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An Analysis of Gamification in Boosting Training Effectiveness: The Mediating Role of Engagement

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ABSTRACT

This study explores how gamification influences the effectiveness of training in a corporate middle management program. Based on Social Cognitive Theory (SCT), it aims to fill the mechanistic gap by proposing and empirically testing a mediation model to understand how gamification works, focusing on whether its impact is mediated through participant engagement. The study used a quantitative, explanatory survey design. Data was gathered from 214 participants in the "Leading and Empowering Your Team" module, a key part of the Astra Middle Management Program (AMMP). The proposed mediation model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The model exhibited excellent predictive accuracy, accounting for 68.6% of the variance in Training Effectiveness and 56.4% in Engagement. Path analysis verified that all hypothesized relationships were strong and statistically significant. Gamification had a significant impact on training effectiveness (β = 0.599, $p < 0.001$). Additionally, a notable indirect effect was observed (β = 0.209, p = 0.006), indicating that Engagement mediates this relationship (β for GAM -> ENG = 0.751; β for ENG -> TEF = 0.278). This study offers solid empirical evidence for the two main ways gamification functions. It shows that gamification is not merely a gimmick for "fun" (engagement), but also serves as a strong cognitive instrument that enhances learning directly. The research highlights Engagement as a crucial mechanism, providing T&D practitioners with a clearer understanding of how their gamified strategies accomplish their goals.

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INTRODUCTION

The business environment of the 21st century is characterized by ongoing change. Factors like globalization, digital innovation, and artificial intelligence have created a volatile, uncertain, complex, and ambiguous (VUCA) landscape, making long-term stability outdated (Kulkarni et al., 2022). In this evolving "future of work,' competitive advantage has shifted from tangible assets and market share to intangible assets such as workforce agility, knowledge, and innovation. This shift has transformed the "war for talent" from a basic recruitment issue into a strategic focus on continuous development, upskilling, and retention (Mohanty & Christopher B, 2024). As a result, corporate Training and Development (T&D) has transitioned from a discretionary, compliance-driven expense to a vital strategic function essential for organizational survival and growth. Global investments in corporate Talent and Development (T&D) reflect this change, with organizations spending hundreds of billions annually to keep their human capital relevant and capable. However, this significant investment is often hindered by a persistent and costly issue: the limited effectiveness of traditional training methods. Conventional approaches such as passive classroom lectures or "click-next" e-learning modules are increasingly recognized for their pedagogical limitations. These methods, based on outdated industrial-age models, often fail to engage modern learners, resulting in poor knowledge retention. This phenomenon, described by the Ebbinghaus forgetting curve, shows that learners can forget up to 90% of new information within a month. This "engagement gap" results in poor return on investment (ROI) and a workforce that remains "in training" without truly "learning" (Martins et al., 2021).

To tackle the engagement challenge, organizations are increasingly turning to technological solutions to enhance learning by making it more interactive, tailored, and effective. The rise of Information and Communication Technology (ICT) has brought about a notable shift in corporate training methods (Cheng & Chau, 2022). Gamification, defined as "the use of game design elements in non-game contexts" (Deterding et al., 2011), aims to harness the motivational psychology behind games and apply it to business goals. The gamification strategies here mainly focus on extrinsic motivators, such as points, leaderboards, and friendly competition, to turn passive learning into engaging, active experiences (Duggal et al., 2021). The fundamental idea is that by making learning enjoyable and intrinsically rewarding, learner engagement will increase, leading to better knowledge retention, skill development, and overall performance (Silic et al., 2020).

Despite widespread use and billions invested in gamified platforms, understanding their true impact remains inconsistent and mixed. The academic and practical literature shows varied results. Some studies, like Cheng and Chau (2022), report improved team effectiveness, while others find little or no effect on actual learning or performance. For example, a meta-analysis by Vermeir et al. (2020) indicates that although gamification increases motivation, this does not always lead to measurable cognitive improvements. Similarly, Rincón-Flores et al. (2022) observed motivation gains without corresponding academic performance increases, suggesting a possible gap between engagement and actual learning outcomes. This significant inconsistency in the literature highlights a fundamental "black box" in the way gamification has been researched.

