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Comparative Study of Elementary School Student's Mathematics Learning Motivation In Offline And Online Learning

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Abstrak

Penelitian ini bertujuan untuk membandingkan tingkat motivasi belajar matematika siswa sekolah dasar pada pembelajaran offline (tatap muka) dan online (daring). Metode yang digunakan adalah pendekatan kuantitatif dengan desain komparatif. Sampel dalam penelitian ini adalah siswa kelas IV dan V dari satu sekolah dasar yang melaksanakan pembelajaran dalam dua model tersebut. Data dikumpulkan melalui angket motivasi belajar yang telah divalidasi dan dianalisis menggunakan uji-t. Hasil penelitian menunjukkan bahwa motivasi belajar siswa dalam pembelajaran offline lebih tinggi dibandingkan dengan pembelajaran online. Faktor yang memengaruhi perbedaan ini antara lain adalah intensitas interaksi dengan guru, suasana kelas, serta kemampuan siswa dalam mengatur waktu belajar secara mandiri. Penelitian ini merekomendasikan perlunya strategi pembelajaran yang adaptif dan interaktif dalam pembelajaran online, khususnya bagi siswa sekolah dasar yang masih membutuhkan bimbingan intensif

Kata kunci: perbandingan motivasi belajar matematika siswa pada pembelajaran online dan offline

Abstract

This study compares elementary school students motivation to learn mathematics in offline face-to-face) and online (online) learning. The method used is a quantitative approach with a comparative design. The sample in this study were students in grades IV and V from one elementary school who implemented learning in the two models. Data were collected through a validated learning motivation questionnaire and analyzed using the t-test. The results of the study showed that students learning motivation in offline learning was higher than in online education. Factors influencing this difference include the intensity of interaction with the teacher, the classroom atmosphere, and the students ability to manage their time independently. This study recommends adaptive and interactive learning strategies in online learning, especially for elementary school students who still need intensive guidance.

Keywords: comparison of students mathematics learning motivation in online and offline learning.

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INTRODUCTION

The Importance of Motivation in Mathematics Learning. Motivation is an internal factor that significantly influences the learning process, including mathematics subjects, which students often consider difficult. According to the Self-Determination theory (Deci & Ryan, 1985), motivation is divided into intrinsic and extrinsic. Intrinsic motivation makes students learn because of interest or curiosity, while extrinsic motivation is triggered by external drives such as grades or rewards. High learning motivation contributes to students academic achievement in challenging subjects such as mathematics. Pintrich and Schunk (2002) stated that motivated students are more persistent and focused in solving mathematics problems. The characteristics of elementary school children at the concrete operational stage require contextual and enjoyable learning to foster motivation. According to Piaget, children aged 7–11 years learn most effectively through activities that involve real experiences.

Digital and Conventional Contexts. Several studies have attempted to compare students learning motivation in online and offline learning, but the majority do not specifically address the context of mathematics at the elementary school level. Rahmawati (2021) found that students felt more motivated in face-to-face learning because of direct interaction and feedback from teachers. Research by Yulianto and Fitriani (2022) showed that online learning motivation was relatively high in students who received parental guidance at home. Most existing studies still focus on middle and high school levels, with a quantitative approach without in-depth contextual exploration.

Study Gaps in Elementary School Mathematics Context. Although there are many studies on online and offline learning, comparative studies on mathematics learning motivation, especially at the elementary school level, are still limited. Not many studies specifically examine the differences in motivation to learn mathematics between online and offline learning for elementary school students. Most studies use quantitative survey methods that do not explore the factors that cause motivation in depth. Local contexts have not been widely explored, such as differences in technology access, teacher roles, and parental involvement at the elementary level, have not been widely explored. (Kundu & Bej, 2022)

Learning motivation is a crucial factor in student achievement, especially in mathematics, a subject often perceived as difficult (Slavin, 2006). At the elementary school level, motivation significantly shapes students' attitudes and self-confidence toward learning. The shift from offline (face-to-face) to online learning, particularly since the COVID-19 pandemic, has impacted the dynamics of students' learning motivation. Offline learning provides direct interaction and a more structured environment (Vygotsky, 1978), whereas online learning offers flexibility but often reduces social interaction and student focus (Garrison et al., 2000). Previous studies have shown that learning motivation tends to be lower in online learning environments (Dong et al., 2020). However, this is also influenced by factors such as teaching quality and technological readiness. Based on these conditions, a comparative study is necessary to determine whether there is a significant difference in mathematics learning motivation between elementary school students engaged in offline and online learning.

