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Game-Based Microlearning Strategy to Enhance Migrant Students' Learning Engagement at SB SIKL Serdang Malaysia

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ABSTRACT

This study aims to determine the effectiveness of microlearning strategies based on snake and ladder games in increasing the learning involvement of migrant students at Sekolah Indonesia Kuala Lumpur (SIKL) Serdang, Malaysia, especially in Islamic Religious Education. The research used a quantitative approach with a pre-experimental one-group pretest-posttest design. Data was obtained through a questionnaire that measures student learning engagement based on three aspects, namely behavioral, emotional, and cognitive, and supported by observation and documentation. Data analysis was carried out by statistical test to compare the level of learning engagement before and after the implementation of the strategy. The results show that the application of a microlearning strategy based on the snake and ladder game is able to significantly increase student learning engagement. Therefore, this strategy is recommended as an interactive learning alternative, contextual, and inclusive in non-formal education.

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Keywords:

Games-Based
Microlearning;
Learning Engagement;
Migrant Student.

INTRODUCTION

Student learning engagement is still a global issue in the learning process, especially when the teaching approach is monotonous and less relevant to the daily lives of students, so students easily feel bored, less active, and lose interest in (Nursiniah et al., 2025). This condition is exacerbated by increasing student's interest in short, interactive, and fun digital activities (Ariati, 2025), which makes conventional learning less and less desirable and demand learning innovations that are more in line with the characteristics of today's students, such as a game-based microlearning that is able to increase motivation and learning participation (Taupik & Fitriani, 2021). This problem is also reflected in migrant students at Sekolah Indonesia Kuala Lumpur Serdang, Malaysia, which shows relatively low learning involvement due to less varied learning methods, material that that is not fully contextual with lives of migrant students, and a learning environment that is not optimal, so that students tend to be passive, lack focus, and have minimal interaction during the learning process (Susanti et al., 2024)

Game-based microlearning strategies are an innovative and suitable way of learning to increase student engagement in the present (Disa & Arni, 2025). This method presents the material in a small, concise, and clear from, making it easier to understand and less boring (Salma, 2025). By adding game elements such as challenges, points, level, and live feedback, the learning process becomes more engaging, interactive, and fun. This is in line with the way students learn today who likes fast-paced, fun and challenging activities (Rahma et al., 2025). With short but meaningful learning activities, student is expected to be more concentrated, emotional engaged, and active in the learning process, so that this approach can overcome the boredom arising from boring teaching methods and increase student engagement cognitively and affectively (Di & Al, 2025).

Previous studies have shown that game-based microlearning strategies have a significant contribution to improving engagement, motivation, and learning effectiveness. Research by (Cuhanazriansyah, n.d.) conclude that the delivery of material in form of small sections balanced with game elements, such as gradual challenges, direct feedback, prizes, as well as healthy competitions, succeeded in increasing student engagement as well as effectiveness in real terms. In accordance with this, (HERWATI, n.d.) Affirms that involvement in learning directly affects student' motivation and learning outcomes,

especially through interactive and fun learning methods. Nonetheless, the two previous studies have not specifically examined the use of traditional games or group microlearning approaches to migrant students in the context of non-formal education. Thus, the uniqueness of this research lies in the application of microlearning strategies based on the traditional game Snake and Ladder to increase the involvement and learning motivation of migrants' students at Sekolah Indonesia Kuala Lumpur (SIKL) Serdang, Malaysia. It offers a learning model that is more contextual, flexible, and covers a wide range of needs and the challenges faced by the study group.