The common belief in gamification is the assumption that it would enhances learning by making it more enjoyable, thereby boosting learner engagement, which in turn leads to improved results (the sequence: Gamification -> Engagement -> Effectiveness). However, this causal chain is often assumed without thorough empirical validation. It is equally reasonable to consider that gamification impacts directly (for instance, the cognitive framework of points and rules helps clarify learning objectives), with engagement being merely a positive side effect rather than the main causal factor. The field has largely overlooked testing these two options together. We lack a definitive understanding of whether the effect is direct, indirect, or both. This study addresses this crucial gap by proposing a mediation model. It aims to decipher how gamification works by testing both the direct

effect (Gamification -> Effectiveness) and the indirect effect (Gamification -> Engagement -> Effectiveness). This method responds to the scholarly call to move beyond simple direct-effect studies and develop more comprehensive models that explain the underlying mechanisms.

Based on the identified research problem, this study aims to achieve the following objectives: (1) To examine the direct effect of gamification on training effectiveness, (2)To investigate the relationship between gamification and participant engagement, (3) To determine the impact of participant engagement on training effectiveness, and (4) to test the mediating role of engagement in the relationship between gamification and training effectiveness.

LITERATURE REVIEW

To develop a model capable of capturing the intricate, bidirectional interactions among an individual, their environment, and their behavior, this research is grounded in Bandura's (2001) Social Cognitive Theory (SCT). SCT represents a significant advancement from traditional behaviorism, which suggested that environments merely influence behavior. Conversely, SCT introduces the concept of "triadic reciprocal causation," wherein three factors, which are (1) environmental influences, (2) personal factors, and (3) behavioral factors, interact and exert mutual influence. This framework is particularly well-suited for constructing and evaluating a mediation model, as it delineates a clear theoretical role for each variable within the study. SCT's key contribution is highlighting the importance of the environmental factors (such as gamification), the internal "personal factors", such as beliefs, attitudes, and emotional states, and "behavioral factors" beyond just outcomes. In our framework, Engagement combines these internal states, representing the emotional and behavioral signs of a learner's motivation, persistence, and absorption (Riyanto et al., 2021). An engaged learner (behavior) pays closer attention, processes information more deeply (cognitive/personal factors), and persists despite challenges. While the environment (gamification) influences this behavior, it also produces the learning result. SCT enables us to view Engagement as a mediator, a process where internal affective and behavioral responses transform environmental stimuli into outcomes. Overall, SCT offers a comprehensive model that suggests complex interactions: The environment (Gamification) can directly impact results (Effectiveness), but it can also do so indirectly by shaping internal affective and behavioral states (Engagement), which in turn affect those results.

Gamification (Independent Variable)

Gamification refers to the strategic incorporation of game elements and dynamics into non-game contexts (Agustini et al., 2023). Its application in corporate training and development (T&D) is based on the premise that traditional learning methods often lack the intrinsic and extrinsic motivators that make games engaging. The literature generally distinguishes between two types of gamification. The first, extrinsic gamification, is the most prevalent and relies on elements such as Points (quantifiable feedback), Badges (virtual achievement rewards), and Leaderboards (social comparison and competition). These elements are utilized in the AMMP module. The second type, intrinsic gamification, involves more profound game components such as narrative, player choice, and exploration, to foster a sense of autonomy and purpose (Duggal et al., 2021).

The specific elements employed in this study, namely points, leaderboards, and competition, are recognized for their effectiveness in enhancing engagement for targeted, short-term tasks (Handayani et al., 2021). Nevertheless, these elements also face criticism. Extrinsic motivators, such as points, can sometimes diminish or eliminate pre-existing intrinsic motivation, a phenomenon known as the over-justification effect (Mohanty & Christopher B., 2024). While leaderboards can motivate high-performing individuals, they may also be highly demotivating for those at the lower end, potentially leading to disengagement. This dichotomy accounts for the mixed findings in the existing literature and underscores the importance of evaluating these elements within specific contexts and with relevant moderators.

Training Effectiveness (Dependent Variable)

Training effectiveness is a multifaceted construct

that assesses the extent to which a training program attains its intended outcomes (Sahni, 2020). The most widely recognized framework for evaluating effectiveness is the Kirkpatrick Model (1994), which delineates four levels of evaluation:

- Level 1: Reaction: How did the participants perceive the training? Were they satisfied? (An affective metric).
- Level 2: Learning: To what degree did participants acquire the desired knowledge, skills, and attitudes? (A cognitive metric).
- Level 3: Behavior: To what extent did participants implement what they learned in their professional roles? (A behavioral metric).
- Level 4: Results: To what degree did the training influence organizational metrics (e.g., productivity, sales, safety incidents)? (An organizational metric).

