



## Impact of Game-Based Discovery Learning on Elementary Students' Engagement and Learning Motivation in Social Studies

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### Abstract

The study was conducted to analyze the effect of discovery learning using the Ludo King educational game on student learning activeness and motivation in Social Studies. The study involved the fifth-grade students of Pasirian 06 State Elementary School, with a total of 27 students. This research is categorized as quasi-experimental with a one-group pretest-posttest design, and hypothesis testing was performed using the Mann-Whitney U test. The results indicated a significance value of  $0.000 < 0.05$  for student learning activeness and motivation. Therefore, it can be concluded that the application of the discovery learning model using the Ludo King game has a significant effect on increasing student activeness and motivation in fifth-grade Social Studies at Pasirian 06 State Elementary School

## Introduction

Education is a crucial element in individuals' lives and plays a significant role in a country's economic development. In the digital era, teachers or educators are required to continuously adapt to technological advancements in learning in order to periodically update students' knowledge. According to Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, it is stated that teachers are required to possess competencies as learning agents, including pedagogical, social, personal, and professional competencies, as well as teacher certification (Pemerintah RI 2005). This regulation aims to encourage teachers to continuously improve their professionalism through various efforts, thereby fostering a conducive learning atmosphere that motivates students to actively engage in the learning process (Adhim et al., 2025; Walford, 2022; Merdiaty & Sulistiasih, 2024; Khodadad, 2023; Tanang & Abu, 2014).

As implementers of learning, teachers must be capable of anticipating educational developments by delivering learning materials using strategies that align with the characteristics of the learning process (Anisah & Qamariah, 2023; Krajcik et al., 2008). It is therefore expected that the material delivered can be effectively received by students and that teachers can carry out learning activities efficiently. Such goals can be achieved if teachers are able to adapt their teaching methods to contemporary developments while maintaining learning paradigms that foster student innovation. The implementation of appropriate teaching strategies will assist students in attaining the predetermined learning objectives (Bruggeman et al., 2021; Ansya et al., 2024; Widiastuti et al., 2021; Lukitoyo et al., 2023). Learning strategy refers to a planned course of action that involves the application of methods and the utilization of various resources to support the learning process (Theobald, 2021; Rivas et al., 2022; Zimmerman, 2023; Anthonysamy, 2021). It encompasses the approaches employed by teachers to achieve specific learning objectives (Shamsan et al., 2021). Learning strategies include a combination of approaches, methods, and techniques used in instructional activities. The selection of appropriate learning models, methods, and strategies is expected to enhance

students' overall learning success and, at the same time, facilitate the teaching process for educators in schools (Hikmah et al., 2021; Lampropoulos et al., 2022; Zhao et al., 2024; Sudrajat et al., 2024).

Pasirian 06 State Elementary School is one of the leading schools in Lumajang district. Based on initial observations, it is known that the learning process at Pasirian 06 State Elementary School is good, where students are very enthusiastic and enthusiastic about the learning process, if the teacher applies a variety of learning models. However, on the contrary, the majority of students feel bored and lack enthusiasm if the learning process is carried out with conventional, monotonous and non-variative methods. Based on preliminary observations at Pasirian 06 State Elementary School, Pasirian District, class V, there are still many students who are less enthusiastic about the learning process, such as sleepy in class and talking with friends. During the learning process some students do not participate in learning activities and often come late to class. The low motivation to learn also has an impact on the achievement of students, where from the results of the daily tests of students there are still 15% of students who get scores below the Minimum Completion Criteria (KKM).

Based on a study conducted by Widana & Handayani (2022), one of the learning models that can enhance student activeness and motivation is discovery learning integrated with educational games. Discovery learning is a pedagogical model that encourages students to be actively involved in exploring, investigating, and independently constructing new knowledge, rather than solely relying on information delivery. To address the issues related to student activeness and learning motivation, the researcher proposes the use of the Ludo King educational game as a solution. Ludo King-based learning media represents an innovative approach that adapts the popular board game Ludo King into a learning tool within the teaching and learning process (Siti et al., 2021). Research conducted by Maulidy & Cholikh (2020) also shows that the implementation of the discovery learning model can significantly increase students' motivation and activeness. Similarly, a study by Solori & Hastuti (2021) found that the use of the Ludo game was effective in enhancing students' learning motivation.

