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THE EFFECT OF ESCAPE ROOM ASSISTED GAME BASED LEARNING ON THE MATHEMATICS LEARNING MOTIVATION ON 7TH-GRADE STUDENTS

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ABSTRAK

Pembelajaran matematika di sekolah masih sering berpusat pada guru (*teacher-centered*) sehingga keterlibatan dan motivasi belajar siswa belum berkembang secara optimal, termasuk pada materi data dan diagram di kelas VII SMP Negeri 7 Jember. Penelitian ini bertujuan untuk mendeskripsikan motivasi belajar matematika siswa kelas kontrol dan kelas eksperimen sebelum maupun sesudah perlakuan, serta mengkaji pengaruh penerapan model *Game-Based Learning* berbantuan *Escape Room* terhadap motivasi belajar matematika siswa. Penelitian kuantitatif *quasi-experimental* dengan desain *nonequivalent control group design* ini dilaksanakan pada semester genap tahun ajaran 2025/2026 (bulan Maret hingga April 2026). Sampel ditentukan menggunakan teknik *purposive sampling*, yaitu kelas VII B sebagai kelas eksperimen dan kelas VII C sebagai kelas kontrol, yang masing-masing berjumlah 35 siswa. Data dikumpulkan melalui angket motivasi belajar matematika berskala *Likert* dan dianalisis menggunakan uji normalitas, uji homogenitas, serta uji hipotesis *Independent Sample t-Test* berbantuan IBM SPSS *Statistics* 27. Hasil penelitian menunjukkan bahwa motivasi belajar matematika siswa kelas kontrol meningkat dari rata-rata 66% menjadi 78% (kategori tinggi), sedangkan kelas eksperimen meningkat dari 67% menjadi 86% (kategori sangat tinggi). Hasil pengujian hipotesis menunjukkan nilai $Sig.$ (2-tailed) $< 0{,}001$, yang mengindikasikan penolakan H_0 dan penerimaan H_a. Dengan demikian, dapat disimpulkan bahwa model *Game-Based Learning* berbantuan *Escape Room* berpengaruh signifikan terhadap motivasi belajar matematika siswa kelas VII SMP Negeri 7 Jember pada materi data dan diagram. Penerapan model tersebut terbukti mampu menciptakan lingkungan belajar yang lebih partisipatif, interaktif, dan menyenangkan, sehingga motivasi belajar siswa meningkat dibandingkan dengan pembelajaran konvensional.

Kata Kunci: *Game-Based Learning, Escape Room, Motivasi Belajar.*

ABSTRACT

Mathematics instruction in schools is still often teacher-centered, so student engagement and motivation have not developed optimally, including in the topic of data and diagrams in 7th-grade classes at SMP Negeri 7 Jember. This study aims to describe the motivation to learn mathematics among students in the control and experimental classes before and after the intervention, as well as to examine the effect of implementing a Game-Based Learning model assisted by an Escape Room on students' motivation to learn mathematics. This study employed a quantitative approach with a Quasi-Experimental Design and a Nonequivalent Control Group Design, conducted during the second semester of the 2025/2026 academic year (from March to April 2026). The sample was determined using purposive sampling, selecting class VII B as the experimental group and class VII C as the control group, each consisting of 35 students. Data were collected through a Likert-scale mathematics learning motivation questionnaire and

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analyzed using normality tests, homogeneity tests, and an Independent Samples t-Test with the assistance of IBM SPSS Statistics 27. The results showed that the learning motivation of the control class increased from an average of 66% to 78% (high category), while the experimental class increased from 67% to 86% (very high category). Hypothesis testing revealed $p < 0.001$, confirming the rejection of H_0. These findings confirm that the Escape Room-assisted Game-Based Learning model can create a more active, interactive, and enjoyable learning environment, making it an effective alternative strategy for teaching mathematics.
Keywords: *Escape Room, Game-Based Learning, Learning Motivation.*

INTRODUCTION

Advances in education in the digital age demand continuous innovation in instructional methods capable of fostering 21st-century skills (Untari, 2022). Active, enjoyable, and meaningful learning environments are essential for stimulating student engagement and enhancing learning motivation a key determinant of academic achievement. This aligns with Law No. 20 of 2003 on the National Education System (Indonesia, 2003) and Government Regulation No. 57 of 2021 on National Education Standards (Indonesia, 2021), which mandate interactive, inspiring, and student-centered educational practices.

However, preliminary observations at SMP Negeri 7 Jember revealed that seventh-grade mathematics instruction remains predominantly teacher-centered and lecture-based. This instruction style frequently leads to low student participation and passive learning habits. This issue is particularly evident in topics involving data and diagrams, where students are required to collect, process, represent, and interpret quantitative information accurately. When taught through repetitive drilling and static textbook exercises, students often experience cognitive fatigue and decreased interest in the subject matter (Djamilah et al., 2023).