Most corporate training initiatives are evaluated solely at Level 1, if at all. The "Training Effectiveness" (TEF) construct in this study, as operationalized through the questionnaire, integrates elements of Level 1 (e.g., items related to satisfaction with the training, as exemplified by the "Engagement" construct, which serves as a precursor) and Level 2 (e.g., "I believe that my knowledge... has improved," "I am more confident in my leadership abilities"). It serves as a measure of perceived learning and satisfaction, which are common and pragmatic (albeit self-reported) indicators of effectiveness (Uslu et al., 2022).

Engagement (Mediating Variable)

Engagement is a key concept in both human resource management and educational research. It is typically described as a "positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption" (Schaufeli et al., 2002). In learning, this means: Vigor involves high energy and mental resilience, along with a willingness to put in effort. Dedication reflects strong involvement in education, feelings of significance, and enthusiasm. Absorption refers to being fully focused and happily immersed in the learning process, with time passing quickly, which is similar to Csikszentmihalyi's "flow" state. The literature mainly suggests that engagement mediates most interventions (such as gamification) in achieving their outcomes (Jaramillo-Mediavilla et al., 2024). The idea is that gamification influences engagement first, and this engagement drives learning outcomes (Wibisono & Abdullah, 2022).

Hypothesis Development

Based on the theoretical framework of Social Cognitive Theory and the synthesis of the empirical literature, the following five hypotheses are proposed:

H1: Gamification has a significant positive effect on Training Effectiveness. This hypothesis posits a direct, unmediated relationship. It represents the "cognitive" argument, rooted in SCT's emphasis on environmental factors. It contends that the gamified environment itself, regardless of "fun" or 'engagement', offers a superior instructional framework. The explicit rules, immediate feedback through points, and defined objectives (such as climbing the leaderboard) construct a cognitive scaffold that clarifies learning goals and facilitates direct knowledge acquisition (Gündüz & Akkoyunlu, 2020).

H2: Gamification has a significant positive effect on participant Engagement. This hypothesis embodies the "affective" argument and constitutes the most prevalent assertion within the gamification literature. It asserts that incorporating points, leaderboards, and competitive elements is explicitly intended to make the learning process, which is often perceived as dry, more engaging, motivating, and immersive (Handayani et al., 2021). This approach directly addresses the behavioral component of Social Cognitive Theory (SCT) to enhance vigor, dedication, and absorption.

H3: Engagement has a significant positive effect on Training Effectiveness. This hypothesis associates the proposed behavioral mediator with the ultimate learning outcome. It asserts that the affective and behavioral state of engagement is a requisite precursor to effective learning. Engaged learners are actively involved; they are cognitively and emotionally committed. This condition of "vigor" and "absorption" (Kahn, 1990) facilitates more profound information processing, enhanced problem-solving abilities,

and increased retention of knowledge (Riyanto et al., 2021).

H4: Engagement significantly mediates the relationship between Gamification and Training Effectiveness. This hypothesis examines the complete indirect "affective" model: Gamification -> Engagement -> Effectiveness. It indicates that the primary mechanism through which gamification exerts its influence (H1) is by increasing engagement (H2), which, in turn, enhances outcomes (H3). Confirmation of this hypothesis would suggest that "engagement" serves as the central explanatory mechanism.

Conceptual Framework

Based on the theoretical grounding and the five hypotheses developed above, the following mediation framework is proposed for testing.

