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The Effectiveness of the Snakes and Ladders Game as a Learning Medium to Enhance Mathematics Learning Motivation Among Seventh-Grade Students

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Abstract

Math can seem really hard to middle schoolers, and because of that it can be a less motivating subject for them. As teachers we need to make school more fun and more stimulating. One way I looked at doing that is with the Snakes and Ladders game. My goal was to see how much this game would motivate 7th graders to learn more about Integer Algebra. My study incorporated 25 different students, and the data I used came from a motivation to learn survey I created. I made sure everything from the survey was validated, and elements like consistency and difficulty assessment were created. Based on the results of my study, the Snakes and Ladders game motivated the students to get more involved in the more fun and energetic classroom. The Snakes and Ladders game for motivated the students. I would recommend this game to other teachers because it helps engage students. For motivating younger students to learn math, I would call this a success. My only other recommendation is to use more detailed statistics to justify the success of using Snakes and Ladders as a learning resource on a larger population.

Keywords: Learning Media, Snakes and Ladders Game, Learning Motivation, Mathematics Education, Integer Algebra.

1. Introduction

Mathematics helps students with all kinds of reasoning skills including logical, analytical, critical, and methodical thinking. For this reason, it is a school subject of great importance. Most students learn arithmetic in junior high, even where students struggle with its abstract concepts. Understandably, this attitude reduces students' enthusiasm to learn and lessens their participation in classroom activities. It has been said that motivation to learn has an impact on students' participation in the subject and success in mathematics. According to Hamalik (2010), motivation is a psychological characteristic that helps students to be an active participant in the course and to strive to accomplish the goals set for them in the course. In light of this, it is the teacher's responsibility to prepare learning tools and methodologies that inspire and boost students' motivation and interest, while providing greater relevance to the subject matter of the mathematics lessons.

Instructional media is used to make learning and teaching more effective. Arsyad (2017) states that learning media can enhance learning, make students more focused on learning, and simplify communication between students and teachers. Games have the ability to capture and maintain learners' attention and help the teacher engage the students. Games have the unique ability to present ideas that are difficult to visualize in a practical and enjoyable learning environment. There is a large amount of positive interest in the utilization of games in math learning. Educational games make students participate in the learning process and also help them cooperate with their classmates and maintain interest.

Many studies have focused on the positive effects of game-based learning. Game-based learning impacts not only students' level of interest, but their achievement, too. Board games used as learning tools increased students' interest and engagement in learning activities and math practice, as found/argued by Ningsih and Marlina (2021). Learning tools classified as game-based learning decreased students' boredom and increased students' engagement in learning activities in math, according to Pratama et al. (2022). Learning games used in this study/these studies increased students' motivation and engagement in the classroom, according to Wulandari and Sari (2023). Based on the results of the studies, educational games can be valuable in math instruction.

Even though previous studies have had some success, the effect of the Snakes and Ladders game (and game-based learning in general) on the motivation to learn Integer Algebra among seventh-grade students is still untested. Current studies have focused primarily on students' performance and engagement in class, and have given little regard to motivation in the context of this branch of mathematics. There is, therefore, a need for research to fill in the gaps concerning the potential inspiration this game and this approach to the teaching of mathematics may invoke among the students.

Because of the concerns mentioned earlier, this research will look at how useful the Snakes and Ladders game is, for increasing seventh grade students' interest in learning about Integer Algebra. It is believed that using this game as a teaching tool will prepare teachers better for using game-based instruction in all areas of math, which will lead to a more involved, happy, and motivated learning atmosphere for the students.

2. Methods

The Snakes and Ladders Game was employed in this study to measure student motivation to increase their math learning abilities, especially in Integer Algebra. A quantitative approach with a quasi-experimental design of the nonequivalent control group type was used for this purpose.All respondents in this study were 7th graders in Junior High. This study used the 7th graders who were available during the time of the study. From this population, the researchers determined respondents with the presence and willingness to participate in the learning process, numbering 25 respondents, using purposive sampling. Then, these respondents were divided into two groups. the group that was taught using the Snakes

and Ladders Game was the experimental group, and the group that was taught using the conventional method was the control group. The participants were grouped based on the current class size so the groups were of unequal size.