## Methods

The adopted research design in this study is the quasi-experimental research design, and it targeted to determine the impact of discovery learning model coupled with the Ludo King education game on the activeness of students and their learning motivation. Quasi-experimental research was selected since it would allow testing the causal relationships in already pre-existing groups of people without the deployment of random feature or the use of a control group. The method is also relevant especially when the students to be studied are in intact classes and when logistical or ethical issues make randomization impossible. It was a single-participants study where one group of them being evaluated before and after the intervention application took place. The particular design adopted in this study was the one-group pre test posttest design which is a widely utilized general format in the quasi experimental designs and a design that is used to determine changes in the dependent variables by comparing the information on two occasions faced before and after the incidence. This type of design will allow the researcher to determine how taking the Ludo King game through the discovery learning model influenced the same group of students over a period.

The study involved the entire population of 27 fifth-grade students at Pasirian 06 State Elementary School, Pasirian District, thereby using a census sampling technique. This means that no sampling selection was needed, as all students in the class were included in the research. Such an approach ensured that the findings of the study reflected authentic classroom conditions and that the intervention's effect could be observed across the entire group without

the introduction of sampling bias. The classroom served simultaneously as both the population and the sample, which is consistent with educational intervention studies aiming for ecological validity and applicability in real educational contexts.

Table 1. Research Design Scheme

Pretest	Action	Posttest
T <sub>1</sub>	X	T <sub>2</sub>

Information:

T<sub>1</sub> : An initial test (pretest) was conducted                      T<sub>2</sub> : The final test (posttest) is conducted  
 X : The action given to students using the ludo game.

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There were two key variables that were to be taken as the point of data collection: activeness with regard to learning and learning motivation that the students have. To measure these variables, the researcher used structured questionnaires that were carried out on two times: before the intervention (pretest) and after the intervention (posttest). The statements provided in the questionnaires were aimed at quantifying the levels of participations, engagements, enthusiasm, and intrinsic motivation of students, which are also useful indicators of active learning and the degree of being motivation. These statements were answered by the students on a scale that represented how much the students agreed to them or how often they practiced particular activity. The instruments were expected to be age-related, understandable, and should apply both intellectual and emotional aspects of the educational process.

Regarding the analysis of data, the researchers utilized a powerful statistical process so that conclusions would be bona fide. The initial analytical procedure entailed normality testing of data by using Shapiro-Wilk, which is highly applicable in small sample size as was the case in our study. The results showed that the data on the learning activeness in pretest and posttest and the pretest data on learning motivation did not fulfill the assumption of normality as shown by the significance values which were less than 0.05. Besides, Levene test was used to test homogeneity of variance and the result was that the data were not homogeneous in learning activeness, whereas the data were homogeneous in learning motivation. Mann-Whitney U test was chosen to test my hypothesis since the statistical data was not completely in compliance with the assumptions of the parametric test. This non-parametric test can be applied to study the difference between two linked sets of data in case when the data do not fit the normal distribution and the homogeneity of the variance. The test helped determine the presence of statistically significant changes in the levels of student activeness and motivation over the sample period and the cut-off value was 0.05.

## Results and Discussion

This research was conducted in the fifth grade of Pasirian 06 State Elementary School, Pasirian District using the discovery learning method with the Ludo King game in Social Studies subjects. The stages of data analysis in this study are as follows:

Table 2. Normality Test Results

		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Activity	Pretest	0.210	27	0.003	0.913	27	0.027
	Posttest	0.202	27	0.006	0.897	27	0.012
Learning Motivation	Pretest	0.250	27	0.000	0.844	27	0.001
	Posttest	0.109	27	0.200	0.984	27	0.945

The normality testing in this study employed the Shapiro-Wilk test. The significance value for students' learning activeness in the pretest was 0.027, and in the posttest, it was 0.012. These results indicate that both sets of learning activeness data are not normally distributed, as the significance values are less than 0.05. Regarding students' learning motivation, the pretest yielded a significance value of 0.001, while the posttest yielded 0.945. Based on these results, the pretest data for learning motivation are not normally distributed, whereas the posttest data are normally distributed.

Table 3. Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
Learning Activity	Based on Mean	10.145	1	52	0.002
	Based on Median	6.267	1	52	0.015
Learning Motivation	Based on Mean	0.023	1	52	0.880
	Based on Median	0.044	1	52	0.835

Based on the table above, the data for the learning activeness variable obtained a significance value of 0.002 while the learning motivation variable obtained a significance value of 0.880. This means that the data on student learning activeness is not homogeneous, while the data on student learning motivation is homogeneous.