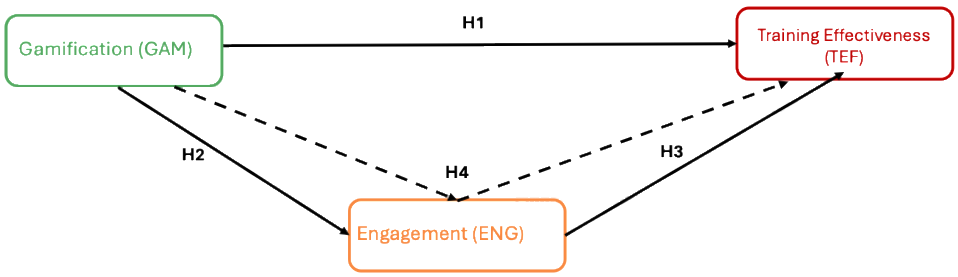

Figure 1. Conceptual Research Framework

RESEARCH METHOD

This study used a quantitative, explanatory research approach. The main aim of explanatory research is to test causal theories and explore relationships between variables, which aligns with the study's goal of evaluating a structural model based on Social Cognitive Theory. A cross-sectional survey was conducted with participants after they completed the gamified training module. This post-test-only approach provides a snapshot of participant perceptions at a single moment. Although this method is practical and efficient in a corporate context, it relies on self-reported data and cannot establish causation definitively like a true experimental design. Nonetheless, using PLS-SEM allows us to assess the plausibility of the proposed causal relationships and evaluate the model's predictive capabilities. To reduce the likelihood of common method bias, statistical methods such as Harman's single-factor test and the marker variable approach were used during data analysis.

The study focused on all middle managers at Astra, a major Indonesian conglomerate, who participated in the mandatory Astra Middle Management Program (AMMP). This group is highly pertinent because middle managers play a crucial role in leadership development and are often the focus of substantial training and development (T&D) investments. The final sample included participants who completed the "Leading and Empowering Your Team" module and provided a complete, valid questionnaire. With a sample size of 214, the study is well-powered for PLS-SEM analysis, ensuring robust statistical results (Hair et al., 2019).

Data Collection Procedures

Data was gathered through an online survey (Google Forms) conducted immediately after the 'Leading and Empowering Your Team' module. All participants received a WhatsApp message with a link to the survey. The survey introduction assured confidentiality and anonymity, stating that data would be aggregated and used solely for research to enhance future training. This reassurance is crucial for obtaining honest, unbiased responses, especially for self-report measures of engagement and effectiveness. A total of 214 participants completed the survey, forming the final dataset for analysis.

All constructs were assessed using reflective indicators on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), based on a

validated questionnaire by Lai et al. (2020). The complete survey items is provided in Appendix A.

- **Gamification (GAM):** A 9-item reflective construct measuring participant perceptions of the gamified elements. Items covered perceived enjoyment of teamwork (GAM1), social benefits (GAM2), team arrangement (GAM3), and the motivational impact of points (GAM4), leaderboards (GAM5), competition (GAM6), feedback (GAM7), enjoyability (GAM8), and rewards (GAM9).

- **Engagement (ENG):** A 3-item reflective construct measuring the affective and behavioral state of engagement. Items measured motivation (ENG1), absorption/flow ("time passed by quickly," ENG2), and overall satisfaction (ENG3).

- **Training Effectiveness (TEF):** A 5-item reflective construct measuring perceived (Kirkpatrick Level 2) learning. Items measured perceived improvement in knowledge (TEF1), ability to apply skills (TEF2), confidence (TEF3), decision-making (TEF4), and information retention (TEF5).

Common Method Bias Assessment

Since all construct data were gathered through self-reported questionnaires completed by the same respondents at one point in time, there is a potential risk of common method bias (CMB). To mitigate this, two statistical techniques were employed: Harman's single-factor test and the marker variable approach.

Initially, Harman's single-factor test was performed by including all measurement items in an exploratory factor analysis without rotation. The findings revealed multiple factors, with the first factor explaining about 38.7% of the variance, which is less than 50%. This suggests that common method bias is probably not a major issue (Podsakoff et al., 2003).

Secondly, the marker variable method was used to evaluate the possible impact of common method variance. The correlations between the marker variable and the main constructs were minor and not statistically significant. This indicates that the connections among gamification, engagement, and training effectiveness are unlikely to be significantly influenced by common method bias (Lindell & Whitney, 2001).