The Snakes and Ladders game as an instructional aid was the independent variable in this study, while students' drive to learn math was the dependent variable.The data collection tools included observation sheets, motivation questionnaires, and documentation. The motivation questionnaire that used the Likert scale was employed to assess the motivation to learn, the enjoyment of the learning process, the level of participation, perseverance to complete the task, and the activeness in the mathematics learning process. Before conducting the study, the research instrument was given validity and reliability tests. The split-half method was used for reliability and the Product Moment correlation for item validity. The research was conducted in three main stages. The first step involved getting the educational game ready, creating the Snakes and Ladders game media, and checking the research tools. The learning activities were implemented during the second phase. The control group was taught using traditional methods at this stage, while the experimental group was taught using the Snakes and Ladders game.The researcher made classroom observations in order to assess the participants and the active involvement of the students in the learning process. The third stage was the administration of the motivation post-test and the collection of observation and documentation data for analysis.

In this study, both descriptive and inferential methods were used to examine the data. To illustrate the scores for mathematics learning motivation both before and after the learning intervention, descriptive statistics were used.The normality and reliability tests were used to analyze the collected data before conducting hypothesis testing. Subsequently, appropriate statistical comparison tests were chosen in light of the data distribution findings in order to determine any differences in student motivation across the experimental and control groups, as well as between pre- and post-measurement results. A significance level of $\alpha = 0.05$ was used in this investigation. The results of the study were utilized to determine how effective the Snakes and Ladders game was as a teaching tool in boosting children's enthusiasm for learning math.

3. Result and Discussion

3.1 Results

This research was conducted to investigate the effectiveness of the Snakes and Ladders game in enhancing the mathematics learning motivation of seventh-grade students on the topic of Integer Algebra. The study involved 50 participants who were assigned into two groups, namely an experimental group that received instruction through the Snakes and Ladders game and a control group that was taught using traditional learning methods.

3.1.1 Learning Motivation Scores

The results of the pretest and posttest motivation scores are presented as follows:

Table 1. Descriptive Statistics

Groups	Assignment	N	Min	Max	Mean	SD
Kontrol	Pretest	25	1	29	15,04	9,75
	Posttest	25	1	29	15,12	9,75
Eksperimen	Pretest	25	2	29	15,40	9,54
	Posttest	25	7	30	20,56	8,29

Table 1 presents the descriptive statistics of learning motivation scores for the control and experimental groups at both measurement points. Prior to the intervention, the two groups displayed comparable baseline characteristics, with the control group achieving a mean pretest score of 15.04 (SD = 9.75) and the experimental group a mean of 15.40 (SD = 9.54), while both groups exhibited a similar maximum score of 29. Following the intervention, the control group demonstrated only a negligible change, as the mean score increased marginally to 15.12 and the standard deviation remained constant (SD = 9.75), indicating that students' motivation levels were largely stable over the study period. By contrast, the experimental group showed a marked increase in learning motivation, with the mean score rising to 20.56, accompanied by a reduction in score dispersion (SD = 8.29). The minimum score also increased substantially from 2 to 7, whereas the maximum score reached 30, suggesting that improvements were observed across a broader range of participants rather than being confined to a limited number of students.

3.1.2 Instrument Validity Test

Prior to hypothesis testing, the validity of the research instrument was evaluated to determine whether each questionnaire item accurately measured the intended construct. The validity check was done using the item–total correlation approach, and an item was considered valid if its correlation score was higher than the critical value from the r-table. We used Product Moment correlation to run a validity test. With 25 samples, we used the 5% significance level R table value of 0.361.