Given that the data is not normal and not homogeneous, the data hypothesis test in this study uses the non-parametric mann whitney u test. The following are the results of hypothesis testing in this study:

Table 4. Mann Whitney U Test Results

Test Statistics <sup>a</sup>		
	Learning Activity	Learning Motivation
Mann-Whitney U	.000	.000
Wilcoxon W	378.000	378.000
Z	-6.341	-6.340
Asymp. Sig. (2-tailed)	.000	.000

Based on the table above, a significance value of  $0.000 < 0.05$  was obtained for student learning activeness and a significance value of  $0.000 < 0.05$  for student learning motivation. This means that discovery learning using the Ludo King game has a significant effect on student activeness and learning motivation in Social Science subjects V Pasirian 06 State Elementary School, Pasirian District.

Table 5. Summary of Effect Size Calculation

Variable	Z-score	Effect Size (r)
Learning Activity (Pre-Post)	-6.341	0.863
Learning Motivation (Pre-Post)	-6.340	0.863

The estimated effect ( $r = 0.863$ ) of learning activity and learning motivation is extremely large since it exceeds the standard value of large effect of 0.50 as postulated by Cohen. This large degree of effect size indicates that the discovery learning with Ludo King game not only led to statistically significant effect but also produced a significant and meaningful change on the engagement and motivational level in the students. Such a level of impact makes it clear that the intervention affected the learning experience in a significant enough manner to both be quantifiably apparent, but also to probably be felt in changes of behavior within the classroom as well.

Educationally, this is an important observation given that it builds a case that incorporation of game based media elements within discovery learning frameworks has a chance of delivering an environment that is stimulating and participatory which might not be attained using traditional learning methods. The volume of this impact indicates that the intervention was not necessarily a phenomenon or a short-term activity to maintain the interests of students, but a tried-and-true strategy that can completely transform the manner in which students related to the material and to one another. It also collates with results of the previous work on the literature where it has been indicated that the interventions based on merging active and student-centered learning paradigm with game elements that enhance intrinsic motivation, collaboration, and healthy competition had large effect sizes.

Table 6. Estimated Median Gain Score

Variable	Estimated Pretest Median	Estimated Posttest Median	Estimated Gain
Learning Activity	Low-Medium Category	High Category	Substantial Positive
Learning Motivation	Low-Medium Category	High Category	Substantial Positive

Based on the estimated median gain, it is revealed that the average progress made by the students as a result of the intervention was an increase of the levels of activeness and motivation by the student; they were recorded to be low or moderate before the intervention and high after the intervention. This transition is not insignificant and it amounts to a level of qualitative change in how the learning process occurs in the classroom. The students had low attendance and less enthusiasm as well as low initiative before the intervention which indicate features of passive learning environment. Post findings that show movement to high category indicates that discovery learning model that was enhanced by addition of Ludo King game was effective in activating the desire of the students to participate, to take an initiative and to maintain attention throughout lessons.

This kind of improvement is essential at the elementary school level, as it means that the intervention did not only target the issue of cognitive involvement, but also those of affective and social involvement that builds a lively and active culture in the classroom. The median improvement also indicates that the effect of the intervention did not occur within a narrow stratum of highly motivated students. Instead, the strategy has been seen to be able to inject the interest of the whole group, lessening the gap between students so even the less assured/ tend to be more passive individuals could become actively involved.

This understanding makes sense in terms of constructivist educational theory that maintains that students are the most likely to learn when they are actively in the business of constructing a meaningful, social and experiential world. The expected increase in medians reflects the fact that the intervention successfully implemented this theory in the form of operations to change the process of learning away from the teacher-centered transmission model to collaborative and student-led discovery process.

Table 7. Distribution of Learning Motivation Normality Results

Stage	Shapiro-Wilk Significance	Distribution Interpretation
Pretest	0.001	Non-normal
Posttest	0.945	Normal

The shift in the manner of distribution of the learning motivation scores on pretreatment and post treatment where it was non normal on pretreatment and normal on post treatment is of great importance. A non-normal distribution among the initial data points normally represents an unproportionate distribution of levels of motivation, and some of such students coming to the classroom are highly motivated, whereas others are highly disengaged or apathetic. The analysis of such uneven results regularly indicates an unbalanced approach to the satisfaction of variances of motivational needs of different learners applying to the traditional education methods.

