motivation, consistent with Self-Determination Theory, which holds that learning environments fulfilling the needs for autonomy, competence, and relatedness will foster internally driven motivation (Ryan &

Deci, 2000) . Game elements such as challenge, immediate feedback, and incremental achievement appear to align closely with these psychological needs, thereby cultivating intrinsic motivation among students at SMKN 2 Kota Kediri. These findings are also consistent with meta-analytic research showing that gamification and game-based learning designs can enhance intrinsic motivation (L. Li et al., 2024; Soriano-Sánchez et al., 2026). Experimental studies and several literature reviews likewise indicate that game elements can increase learners' motivation to learn. Furthermore, these findings support and provide evidence that cooperative game design can increase the level of participation and motivation in the classroom (Chen & Tu, 2021; Fonseca et al., 2023b; Leitão et al., 2022). The strong effect of GBL on intrinsic motivation may partly be influenced by measuring both variables using the same students' perceptions at the same time, which could make their relationship appear stronger. GBL features, such as challenges, immediate feedback, and gradual achievements, may support students' feelings of competence and autonomy, while group competition and collaboration may strengthen relatedness. However, L. Li et al. (2024) found that perceived competence improved less than autonomy and relatedness, suggesting that future studies should examine specific game features, such as tiered difficulty and instant points, separately

GBL was also found to exert a significant direct effect on both behavioral and emotional engagement, suggesting that the effect of game-based learning on student engagement does not operate solely through the pathway of intrinsic motivation. These results are in line with studies reporting that digital and game-based approaches increase student engagement in higher education (Eltahir et al., 2021; Nadeem et al., 2023; Nusairat et al., 2024), middle school (Amzalag et al., 2024), and senior high school (Raharjo et al., 2024; Y. Rahmawati, 2022).

In particular, the non-significant path from intrinsic motivation to behavioral engagement indicates that active classroom participation may be more strongly influenced by external factors such as instructional design, teacher guidance, and task structure, rather than by internally driven motivation alone (Mendoza et al., 2023; Miao & Ma, 2023; Reymond et al., 2023) . This aligns with the mediation results, which show that intrinsic motivation does not mediate the relationship between GBL and behavioral engagement (Covrig et al., 2023) GBL appears to affect behavior directly through its game mechanics, challenges, and competitive elements (M. Li et al., 2023) . Game mechanics such as points, rankings, time limits, and group competition provide external prompts that elicit participation regardless of how autonomous students' motivation is. Engagement is also known to be strongly shaped by the instructional context rather than by individual motivation alone (Wong & Liem, 2022)

In contrast, intrinsic motivation was found to significantly affect emotional engagement and to partially mediate the relationship between GBL and emotional engagement. This finding is consistent with Ferrer et al. (2022), who reported that students with higher intrinsic motivation exhibit stronger emotional engagement. It suggests that the enjoyment, curiosity, and sense of accomplishment fostered through game-based learning experiences translate into positive affective bonds between students and the learning process, above and beyond the direct emotional stimulation provided by the game elements themselves.

Taken together, these results affirm that GBL is an effective pedagogical approach for enhancing both the motivational and engagement dimensions of learning, particularly within a vocational school context focused on Accounting and Institutional Finance that has received comparatively limited empirical attention relative to higher education and general secondary schools (Srimaryani et al., 2023). The partial mediation of intrinsic motivation on the emotional engagement pathway, contrasted with its non-significant role on the behavioral pathway, underscores the theoretical distinction between behavioral and emotional dimensions of engagement and suggests that different pedagogical levers may be required to strengthen each dimension (Zawacki-Richter & Jung, 2023).

6. CONCLUSION

Based on the results of this study, several conclusions can be drawn: (1) Game-Based Learning has a positive and significant direct effect on Behavioral Engagement; (2) Game-Based Learning has a positive and significant direct effect on Emotional Engagement; (3) Game-Based Learning has a positive and significant direct effect on Intrinsic Motivation; (4) Intrinsic Motivation does not have a significant direct effect on Behavioral Engagement; (5) Intrinsic Motivation has a positive and significant direct effect on Emotional Engagement; (6) Intrinsic Motivation does not mediate the effect of Game-Based Learning on Behavioral Engagement; and (7) Intrinsic Motivation partially mediates the effect of Game-Based Learning on Emotional Engagement.

This study is expected to serve as an initial reference for the further development of Game-Based Learning research within a broader educational context. Future researchers are encouraged to expand the range of variables examined, such as self-efficacy or the quality of instructional design, which were not accommodated in the present research model. Based on the findings, teachers are encouraged to integrate Game-Based Learning regularly into the learning process, supported by adequate school infrastructure. Future researchers are also encouraged to explore additional variables not accounted for in this model in order to broaden the generalizability of the findings.

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