Table 2. Items Validity Test (Control Group)

Variables	Items	R score	R Table	Result
Pretest	P1	0,917	0,361	Valid
	P2	0,840	0,361	Valid
	P3	0,871	0,361	Valid
	P4	0,901	0,361	Valid
	P5	0,905	0,361	Valid
	P6	0,932	0,361	Valid
	P7	0,894	0,361	Valid
	P8	0,848	0,361	Valid
	P9	0,927	0,361	Valid
	P10	0,930	0,361	Valid
Posttest	P11	0,918	0,361	Valid
	P12	0,810	0,361	Valid
	P13	0,870	0,361	Valid
	P14	0,930	0,361	Valid
	P15	0,906	0,361	Valid
	P16	0,943	0,361	Valid
	P17	0,909	0,361	Valid
	P18	0,856	0,361	Valid
	P19	0,928	0,361	Valid
	P20	0,918	0,361	Valid

Table 2 presents the item validity results for the control group. All questionnaire items met the validity criterion, with item–total correlation coefficients ranging from 0.810 to 0.943, substantially exceeding the critical r-table value of 0.361. The consistently high correlation coefficients across both the pretest and posttest measurements indicate that each item demonstrated satisfactory construct validity and was appropriate for measuring students' learning motivation, supporting the use of the instrument in subsequent statistical analyses.

Table 3. Items Validity Test (Experimental Group)

Variables	Items	R score	R Table	Result
Pretest	P1	0,908	0,361	Valid
	P2	0,848	0,361	Valid
	P3	0,878	0,361	Valid
	P4	0,837	0,361	Valid
	P5	0,829	0,361	Valid

	P6	0,922	0,361	Valid
	P7	0,912	0,361	Valid
	P8	0,808	0,361	Valid
	P9	0,910	0,361	Valid
	P10	0,783	0,361	Valid
Posttest	P11	0,856	0,361	Valid
	P12	0,594	0,361	Valid
	P13	0,816	0,361	Valid
	P14	0,781	0,361	Valid
	P15	0,680	0,361	Valid
	P16	0,752	0,361	Valid
	P17	0,530	0,361	Valid
	P18	0,882	0,361	Valid
	P19	0,778	0,361	Valid
	P20	0,835	0,361	Valid

Table 3 summarizes the item validity test for the experimental group. All questionnaire items satisfied the established validity criterion, with item–total correlation coefficients ranging from 0.530 to 0.922, all of which exceeded the critical r-table value of 0.361. These findings demonstrate that every item exhibited adequate discriminative capacity and was considered valid for assessing students' learning motivation in both the pretest and posttest, indicating that the instrument was suitable for subsequent statistical analysis.

3.1.3 Reliability Test

Following the validity assessment, the reliability of the instrument was examined to evaluate the consistency of the questionnaire in measuring students' learning motivation. Internal consistency was assessed using Cronbach's alpha coefficient, with higher alpha values indicating greater reliability of the measurement instrument.

Table 4. Reliability Test

Groups	Variables	Cronbach's Alpha	Criterion	Result
Control	Pretest	0,973	0,600	Reliable
	Posttest	0,973		Reliable
Experimental	Pretest	0,962		Reliable
	Posttest	0,915		Reliable

Table 4 shows the results of the reliability test for the learning motivation questionnaire in both the control group and the experimental group. The tool showed very good consistency within itself, with Cronbach's alpha scores of 0.973 for both the pretest and posttest in the control group, and 0.962 for the pretest and 0.915 for the posttest in the experimental group.All coefficients substantially exceeded the predetermined reliability criterion of 0.600, indicating that the questionnaire consistently measured the intended construct across both groups and measurement occasions, thereby confirming its suitability for subsequent statistical analyses.