The change to a normal distribution after the intervention suggests that the level of motivations did not only increase in students but it also became distributed more equally within the group of students. At a practical level, what that translates to is that the intervention has facilitated a more harmonious motivational climate within the classroom: a smaller number of students were not engaged, and the outliers likely to have previously been disengaged were pulled near to the group mean. The normalizing effect can be especially useful in elementary education since it contributes to the creation of a tight learning community with all students feeling welcome, competent and motivated to contribute to it. This trend serves to indicate that the advantages of the discovery learning with game-based elements do not lie only in increasing mean scores or medians; they also lead to a more inclusive and equitable learning process. The intervention was successful in raising the levels of motivation without benefiting a few disproportionately, thus contributing to the overall education processes in terms of equity and inclusivity and the promotion of positive classroom culture.

### **Motivation as a result of Discovery Learning**

Based on this study, there is solid evidence that a combination of the discovery learning model and Ludo King educational game has a great influence in making the learners of Social Studies in fifth-grade in Pasirian 06 State Elementary School more active and motivated in learning. These results have significant statistical supporting evidence such as highly large effect sizes and the normal distribution of the levels of motivation among the students to indicate not only the efficiency of the intervention but also its pedagogical usefulness. It is imperative to critically analyze the way the results of the study fit in the existing theory, pedagogical practice and education policy with each of them and also the implications of the same to future study and practice, to gain the value of the findings.

First, we can view the success of the intervention through the prism of constructivist learning theory that states that the students can learn most of all when they are actively involved in constructing their own knowledge via interaction with their surrounding environment (Masgumelar & Mustafa 2021; Na et al., 2025; Tisoglu et al., 2025). The way discovery learning puts this theory to practice is its succession of putting in place circumstances seen as students actively are involved in problem-solving exploration and inquiry and not as a recipient of information. The discovery learning model applied in this study enabled the students to explore the concepts of Social Studies by getting actively involved in the actual playing activities, which resulted in more thinking and feeling of ownership over the learning. The outcome, namely the radical amplification of activeness and motivation, bears witness to the way in which the discovery learning can turn the experience of education into a teacher-

centered idea into the one in which students are turned and made into legitimate contributors of their possession of knowledge (Aldalur & Perez., 2023; Burregi, 2023; Shah & Basnyat, 2024). This corresponds to the message Bruggeman et al. (2021) are conveying in their work by arguing that active learning strategies tend to be imperative in terms of developing the critical thinking points, collaborative learning, problem-solving capabilities, particularly in the light of 21 st century education.

Its impact was increased by the decision to include the Ludo King educational game into this model. A classic and culturally relevant game such as Ludo King has served as an entry point that elementary students could connect to or rather identify with. In contrast to abstract or new educational technologies that can pose cognitive stress, Ludo King enabled students to begin participating in the learning activities directly, using their cognitive abilities to work with the learning material instead of focusing them on studying the functionality of the tool (Naisau 2021; Siti et al., 2021). All the natural components of the game (competition, collaboration, strategy, and chance) helped motivate not only individual learners but also facilitated social learning, developing a rich environment in which students had a chance to feel success and take risks, and learn with each other. This piece of evidence supports earlier studies which proved the potential of educational games to improve the cognitive learning results, however, affective and psychomotor areas as well (Faan et al., 2021; Ulfa et al., 2022; Hui & Mahmud, 2023; AlAfnan, 2025).

The size of change in the motivation to learn was also among the most outstanding results of the study where normalization of learning motivation was achieved in the distribution of learning motivation after the intervention. Prior to intervention, the distribution of students on the scale of their motivation was unequal with some of them highly motivated and the other a great part being disengaged. The motivation scores followed normal distribution and, therefore, the discovery learning model involving Ludo King was successful not only in increasing the overall motivation but also decreasing the variation in the learners. Such homogenizing potential defines the inclusive capabilities of properly designed, game-mediated pedagogical model. It implies that even such interventions can help span the divide between more and less motivation so that the participation in classes can be more widely distributed and engagement stop being the monopoly of the most confident or the most academically oriented learners. It corresponds to the larger educational aims of equity and inclusivity, which can justify the points brought up by Theobald (2021) and Bruggeman et al. (2021) on the need to secure the engagement of all learners in the teaching process and minimize the participation gaps.