To address these pedagogical challenges, *Game-Based Learning* (GBL) has emerged as an effective framework that incorporates challenges, immediate feedback, and reward mechanics to promote active student involvement (Putri et al., 2025). A particularly promising application of GBL is the physical *Escape Room*, which integrates immersive narratives, puzzle-solving, and collaborative team missions into the curriculum. The structural elements of an *Escape Room* align closely with the indicators of learning motivation outlined by Uno (2016), such as the desire for success, intrinsic drive, stimulating activities, and a supportive learning environment.

Previous literature demonstrates the potential of game-assisted instruction across various educational settings. For instance, Agustina and Andriani (2025) found that *Kahoot*-assisted GBL positively influenced mathematics motivation, while Badiatul et al. (2025) showed that digital escape games improved student engagement. Similarly, international studies by Kuo et al. (2022) and Fotaris and Mastoras (2018) confirmed that escape room activities enhance student collaboration and problem-solving skills. Nevertheless, many existing digital game interventions exhibit notable limitations, such as placing students in isolated screen interactions, offering superficial reward structures, or lacking physical collaborative dynamics (Hasto & Pratiwi, 2026). Simple digital quizzes often fail to sustain long-term engagement or foster authentic face-to-face teamwork. Consequently, a physical *Escape Room* model which combines tactile puzzle manipulation with direct peer negotiation provides a well-rounded solution to these limitations.

Despite these developments, empirical research evaluating the specific impact of physical *Escape Room*-assisted GBL on middle school mathematics topics (such as data and

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diagrams) remains limited. To address this research gap, this study examines student motivation across control and experimental classes before and after intervention. It also tests the statistical effect of implementing a physical *Escape Room*-assisted GBL model in 7th-grade mathematics classes at SMP Negeri 7 Jember.

METHODS

This study utilized a quantitative approach with a quasi-experimental *nonequivalent control group design*. The experimental group received instruction via the *Escape Room*-assisted *Game-Based Learning* model, while the control group was taught using conventional teacher-centered methods. Both groups completed a motivation questionnaire prior to the intervention (*pretest*) and after the intervention (*posttest*). The research was conducted during the second semester of the 2025/2026 academic year, specifically from March to April 2026, at SMP Negeri 7 Jember. The study population comprised all 350 seventh-grade students at SMP Negeri 7 Jember across ten classes. A *purposive sampling* technique was employed to select two classes that exhibited comparable baseline academic performance, homogenous class size, and identical teacher assignments. Class VII B ($N = 35$) was designated as the experimental group, while Class VII C ($N = 35$) served as the control group, resulting in a total sample of 70 students.

Data were gathered using a structured mathematics learning motivation questionnaire adapted from Faradila (2023), utilizing a 5-point *Likert* scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The instrument measured six core indicators of learning motivation derived from Uno (2016): (1) desire and drive to succeed, (2) drive and need for learning, (3) hopes and aspirations for the future, (4) recognition in learning, (5) engaging learning activities, and (6) a conducive learning environment. Construct validity was confirmed by subject matter experts, and internal consistency testing yielded a *Cronbach's Alpha* coefficient of 0.940, demonstrating high reliability. The analytical workflow involved calculating descriptive metrics (*mean*, percentage, and categorical boundaries) and conducting prerequisite statistical tests. Normality was evaluated using the *Shapiro-Wilk* test, and variance homogeneity was tested using *Levene's Test*. Inferential testing was carried out using an *Independent Samples t-Test* at a significance level of $\alpha = 0.05$. All statistical procedures were processed using IBM SPSS *Statistics* 27.

RESULTS AND DISCUSSION

Results

Descriptive statistics were computed to summarize learning motivation scores across the control and experimental groups. Table 1 outlines the initial (*pretest*) and final (*posttest*) metrics for both student cohorts.

Table 1. Descriptive Statistics of Students' Motivation to Learn Mathematics

Group	Stage	N	Average Score	Percentage (%)	Category
Control	Initial (*Pretest*)	35	115.77	66	High
Control	Final (*Posttest*)	35	136.69	78	High
Experimental	Initial (*Pretest*)	35	117.26	67	High
Experimental	Final (*Posttest*)	35	150.20	86	Very High

Source: Processed Primary Data (2026)

As shown in Table 1, the control group's average motivation score increased from 115.77 (66%, *High* category) to 136.69 (78%, *High* category), representing a gain of 20.92

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points. In contrast, the experimental group exhibited a substantial gain of 32.94 points, rising from an initial score of 117.26 (67%, *High* category) to a final score of 150.20 (86%, *Very High* category).

Prior to conducting inferential tests, assumption checks were conducted. The *Shapiro-Wilk* test confirmed that all datasets were normally distributed ($p > 0.05$): control *pretest* ($p = 0.673$), control *posttest* ($p = 0.069$), experimental *pretest* ($p = 0.608$), and experimental *posttest* ($p = 0.787$). *Levene's Test* for equality of variances yielded $F = 0.889$ ($p = 0.349$), confirming homogeneity across groups ($p > 0.05$). Consequently, an *Independent Samples t-Test* was performed under the assumption of equal variances, as summarized in Table 2.