Field Facts About Differences in Motivation Between Learning Models. Findings from teachers and parents during the pandemic show that students' motivation in learning mathematics is greatly influenced by the learning mode used. Teachers reported that students get bored and passive more quickly during online math learning. This is due to the lack of direct guidance and distractions from gadgets. In contrast, offline learning is considered to help students understand the material better, although interaction is still limited by lesson time. Some students remain motivated online if learning is delivered with interactive media and strong family support.

Answering Academic and Practical Needs. This study is designed to answer the existing gaps and challenges by comparing elementary school students' mathematics learning motivation between online and offline learning. First, to find out the differences in the level of motivation to learn mathematics between students who study online and offline. Next, to identify factors that influence student motivation in each learning mode. Then, to provide recommendations for teachers, parents, and policymakers to choose a more appropriate approach to increasing student learning motivation.

METHOD

This study adopted a quantitative comparative design to examine whether there were significant differences in elementary school students' motivation to learn mathematics between two instructional modalities: offline (traditional face-to-face classroom learning) and online (digital-based instruction using platforms such as Zoom, Google Meet, or the school's Learning Management System). The comparative approach was deemed appropriate for investigating naturally occurring conditions without manipulation or intervention by the researcher. As highlighted by Sugiyono (2017), the aim of comparative research is to explore differences in outcomes across groups, which allows researchers to analyze the influence of different contextual factors on a particular variable—in this case, students' motivation to learn mathematics. This design facilitated a direct comparison of average motivation scores between students who had engaged in either learning modality. In this research, the independent variable was the mode of instruction (offline vs. online), while the dependent variable was students' mathematics learning motivation.

The participants were drawn from two public elementary schools located in City X, Indonesia. One of the schools, SDN Kebon Sirih 05, represented the offline learning group, while the second school included students with prior experience in online learning during the COVID-19 pandemic. The target population consisted of students from Grades IV to VI who had participated in both offline and online mathematics learning sessions. This age range was selected because students in these grades typically possess sufficient cognitive maturity and digital exposure to reflect meaningfully on both learning environments (Slavin, 2006). Subsequently, a total of 60 students were selected and divided into two equal groups. The offline group comprised 30 students from SDN Kebon Sirih 05 who had participated in traditional face-to-face mathematics instruction. The online group consisted of 30 students from

another public elementary school in the same city, all of whom had engaged in online mathematics learning during the pandemic period. To ensure that participants met specific inclusion criteria, a purposive sampling technique was employed to ensure that participants met specific inclusion criteria. These criteria included: (1) current enrollment in Grades IV, V, or VI; (2) prior experience with both online and offline mathematics instruction for at least one semester; (3) provision of informed consent by parents or guardians; and (4) willingness to complete the motivation questionnaire honestly and independently. This approach aligns with Creswell's (2012) recommendation for selecting participants based on their relevance to the research objectives.

Research Instrument

The primary data collection tool was a mathematics learning motivation questionnaire, structured on a four-point Likert scale: Strongly Disagree, Disagree, Agree, and Strongly Agree. The instrument consisted of 25 positively worded statements designed to assess four key dimensions of learning motivation, adapted from McClelland's (1961) theory of motivation and Slameto's (2010) educational learning framework.

The four dimensions measured are: (1) Persistence: Seeing how often students try to complete math tasks independently or in groups consistently, even though they face several challenges. (2) Interest: Increasing students' curiosity, enthusiasm, and activeness in participating in learning materials and activities related to mathematics. (3) Self-confidence: Students' belief in their own ability to understand math material and solve problems without relying on help. (4) Resilience: Students' ability to continue learning and not give up easily, even when facing challenges such as difficult problems or limited supporting facilities.

Validity and Reliability of the questionnaire underwent content validation by three experts in the fields of education and child psychology to ensure clarity, relevance, and alignment with motivational constructs. After checking its validity, this research tool was first tried on 30 students from almost the same school. From the trial results, the tool used proved to be quite stable because it produced a Cronbach's Alpha value of 0.82. This shows that the tool is reliable and can be used in this study.

Data Analysis

A series of statistical procedures were applied to determine whether a significant difference existed in students' motivation to learn mathematics between the two groups.

1. Normality Test: Kolmogorov-Smirnov or Shapiro-Wilk test is conducted to determine whether the data values are normally distributed.
2. Homogeneity of Variance Test: Levene's test aims to ensure equality of variance between groups, which is a prerequisite for conducting a t-test.
3. Independent Sample T-Test: This test is used to compare the average motivation scores between offline and online groups. A significance level of $\alpha = 0.05$ is used to determine statistical significance.
4. Interpretation of Results: A p-value of less than 0.05 means that there is a significant difference in the level of motivation between students participating in offline and online learning environments.