The research is important because the learning engagement of migrants' students is still a big problem that has not been widely discussed in innovative learning studies, especially in the context of non-formal education. Migrant students have different characteristics, social backgrounds, and learning experience than students in formal schools, so it requires a learning approach that can be adapted, contextually appropriate, and able to overcome those limitations (Ariy, 2025). By implementing the microlearning strategy based on the traditional game Snake and Ladder at Sekolah Indonesia Kuala Lumpur (SIKL) Serdang, it is hoped that it can increase student involvement, motivation to learn intellectually, emotionally, and behaviorally (Farichah, 2024). In addition, this research is also expected to make a theoretical contribution in enriching the study of microlearning and gamification in the context of learning migrant students. Practically, the results of this research can be a reference for educators and non-formal educational institutions in designing learning methods that are more inclusive, flexible, and in accordance with the needs of migrant students. In addition, this research can also be the basis for developing learning policies and innovations in the education community Indonesia in overseas.

METHOD

Quantitative methods are suitable because this study focuses on measuring the level of student learning engagement and the influence of game-based learning strategies, which require numerical data and statistical analysis to obtain objective and measurable results that focus on collecting and measuring data in the form of numbers to explain a phenomenon objectively and measurably. This approach was

chosen because it is able to show changes and relationships between variables through statistical analysis, especially in the effectiveness of learning methods on the level of student involvement (Sugiyono, n.d.)

The research design used is a pre-experimental design with a one group pretest – posttest model. This design aims to ignite the effectiveness of the Snake and Ladder game-based microlearning strategy by comparing the level of student learning engagement before and after the treatment is given. This model is seen as appropriate for initial research that focuses on testing the impact of a learning intervention (Syawaluddin et al., 2020).

This research was carried out at Sekolah Indonesia Kuala Lumpur (SIKL) Serdang, with 10 migrant students as research subjects because there are relatively few students there, only 5-10 children in a class, because this migrant school is still classified as secret from the Malaysian government. They followed a learning program during the intervention period. The selection of subjects was carried out because students have diverse social backgrounds and learning experiences, so in accordance with the purpose of the research, the tool used to collect data was a questionnaire about student learning engagement. This questionnaire is designed based on a grid that covers three aspects of learning engagement, namely behavioral, emotional, and cognitive engagement (Aimi Zulaika et al., 2024). The questionnaire was given in two forms, namely pretest and posttest, to find out the level of student learning involvement before and after the implementation of the Snake and Ladder game-based microlearning strategy. In addition to questionnaires, this study also uses observation sheets to record activities, participation, and student responses during the learning process. Documentation is also used as supporting material in carrying out learning activities. All instruments are designed to collect objective and measurable data on changes in student learning engagement during the implementation of the learning method.

Quantitative data obtained from the results of the questionnaire were analyzed using the Paired Sample T-Test statistical test with the help of the SPSS version 27 program. Previously, the data had been tested to find out if it was normally distributed and also measured the level of student involvement using the Ngain test.

The purpose of this analysis was to find out whether there was a significant difference in the level of student learning engagement before and after treatment is carried out. Meanwhile, the observation data was analyzed descriptively in order to strengthen the findings of the analysis quantitative and provide an overview of how student engagement takes place during the learning process (Sousa, 2022).

RESULTS

Implementation of Game-Based Microlearning

In this study, a game-based microlearning strategy was applied through the use of large snake and ladder banner media that functions as the main game board. The banners are designed with sequential boxes that each contain micro content in the form of short questions, simple instructions, or mini-assignments related to the learning material. Each content is arranged in the form of small pieces of material so that it is easily accessible and understood by migrant students who have diverse academic backgrounds and learning experiences.

The implementation of the game begins with 1) an explanation of the rules of the game by the teacher, including the use of digital dice displayed through an LCD screen or projector 2) digital dice are chosen so that the learning process becomes more modern, practical, and attracts the attention of students. 3) As the game progresses, each group of students takes turns pressing the digital dice button to determine the number of pawn steps to be moved on the snake and ladder banner. After the pawn is placed on a specific square, students are required to answer questions or complete the tasks listed on that box. The questions are strung with a gradual level of difficulty, ranging from Islamic Religious Education introduction of simple concepts to brief reflections that trigger critical thinking in a microlearning format, 4) If students manage to answer the questions correctly, they are allowed to continue the game without hindrance. However, if the answer is not correct, the teacher gives short feedback and the student is asked to take a step back as a consequence of learning, 5) During the game, the teacher facilitates and supervises the course of the activity, ensuring that all students are actively involved in reading instructions, discussing in groups, and giving answers. The use of large banners that can be touched directly by

students helps to create a concrete and enjoyable learning experience, while the short questions that appear on each box are able to stimulate behavioral, emotional, and cognitive engagement simultaneously, 6) The game ends with a short reflection session to get the migrant students started at SB SIKL Serdang Malaysia.