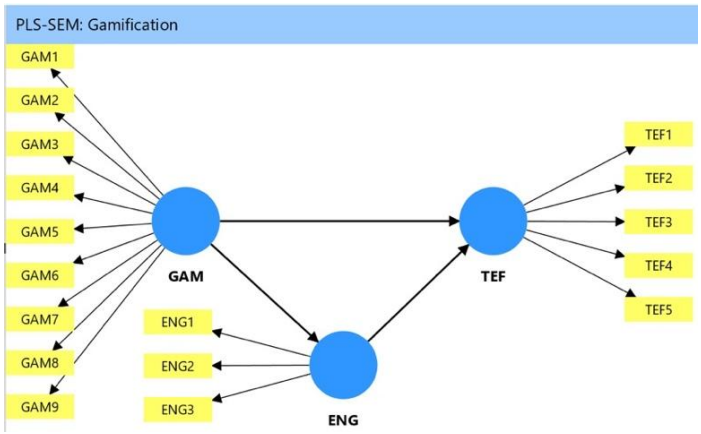

Figure 2. PLS-SEM Model

RESULT AND DISCUSSION

A preliminary analysis of the 214 participant responses revealed that, on average, all aspects of the training were perceived positively. The high means (on a 5-point scale) indicate a generally positive response to the module, but do not explain the relationships between the variables. The measurement model was rigorously assessed and confirmed to be reliable and valid. All indicator loadings were strong, exceeding the 0.70 threshold, with most surpassing 0.80. This

demonstrates the high reliability of the indicators. All constructs exhibited excellent internal consistency. Cronbach's Alpha values exceeded 0.80 for all constructs. Additionally, the Composite Reliability was also substantially above the 0.80 threshold, indicating that all items reliably measure their respective constructs. The Average Variance Extracted (AVE), which measures the amount of variance a construct explains in its items, was well above the required 0.50 threshold for all constructs, this confirms strong convergent validity. The Heterotrait-Monotrait (HTMT) ratio used to evaluate discriminant validity showing values well below the 0.90 threshold confirming that the three constructs are statistically distinct and thus establishing discriminant validity.

Table 2. Descriptive Statistics

Variable	Mean (SD)	Cronbach's Alpha	Reliability	Average Variance Extracted (AVE)
GAM	4.15(0.72)	0.933	0.944	0.652
ENG	4.09(0.88)	0.806	0.886	0.723
TEF	4.21(0.65)	0.902	0.927	0.718

Table 3. The Heterotrait-Monotrait (HTMT) Analysis

The Heterotrait-Monotrait (HTMT)	GAM	ENG	TEF
GAM		0.866	0.877
ENG	0.866	0.851	0.851
TEF	0.877		

Collinearity Assessment (VIF): An analysis of the Variance Inflation Factor (VIF) for all indicators revealed that all values were comfortably below the threshold of 3.3. The highest VIF observed was 3.777 for GAM5, slightly above the 3.3 cutoff, suggesting possible collinearity. Nonetheless, because all VIFs fall below the more lenient threshold of 5.0, the model remains valid.

Results for coefficient of determination shows that the model demonstrated exceptionally strong predictive power, shown in Table xx. For the variable of Engagement (ENG), the model accounted for 56.4% of the variance in Engagement ($R^2 = 0.564$), indicating a substantial effect. While for the variable of Training Effectiveness (TEF), the model explained 68.6% of the variance ($R^2 = 0.686$), reflecting a strong effect. This suggests that the chosen predictors are highly relevant to the outcome.

Table 4. R-square

	R-square	R-squre adjusted
ENG	0.564	0.562
TEF	0.686	0.683

The bootstrap procedure with 5,000 resamples was performed to calculate p-values and verify the statistical significance of all hypothesized paths. As presented in Table 5, the results confirm that all four hypotheses are statistically significant.

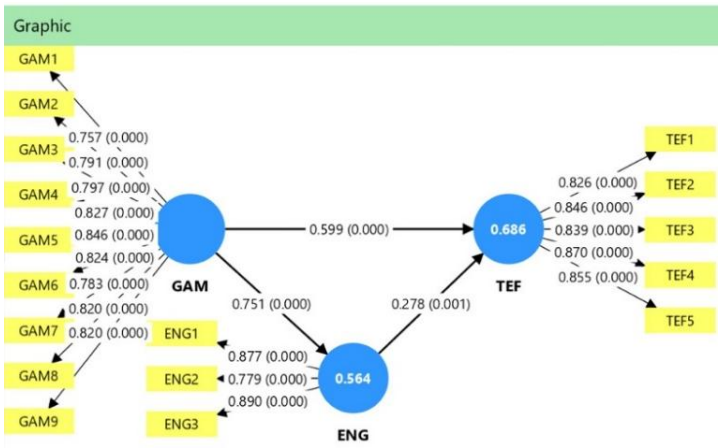

Figure 3. PLS-SEM Model

Table 5. Hypothesis Testing Summary (Path Coefficients & p-values)