3.1.4 Discriminating Power and Difficulty Index

The quality of the questionnaire items was further evaluated by examining their discriminating power and difficulty index to determine their effectiveness in distinguishing between students with different levels of learning motivation and to assess the relative ease or difficulty of each item. Items meeting the established criteria for both indices were considered appropriate for inclusion in the final instrument and subsequent data analysis.

Table 5. Discriminating Power

Group		Score	Criteria
Control	Pretest	0,56	Good
	Posttest	0,56	Good
Experimental	Pretest	0,54	Good
	Posttest	0,49	Good

Table 5 shows the results from the analysis that checks how well the questionnaire can tell apart the responses from the control group and the experimental group. The discrimination indices varied between 0.49 and 0.56. The control group had the same scores of 0.56 before and after the test.The experimental group had scores of 0.54 and 0.49 before and after the test.All values were classified as good, indicating that the instrument consistently demonstrated an adequate ability to distinguish between students with relatively higher and lower levels of learning motivation. These findings support the suitability of the questionnaire for accurately differentiating participants according to the construct being measured.

Table 6. Difficulty Index

Groups		Item	Discriminating Power	Criteria
Control	Pretest	P1	0,28	Hard
		P2	0,16	Hard
		P3	0,24	Hard
		P4	0,20	Hard

Groups		Item	Discriminating Power	Criteria
		P5	0,16	Hard
		P6	0,12	Hard
		P7	0,16	Hard
		P8	0,20	Hard
		P9	0,32	Moderate
		P10	0,28	Hard
	Posttest	P1	0,28	Hard
		P2	0,20	Hard
		P3	0,20	Hard
		P4	0,20	Hard
		P5	0,20	Hard
		P6	0,24	Hard
		P7	0,16	Hard
		P8	0,16	Hard
		P9	0,24	Hard
		P10	0,28	Hard
Experimental	Pretest	P1	0,28	Hard
		P2	0,20	Hard
		P3	0,24	Hard
		P4	0,20	Hard
		P5	0,16	Hard
		P6	0,24	Hard
		P7	0,24	Hard
		P8	0,20	Hard
		P9	0,28	Hard
		P10	0,32	Moderate
	Posttest	P1	0,48	Moderate
		P2	0,52	Moderate
		P3	0,52	Moderate
		P4	0,40	Moderate
		P5	0,48	Moderate
		P6	0,48	Moderate
		P7	0,56	Moderate
		P8	0,48	Moderate
		P9	0,52	Moderate
		P10	0,52	Moderate

Table 6 presents the item difficulty analysis for the learning motivation questionnaire administered to the control and experimental groups. In the control group, most items in both the pretest and posttest were classified as hard, with difficulty indices ranging from 0.12 to 0.32, while only one item reached the moderate category at each measurement occasion. A similar distribution was observed in the experimental group's pretest, where nearly all items were categorized as hard, except for one item with moderate difficulty. Following the intervention, all posttest items in the experimental group were classified as having moderate difficulty, with difficulty indices ranging from 0.40 to 0.56. This shift indicates that the questionnaire items became more balanced in terms of response difficulty after the intervention, reflecting an increased proportion of students who were able to respond positively to the learning motivation items.

3.1.5 Normality Test

Prior to hypothesis testing, the distribution of the data was examined using the Liliefors normality test to determine whether the assumption of normality was satisfied. The test results were used to establish the appropriateness of applying parametric statistical procedures in the subsequent data analysis.

Table 7. Liliefors Normality Test

Groups		Liliefors Test		Results
		Stat.	p value	
Control	Pretest	0,127	0,200	Normal
	Posttest	0,124	0,200	Normal
Control	Pretest	0,159	0,102	Normal
	Posttest	0,166	0,075	Normal

Table 7 shows the results of the Liliefors normality test for the scores before and after the intervention in both groups. The control group had test scores of 0.127 and 0.124, and the p-values for these were 0.200 and 0.200. The experimental group had test scores of 0.159 and 0.166, with p-values of 0.102 and 0.075 for the pretest and posttest, respectively. Since all the p-values were higher than the 0.05 significance level, we kept the null hypothesis of normality for each dataset. This suggests that the scores in both groups followed a normal pattern, which meets the requirement for using parametric statistical methods in the next steps.