Figure 1. The process of Implementing Microlearning Based on the Snake and Ladder Game

Student Learning Engagement Data

Data collection on the learning engagement of Migrant Students was carried out at SB SIKL Serdang Malaysia, which included one class with a total of 10 students. This achievement data was obtained from the results of pretest and posttest to measure the learning involvement of students in Islamic Religious Education subjects before and after the implementation of the Microlearning Strategy based on the snake and ladder game. The pretest serves as the initial data collected before students receive an intervention through the use of Game-based Microlearning learning media. Meanwhile, the posttest reflects the final data obtained after the intervention using the given snake and ladder Game-Based Microlearning Strategy. Furthermore, the students' pretest and posttest scores will be analyzed to identify the development of the level of Engagement ability after the use of Game-based Microlearning Strategies. The results of obtaining students' pretest and posttest scores are presented in Table 1 below.

Table1. Pretest and Posttest Scores

Statistics	Pretest	Posttest
N	10	10
Mean	37,50	75,70

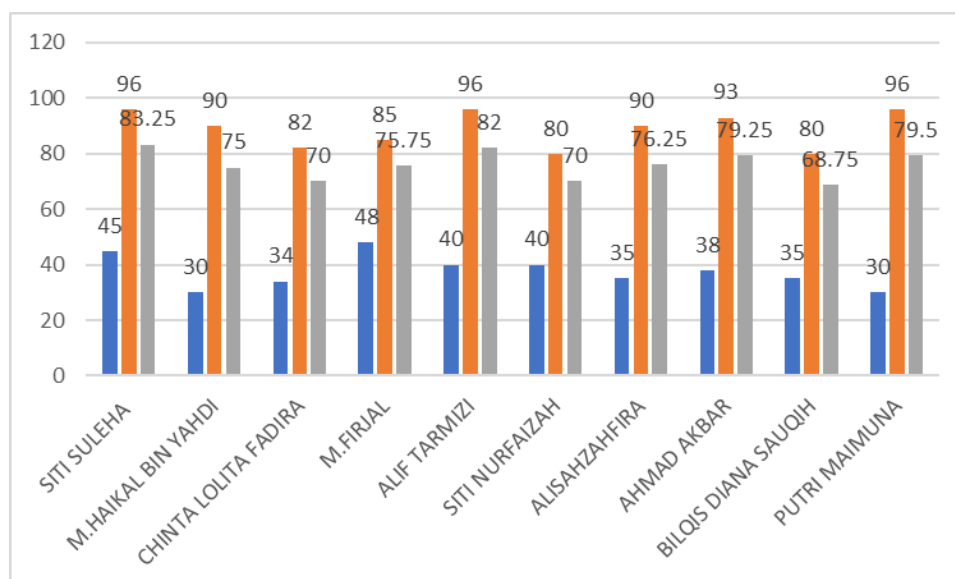
Statistics	Pretest	Posttest
Std. Deviation	5.930	5.165
Minimum	30	68
Maximum	48	83

Source: data processed with SPSS version 27

Data on the results of the initial teste (Pretest) and final test (Posttest) followed by 10 students showed an increase in learning outcomes after the application of the Microlearning Strategy. The average score achieved by students in the pretest stage in 37,50 with a standard deviation of 5.930. This shows that the initial competencies of the students tend to be homogeneous, with limited variation in scores. The minimum score in the pretest was recorded at 30, while the maximum score reached 48.