Hypothesis	Path	Path Coefficient (β)	Significance (p-value)	Result
H1	GAM -> TEF	0.599	0.000	Supported
H2	GAM -> ENG	0.751	0.000	Supported
H3	ENG -> TEF	0.278	0.001	Supported
H4	GEN -> ENG->TEF	0.209	0.006	Supported

The indirect effect of GAM -> ENG -> TEF was found to have a path score of 0.209 with a p-value of 0.006. Since the p-value is less than 0.05, the indirect effect is statistically significant. Therefore, Hypothesis H4 is supported. However, since the direct effect (H1, 0.599) is also significant (p = 0.000), this relationship suggests partial mediation. This indicates that Gamification influences Training Effectiveness both directly and indirectly, via Engagement.

Table 6. Bootstraping Report

	Original Sample (D)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P values
GAM – ENG - TEF	0.209	0.223	0.076	2.734	0.006

The results of the structural model analysis are strong and offer a clear, compelling story. The model confirms that gamification is a powerful factor in enhancing training effectiveness and explains its underlying mechanisms. This discussion is organized to evaluate each hypothesis based on the supporting literature.

The analysis revealed a strong, statistically significant direct relationship between Gamification and Training Effectiveness (β = 0.599, p < 0.001). This supports Hypothesis 1 and the "cognitive" argument from Social Cognitive Theory (SCT). It suggests that the gamified environment itself, beyond "fun" or "engagement," provides a more effective instructional framework. This finding aligns with Gündüz & Akkoyunlu (2020) and Capatina et al. (2024), who suggest that clear rules, immediate feedback through points, and goals like climbing

the leaderboard create a cognitive scaffold that clarifies learning objectives and promotes knowledge retention. This is important because it provides empirical evidence that gamification is more than just an affective "gimmick"; it's a valid teaching method. The structured game environment appears to clarify learning outcomes and make the achievement process more concrete for learners.

Hypothesis 2, which proposed a positive link between Gamification and Engagement, received strong significant support ($\beta = 0.751$, $p < 0.001$\$). This reflects the "affective" perspective and aligns with common themes in gamification research. The incorporation of points, leaderboards, and competition in the AMMP module was highly effective in making the learning process, often perceived as dull, more engaging, motivating, and captivating. These findings align with those of Handayani et al. (2021) and Wibisono & Abdullah (2022), who also reported that incorporating such PBL elements into a learning system enhances active learning and engagement. Explaining 56.4% of the variance in Engagement, this result confirms that the game features successfully evoked participants' affective and behavioral responses, enhancing their vigor, dedication, and absorption in the training content, as defined by Schaufeli et al. (2002).

Connecting the process to the outcome, Hypothesis 3 was also supported ($\beta = 0.278$, $p = 0.001$). This suggests that the emotional and behavioral aspects of engagement are key predictors of effective learning. Engaged learners, who exhibit "vigor" and "absorption," are actively involved, not just passively receiving information; they are emotionally and cognitively committed. This supports the engagement models proposed by Kahn (1990) and agrees with the findings of Riyanto et al. (2021) and Lai et al. (2020), which also identified engagement as a vital mediating factor that connects workplace conditions like the training environment to positive performance results such as perceived learning effectiveness.

The main finding of this study is the validation of Hypothesis 4, which states that Engagement acts as a partial mediator in the relationship. Bootstrapping analysis revealed a significant indirect effect ($\beta = 0.209$, $p = 0.006$). This result encapsulates the entire model. The overall impact of Gamification on Training Effectiveness combines both the direct and indirect effects: $\beta_{Direct} + \beta_{Indirect} = 0.599 + 0.209 = 0.808$. This empirical findings support the mediation pathway often assumed in the literature, as highlighted by Jaramillo-Mediavilla et al. (2024) and Wibisono & Abdullah (2022). It effectively clears up the "black box" mentioned in the introduction by showing that the answer to "How does gamification work?" is "Both."