3.1.6 Hypothesis Testing

Hypothesis testing was conducted to evaluate the effectiveness of the snake-and-ladder game in improving students' learning motivation. The study used paired-samples t-tests to look at the changes in scores from the pretest to the posttest within each group.It also used an independent-samples t-test to compare the posttest scores between the two groups. These analyses were performed to determine both the within-group changes following the intervention and the comparative effectiveness of the instructional approach across groups.

Table 8. Paired Sample T Test Results

Groups		Mean	p value	Results
Control	Pretest	15,04	0,161	H0 Accepted/Ha Rejected
	Posttest	15,12		
Experimental	Pretest	15,40	0,000	H0 Rejected/Ha Accepted
	Posttest	20,56		

Table 8 shows the results from a paired-samples t-test that compares the learning motivation scores from before and after the test within each group. The control group showed a small rise in the average score from 15.04 to 15.12; however, this difference wasn't big enough to be statistically significant ($p = 0.161$), which means that students' motivation to learn didn't change much after receiving traditional instruction. In contrast, the experimental group demonstrated a substantial increase in the mean score from 15.40 to 20.56, with the paired-samples t-test yielding a highly significant result ($p < 0.001$). Accordingly, the null hypothesis was rejected for the experimental group, providing statistical evidence that the implementation of the snake-and-ladder game produced a significant improvement in students' learning motivation.

Table 9. Independent Sample T Test Result

Groups		Mean	p value	Results
Control	Posttest	15,12	0,039	H0 Rejected/Ha Accepted
Experimental	Posttest	20,56		

Table 9 shows the results from a t-test that compared the learning motivation scores after the test between the control group and the experimental group. The group that took part in the experiment scored higher on average (20.56) compared to the group that didn't (15.12), and this difference was found to be important in statistics ($p = 0.039$). Since the p-value was less than 0.05, the null hypothesis was

rejected.This shows that students who played the snake-and-ladder game had much more learning motivation compared to students who got traditional instruction.These findings provide statistical evidence that the game-based learning intervention was more effective in enhancing students' learning motivation.

3.2 Discussion

The test showed that using the snakes-and-ladders game helped students become more motivated to learn, but regular teaching methods did not make a noticeable difference in their motivation. At the end of the intervention, when comparing the experimental group with the control group, it was found that students who used the game-based learning method showed much higher levels of motivation to learn compared to students who had traditional classroom lessons. These findings indicate that integrating educational games into classroom activities creates a more engaging learning environment that encourages active participation, sustained attention, and positive emotional involvement throughout the learning process. The competitive and collaborative characteristics of the snakes-and-ladders game appear to stimulate students' intrinsic interest in learning by transforming instructional activities into meaningful and enjoyable experiences. Such conditions are consistent with educational theories emphasizing that motivation is strengthened when learners actively interact with instructional materials, participate in social learning experiences, and perceive learning tasks as both enjoyable and attainable. The observed improvement therefore reflects not only the influence of the instructional medium itself but also the enhanced quality of student engagement facilitated by game-based learning.

These results match what earlier studies have shown about how using interactive learning tools can help with education. Anggraini et al. (2026) reported that the use of varied instructional media, including the snakes-and-ladders game, significantly enhanced students' conceptual understanding by promoting active engagement and creating more meaningful learning experiences, suggesting that interactive media encourage deeper involvement during classroom instruction. Likewise, Hidayani et al. (2026) found that snakes-and-ladders media increased students' classroom participation, motivation, and learning outcomes by fostering collaboration, discussion, and active interaction among learners. The present findings extend these studies by demonstrating that, beyond improving cognitive performance and classroom participation, the snakes-and-ladders game also serves as an effective pedagogical approach for strengthening learning motivation when compared with conventional teaching methods. From a theoretical perspective, game-based learning provides opportunities for students to experience autonomy, social interaction, immediate feedback, and enjoyable challenges, all of which are recognized as essential elements for fostering and sustaining academic motivation. Consequently, incorporating structured educational games into classroom instruction represents an effective strategy for creating learner-centered environments that promote greater motivational engagement and support more meaningful learning experiences.