Post-application of treatment through using Snake and Ladder media showed an improvement in posttest results. The average score increased to 75.70 with a standard deviation of 5.165 indicating progress in learning outcomes as well as slight variation in the achievement of each student. The lowest score in the posttest was 68 , while the highest score was 83. Overall, the difference between the average pretest and posttest scores was 38.2 points, which confirmed that the Snake and Ladder Game-Based Microlearning Strategy had a positive impact on the improvement Migrant Student Learning Engagement.

Table 2. Bar Graph Comparison of Pre-Test and Posttest



Based on the bar graph above, it can be seen that all students experience improved learning outcomes after participating in learning. The initial score or pretest shows their ability is still relatively low, with a score range of around 30 to 48. After receiving the learning, the final or posttest scores increase significantly, with a score range between 80 to 96. The percentage of improvement in student learning outcomes ranges from 68.75% to 83.25%, which indicates a considerable improvement in understanding in each student. This proves that the learning method used is quite effective in improving student learning outcomes and can be applied in the next learning

Normality Test Results

Normality test are carried out to determine wheter the data is distributed normally or not. This test uses *the Shapiro method wilk* with SPSS software version 2 7. The results of the normality test can be seen in the table bellow:

Table 3. Data Normality Test Results

			Shapiro-Wilk			
	Statistic	Df	Sig.	Statistic	Df	Sig.
PRE	,163	10	,200*	,944	10	,594
POST	,172	10	,200*	,867	10	,092

Sumber: data processedwith SPSS versi 27

Based on the table presented, the results of the significance test using the Shapiro wilk method for pretest and posttest data showed values greater than 0,05 Berdasarkan tabel yang disajikan, hasil uji signifikansi menggunakan metode (Sig. = 0,200* for Shapiro-Wilk, as well as 0,594 and 0,92. This contains that the distribution of student learning outcome data, both before (pretest) and after the intervention (posttest), follows a normal pattern.

Results of the Homogeneity Test

Table 4. Homogeneity Test Result

Test of Homogeneity of Variances

PREPOST			
Levene	df1	df2	Sig.
Statistic			
,470	1	18	,502

Source: data processed with SPSS version 2 7

Based on the homogeneity test presented in the table, the significance value (Sig.) is $0,502 > 0,05$. This shows that the data show uniform variance. The results of this normality test and homogeneity test confirm that the data is distributed normally and method. the data has homogeneous variance. Therefore, the data is considered to have met the initial criteria required to conduct hypothesis testing using the Paired Sample t-Test.

T - Test Results (Paired Sample T-Test)

Table 5. T - Test Results

Data Pairs	Mean	N	Std. Deviation	Std. Error Mean	T	df	Sig. (2-tailed)
Pretest - Posttest	-51,300	10	8,970	2,836	-18,086	9	0.00

Source: data processed with SPSS version 27

Based on the results of the Paired Sample T-Test analysis, it was found that the average score of migrant students' learning engagement before treatment (pretest) through the game-based microlearning strategy was 37,50. After applying the treatment using snake and ladder game learning in the microlearning strategy, the average score on the posttest increased significantly to 88,80. This shows an average increase of 51,30 points, indicating that the implementation of game-based microlearning strategies is able to substantially increase the learning engagement of migrant students. Furthermore, the results of the statistical test showed a significance value (Sig. 2-tailed) of $0,000 < 0,05$, so it can be concluded that there is a significant difference between the pretest and posttest scores. Thus, the zero hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, which means that the snake and ladder game-based microlearning strategy has a significant effect on increasing the learning engagement of migrant students in SB SIKL Serdang, Malaysia.