1. **A large part of its benefit (74.1%, based on 0.599/0.808) is direct.**
   This affirms the "cognitive" approach (H1), aligning with SCT's focus on the environment's influence (Bandura, 2001). The game's structural components directly assist middle managers in understanding the content and boost their confidence.
2. **A large portion of its benefit (25.9%, calculated as 0.209 / 0.808) is indirect.**
   This supports the "affective" pathway (H2 & H3). Additionally, the game enhances training engagement, similar to Silic et al. (2020), providing a secondary, mediated increase in effectiveness.

This dual-path finding clarifies why the intervention was highly effective, enabling the model to explain a substantial 68.6% of the variance in Training Effectiveness.

CONCLUSION

This study aimed to go beyond the basic question of whether corporate gamification is effective, focusing instead on understanding the underlying mechanisms. By developing and testing a mediation model based on Social Cognitive Theory, the research presents a clear and persuasive story. Results show that gamification in the Astra Middle Management Program is a highly effective teaching method. The model's strong predictive ability, accounting for 68.6% of perceived effectiveness, highlights its significance. The central conclusion of this research is that gamification's success is not monolithic but operates through two distinct, simultaneous, and statistically significant

pathways. First, the intervention possesses a powerful direct cognitive effect. The very structure of the game, which includes its clear rules, immediate point-based feedback, and competitive goals, acts as a cognitive scaffold, clarifying learning objectives and directly enhancing perceived knowledge and confidence. This finding firmly establishes gamification as a legitimate instructional design tool.

Second, the study empirically verifies the long-held belief in the indirect affective impact of gamification. Gamification notably increases participant engagement, which boosts vigor, absorption, and dedication, thereby enhancing the effectiveness of training. This research clarifies the "black box" of how gamification works, functioning both as a direct cognitive tool and as an indirect affective motivator. Nevertheless, the data indicate that the direct cognitive pathway ($\beta = 0.599$) is considerably more influential than the engagement-driven indirect path $\beta = 0.209$). This implies that although engagement is essential, the main factor driving success in this professional setting is the structured, feedback-rich environment the game offers.

While our research supports the SCT model, it also introduces a key nuance to the common gamification discourse, which often overstates the role of the Personal Factor (engagement) as the only mechanism. Our results challenge this "engagement-first" view. Notably, the direct Environment -> Outcome path ($\beta = 0.599$) was nearly three times stronger than the indirect, engagement-mediated path ($\beta = 0.209$). This suggests that the cognitive scaffolding provided by the game's structure, including clear rules, immediate feedback, and defined goals, is the primary driver for this audience. In SCT terms, the environment's ability to directly shape cognition and behavior far exceeds its capacity first to generate an affective response. This challenges the idea that gamification is solely about making learning "fun" (engagement) and shifts focus toward the importance of robust, well-structured instructional design, which is a critical but often overlooked aspect of the Environment in SCT. For this group of professional adult learners, gamification's main value was as a "cognitive tool" rather than an "affective toy," refining SCT's application for this demographic.

This study offers valuable insights, but it has several limitations that suggest directions for future research. The research was conducted with a single company (Astra) in Indonesia, focusing only on middle management. As such, the results are context-specific and may not be applicable to other organizations, cultures, or employee levels. The use of a cross-sectional, post-test-only design means causality cannot be firmly established. All constructs were measured through self-report surveys, which could introduce common method bias (CMB). The Variance Inflation Factor (VIF) for GAM5 was 3.777, slightly above the conservative threshold of 3.3, indicating potential multicollinearity. Future studies could refine the measurement items for GAM4, GAM5, and GAM6 to differentiate them better. This study's results are specifically tied to extrinsic gamification elements such as points, leaderboards, and competition. While this approach effectively enhanced the direct cognitive pathway, it also presents a limitation. Future research should compare these findings with training modules that incorporate intrinsic gamification elements, like storytelling, customized journeys, meaningful choices, and exploration. Such research would help determine if intrinsic motivation shifts the main effect pathway, potentially emphasizing the importance of engagement. It would also highlight the need for customized gamification strategies aligned with various organizational learning objectives (Mohanty & Christopher B, 2024). Additionally, since the intervention focused on a "soft skills" module, future studies should examine whether the dual-path model applies to "hard skills" or technical training, where cognitive processes might be even more prominen

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