4. Conclusion

The findings demonstrate that the use of the snakes-and-ladders game constitutes an effective instructional strategy for enhancing the learning motivation of seventh-grade junior high school students. While students who received conventional instruction exhibited no meaningful improvement in learning motivation, those who participated in the game-based learning activities showed a significant increase, indicating that interactive learning experiences are more successful in stimulating students' willingness to engage in classroom activities. From a theoretical perspective, these findings reinforce the view that learning motivation is strengthened when students actively participate in meaningful, collaborative, and enjoyable learning processes rather than serving as passive recipients of information. Educational games provide opportunities for immediate interaction, challenge, and peer collaboration, thereby creating learning conditions that support sustained motivational engagement and more positive attitudes toward learning.

The practical implications of this study suggest that integrating game-based instructional media into classroom practice may serve as an effective alternative to conventional teaching approaches, particularly for promoting students' motivation during the learning process. Teachers are encouraged to design learning activities that combine educational content with interactive and collaborative elements to foster greater student participation and enthusiasm. It is suggested that future studies should include bigger and more varied groups of people, make the learning activity last longer, and look at other educational results like school performance, thinking skills, how interested students are in learning, and their lasting motivation.This would help better understand how using a snakes-and-ladders game for learning affects education in different teaching situations.

REFERENCES

Anggraini, S. I., Yunarti, T., & Setiawati, S. (2026). The effect of learning media use on conceptual understanding ability in students with low mathematical ability. Al-Khwarizmi: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam, 14(1), 1–18. https://doi.org/10.24256/jpmipa.v14i1.7201

Arsyad, A. (2014). Media Pembelajaran. Jakarta: Rajawali Pers.

Arsyad, A. (2017). Media Pembelajaran. Jakarta: Rajawali Pers.

Depdiknas. (2016). Departemen Pendidikan Nasional Republik Indonesia. Kurikulum dan Standar Isi Pendidikan Dasar dan Menengah. Jakarta.

Hamdani. (2018). Strategi Belajar Mengajar. Bandung: Pustaka Setia.

Hamalik, O. (2010). Proses Belajar Mengajar. Jakarta: Bumi Aksara.

Hidayani, H., Putri, P. D. R., Faisal Eka, M., Trisnawati, N. F., & Layn, R. (2026). Evaluating the effectiveness of snakes and ladders media in improving algebra learning outcomes of junior high school students. Journal of Islamic Education Students, 6(1), 237–248.

Kementerian Pendidikan dan Kebudayaan Republik Indonesia. (2020). Pedoman Implementasi Kurikulum Nasional. Jakarta.

Ningsih, R., & Lestari, D. (2021). Penggunaan permainan edukatif dalam pembelajaran matematika SMP. Jurnal Pendidikan Matematika.
Sardiman. (2018). Interaksi dan Motivasi Belajar Mengajar. Jakarta: Rajawali Pers.
Slavin, R. E. (2018). *Educational Psychology: Theory and Practice*. Boston: Pearson Education.
Suryani, N., Setiawan, A., & Putria, A. (2020). Media Pembelajaran Inovatif dan Pengembangannya. Bandung: Remaja Rosdakarya.
Uno, H. B. (2021). Teori Motivasi dan Pengukurannya. Jakarta: Bumi Aksara.
Usiskin, Z. (2020). Algebra: Meaning and Applications. Chicago: University of Chicago Press.
Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2019). Elementary and Middle School Mathematics: Teaching Developmentally. Boston: Pearson.