N Gain Test Results

To analyze the increase in score, it is calculated by the N Gain test

Table 6. N Gain Test Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	10	,67	,94	,8192	,10862
Ngain_Persen	10	66,67	94,29	81,9164	10,86191
Valid N (listwise)	10				

Based on the results of the N-Gain calculation, an average value (mean) of 0,8192 or equivalent to 81,92% was obtained. These values show that there is a very good improvement after the application of the snake and ladder game-based microlearning strategy in the learning process. Referring to the N-Gain interpretation criteria, the N Gain value of 0,8192 is included in the high category. Thus, it can be concluded that the microlearning strategy based on the snake and ladder game is effective in increasing the learning involvement of migrant students in SB SIKL Serdang, Malaysia, and is able to provide an optimal learning impact.

DISCUSSION

Based on the results of the research that has been carried out, the implementation of microlearning strategies based on snake and ladder games shows an increase in the learning involvement of migrant students in SB SIKL Serdang, Malaysia. Student learning engagement before the implementation of the game-based microlearning strategy was in the low category, while after being given treatment showed a significant increase. This is in line with Syahada & Sundi's research that the positive impact on the application of the game based learning model is, students become active in participatory and interactive when participating in ongoing learning, students tend to be easier in understanding the concept of learning materials (Syahada & Sundi, 2024) microlearning strategies based on snake and ladder games have a positive influence on the involvement of migrant students.

To determine the influence of snake and ladder game-based microlearning strategies on student learning engagement, researchers used the Paired Sample T-Test statistical (Muliani, 2025). The test results showed that the significance value was less than 0.05, so it can be concluded that there is a significant difference between student learning engagement before and after the implementation of game-based microlearning strategies. Like Rahmani's Research (2024) which explains that the paired sample t-test is one of the testing methods used to assess the effectiveness of treatment (Rahmani, 2025). Thus, the hypothesis that the microlearning strategy based on the snake and ladder game has an effect on the learning involvement of migrant students is declared accepted. In addition, the results of the N-Gain test show an increase value that is in the high category. This indicates that microlearning strategies based on snake and ladder games are effective in increasing student learning (Yani & Info, 2025).

However, the increase in student learning engagement is not only influenced by the learning strategies applied, but also (Angga et al., 2024) students' learning interests, motivation, physical condition, and mental readiness. Meanwhile, external factors include the learning environment, peer support, as well as the learning atmosphere created during the learning process (Rahma et al., 2025)

The results of this study are in line with previous research that stated that microlearning and game-based learning can increase student learning engagement. Research conducted by Cuhazriansyah shows that the presentation of material in a short manner and packaged in the form of games is able to increase student participation and interest in (Cuhazriansyah, n.d.). These findings are also supported by Herwati's research which states that interactive and fun learning methods have an effect on student learning engagement (HERWATI, n.d.)

Thus, it can be concluded that microlearning strategies based on snake and ladder games have a significant influence on the learning engagement of migrant students. This strategy is able to create a more active and enjoyable learning atmosphere, there by encouraging students to be more optimally involved in the learning process.

CONCLUSION

Based on the results of the study, it can be concluded that the use of microlearning strategies on snake and ladder games is effective in increasing the learning involvement of migrant students in SB SIKL Serdang, Malaysia. In terms of quantitative, the average score of student learning engagement increased from 3,50 in the pretest to 88,80 in the posttest, with an increase of 51,30 points. The Paired Sample T-Test showed a significance value of 0,000 that was smaller than 0,05, indicating a significant difference between student learning engagement before and after the implementation of the learning strategy. In addition, the results of the N-Gain analysis showed an average score of 0,8192 (81.92%), which was in the high category, indicating an increase in student learning engagement with an excellent level of effectiveness.

Increased learning engagement includes behavioral, emotional, and cognitive aspects, which seen from increased active participation, learning motivation, and understanding of Islamic Religious Education materials. These findings show that the short, focused, and contextual characteristics of microlearning, as well as the use of simple and interactive snake and ladder games, are able to create learning effective and inclusive for migrant students. Therefore, a microlearning strategy based on the snake and ladder game is recommended as an alternative learning model to increase the learning engagement of migrant students, especially in the context of education non-formal. Follow up research is recommended to involve more subjects and a longer duration of implementation in order to evaluate the sustainability of learning impacts.

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