Table 2. Independent Samples t-Test Results for Posttest Learning Motivation

Variable	Assumed Variances	Levene's Test (F)	Levene's Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Posttest Motivation	Equal Variances Assumed	0.889	0.349	-5.004	68	< 0.001	-13.514	2.701

Source: Processed SPSS Output (2026)

As presented in Table 2, the *Independent Samples t-Test* yielded $t(68) = -5.004$ with a $Sig.$ (2-tailed) value of $p < 0.001$. Because $p < 0.05$, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted. These results confirm a statistically significant difference in final learning motivation between students taught via the *Escape Room*-assisted GBL model and those receiving conventional instruction.

Discussion

The empirical findings confirm that implementing a physical *Escape Room*-assisted *Game-Based Learning* model significantly increases middle school students' motivation to learn mathematics. While the control group showed a moderate increase in motivation (66% to 78%), the experimental group experienced a larger gain, advancing from 67% to 86% (*Very High* motivation category). This marked increase in motivation can be explained through *Self-Determination Theory* (Deci & Ryan) and Csikszentmihalyi's *Flow Theory*. The physical *Escape Room* structure satisfies students' psychological needs for autonomy, competence, and relatedness. During the game, students move through narrative-driven stations where solving mathematical tasks regarding data organization, bar graphs, and pie charts unlocks physical padlocks and reveals hidden clues. This setup creates an immersive experience that keeps students focused and engaged. Working in small groups also encourages face-to-face peer interaction and collaborative problem-solving, which helps reduce math anxiety.

The statistical significance ($p < 0.001$) supports previous findings by Agustina and Andriani (2025) and Badiatul et al. (2025), which demonstrated that gamified learning environments enhance student engagement and academic interest. Furthermore, these results align with studies by Kuo et al. (2022) and Fotaris and Mastoras (2018), which highlighted the educational benefits of escape rooms for developing team problem-solving skills. By incorporating immersive and feedback-rich mechanics, such platforms foster meaningful learning experiences that allow students to navigate complex challenges at their own pace (Lim, 2023; Rincón et al., 2026; Veldkamp et al., 2020; Wolf et al., 2024). Moreover, the integration of these gamified elements facilitates the transition toward technology-enhanced learning by providing real-time feedback and fostering higher levels of student interaction and participation

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(Ahmed et al., 2025; Ditha et al., 2026; Mulyana et al., 2026; Sa'diyah et al., 2026; Subiyantoro et al., 2024).

Importantly, these findings contrast with research by Hasto and Pratiwi (2026), who reported that digital reward games (such as *Blooket*) had no significant effect on student motivation. This discrepancy highlights the advantages of a physical *Escape Room* over simple digital reward systems. While screen-based quizzes can become repetitive, physical escape rooms combine narrative immersion, hands-on puzzle solving, and direct peer interaction. This multidimensional approach helps sustain student interest, making it particularly effective for teaching abstract or detail-oriented topics like data and diagrams. Furthermore, positioning these immersive activities after theoretical instruction enables students to apply and reinforce previously introduced concepts, making them particularly suitable as consolidation activities rather than initial topic introductions (Bęś & Strzałkowski, 2024; Fitria & Mahdiannur, 2026; Kwok & Childers, 2022; Oyelere et al., 2020; Siregar et al., 2026; Tene et al., 2024).

CONCLUSION

The application of the physical *Escape Room*-assisted *Game-Based Learning* model significantly enhances seventh-grade students' motivation to learn mathematics on the topic of data and diagrams at SMP Negeri 7 Jember. Incorporating immersive narratives, physical puzzle-solving, and team-based game mechanics effectively transforms traditional teacher-centered classrooms into active, interactive, and enjoyable learning environments. The hands-on tasks and cooperative padlock challenges fulfill students' psychological needs for autonomy, competence, and relatedness, thereby reducing mathematics anxiety and boosting overall academic drive. Consequently, this experiential approach outperforms conventional lecture-based instruction by fostering sustained student engagement and collaborative problem-solving. Overall, the physical *Escape Room* framework is proven to be a highly effective pedagogical alternative for teaching abstract and detail-oriented mathematical concepts in secondary education.

These findings imply that mathematics educators should integrate hands-on game mechanics and collaborative puzzle-solving into their instructional design to boost student interest in quantitative topics. School administrators are encouraged to support game-assisted learning by providing flexible classroom spaces and manipulatives that facilitate peer interaction. For future research, investigators are recommended to evaluate the efficacy of physical and hybrid *Escape Room* models across diverse demographic settings, varying school facilities, and different mathematical domains beyond data analysis. Furthermore, future studies should employ quasi-experimental designs with longitudinal tracking to assess the long-term retention of mathematical concepts and to explore how gamified interventions influence other affective variables, such as self-efficacy and critical thinking skills.

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