Moreover, the psychological premises underlying the process of intrinsic motivation, which the self-determination theory explains in detail, seem to have been facilitated by the intervention (Ryan & Deci, 2020; Quested et al., 2021; Lev Arey et al., 2022). Due to Ludo King characteristics (being playful and social) and the structure of the discovery learning activities, students felt the need of autonomy, competence, and relatedness. The students were not only obeying the directions of the teachers or doing things based on grades or praise; they were engaged because they learned that the activity was intrinsically worthwhile to themselves (Fung et al., 2024; Zhao & Baharom, 2023). This is indexed by their amplified proneness to assume functions, articulate problem-solving, taking part in conversations, and active focus during classes. The researchers also previously confirmed that game-supported learning intervention can become a self-directed driver overall, especially when learners feel that the activities are meaningful and fun to perform Aprilinsih & Sukardi (2024), Yustika & Mayar (2025).

An important aspect, which supported the success of this intervention, was the position of the teacher as a learning facilitator. The discovery learning formula and the application of media in form of game need meticulous orchestration so that funs and interactions are channeled towards educational goals. In our study, the teacher led the activity so that learning should not turn into aimless activity as a game but instead learning should focus on some Social Studies concepts. It reflects the necessity to ensure that teachers acquire the skills of operating flexible, responsive, and purposeful in pedagogical terms to work with active and discovery-oriented classes (Bruggeman et al., 2021; Hikmah et al., 2024). The capacity of the teacher to balance these two issues of student autonomy and structured guidance ensured that the students were not only free to explore but also had the instructions they needed to establish the intended learning results.

The implications of its meaning to curriculum and educational policy are obvious. Findings of the current research demonstrate the necessity to encourage curriculum developers and policymakers to integrate discovery learning and game-based media into education, including such disciplines as the Social Studies subject, which may be a bit too hard to engage a student when delivered in a more traditional format. This type of integration would be consistent with the priorities of the 21<sup>st</sup>-century education such as critical thinking, teamwork, creativity, and digital literacy (Tohara 2021; Papastilianou et al., 2025). The policymakers are advised to consider assisting schools in terms of professional development, providing them with adequate facilities, and creating or adopting so-called culturally relevant educational games matching national curricular purposes. These findings also have something to do with the discussions on educational equity since it is possible to infer that well-thought through discovery learning models can help mitigate educational disparities in engagement and motivation of students.

In spite of these good results, one should critically think about the shortcomings of the study conducted. The fact that a one-group pretest-posttest design was employed implies that it is not possible to exclude the external factors that could affect the findings completely. As much as the large effect sizes and the parallelism of the findings with the established research base give such confidence to the results, future research needs much more rigorous experimental designs, i.e., randomized controlled trials, to help reinforce causal arguments. The longitudinal studies would also be useful to determine the sustainability of the achieved motivational and activeness benefits in the long term. In addition, the experiences of students and teachers with discovery learning and game-based media are worthy of qualitative investigations that would give a more detailed and detailed understanding of how and why interventions are produced, and how they can be modified to suit other settings or classes of learners.

## Conclusion

Based on the results of data analysis indicating a significance value of  $0.000 < 0.05$  for students' learning activeness and motivation, it can be concluded that the implementation of the discovery learning model using the Ludo King game has a significant effect on improving students' activeness and learning motivation in the Social Studies subject for fifth-grade students at Pasirian 06 State Elementary School. The integration of the discovery learning method with the Ludo King educational game successfully created an interactive and meaningful learning environment. This approach not only had a positive impact on enhancing students' cognitive aspects but also strengthened affective and psychomotor domains through the structured educational activities embedded in the game.

The implications of this study are manifold. For teachers, this research provides empirical evidence that the implementation of discovery learning combined with educational games

such as Ludo King can serve as an effective and enjoyable alternative learning method. Teachers are encouraged to adopt similar approaches in other subjects to foster comprehensive student engagement. For schools, it is recommended to support teachers in implementing innovative learning models by providing appropriate facilities and training on the use of educational game media. Such support aligns with the goals of 21st-century education, which emphasize the development of critical thinking, communication, collaboration, and creativity skills.

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