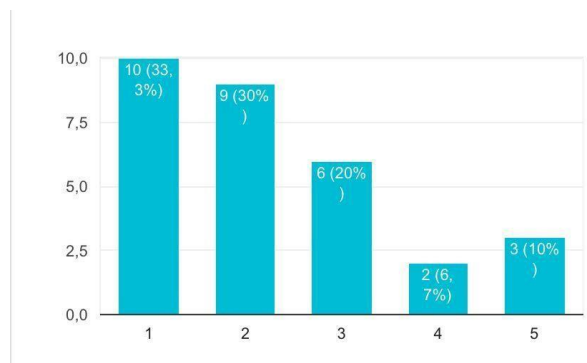
The entire analysis was performed using SPSS version 24, a statistical software widely recognized for its reliability in processing both descriptive and inferential statistics in educational research.

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RESULT AND DISCUSSION

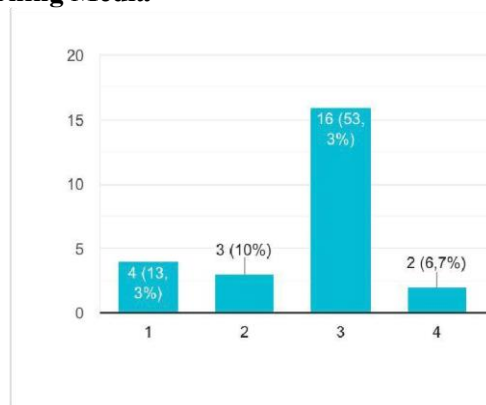
The data from the motivation questionnaire are divided into three categories. The detail can be seen in the following diagram.

Motivation and Learning Independence



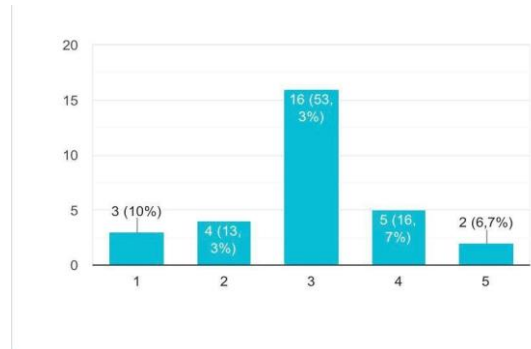
Judging from the bar chart for the first indicator, namely motivation and independence in learning, most students showed a positive response. This indicator is related to how enthusiastic they are in learning on their own, willing to do assignments without help, and keep trying even though the lesson feels difficult. From the available data, 10 students (33.3%) chose the highest answer, namely strongly agree. This shows that quite a lot of students do have the enthusiasm to learn and can be independent in understanding mathematics lessons. Additionally, 9 respondents (30%) chose Agree, which also suggests a strong learning drive, although it may not yet be fully developed. Therefore, the combined percentage of students who gave positive responses (Agree and Strongly Agree) is 63.3%, indicating that the majority of students in this group demonstrate a positive attitude toward independent learning and are motivated to active

Teaching Methods and Learning Media



Based on the bar chart representing the results of the second indicator, namely Teaching Methods and Learning Media, it can be concluded that the majority of students gave a neutral response regarding the methods and media used in mathematics learning. This indicator covers students' perceptions of how the teacher delivers the material, the use of teaching aids, the integration of technology, and the extent to which students engage with the learning media. According to the chart, 16 students (53.3%) chose the Neutral category (category 3), indicating that more than half of the students did not express a clear judgment on whether the teaching methods and media used were appropriate for their needs and learning styles. This may suggest that the students were not particularly impressed by the teaching methods and media, or that they perceived them as average and unremarkable. Meanwhile, 4 students (13.3%) selected Strongly Agree (category 1), and 3 students (10%) chose Agree (category 2), resulting in a total.

Online Learning



Based on the bar chart for the third indicator, namely Online Learning, it can be observed that the majority of students gave a neutral response regarding the implementation of online learning. This is evident from the number of students who selected the Neutral category (category 3), totaling 16 students (53.3%) of all respondents. This relatively high percentage indicates that more than half of the students felt indifferent or did not have a strong impression of their experience with learning mathematics online. It is likely that students perceived online learning as having little significant impact, either positive or negative, on their overall learning process. In addition, 3 students (10%) chose Strongly Agree (category 1). Based on the bar chart results for the fourth indicator, namely Face-to-Face Learning, it is evident that the majority of students gave a very positive response to the implementation of in-person classroom learning. The results of the questionnaire showed that 16 students (53.3%) strongly agreed, and 6 students (20%) agreed with the statement given.

Overall, there were 73.3% of students who showed a positive attitude towards face-to-face learning. This figure illustrates that most students feel more comfortable learning in person. Most likely because they can ask directly if there is something they don't understand, the classroom atmosphere is more supportive, and they feel more focused when studying at school compared to studying from home. Additionally, 6 students (20%) selected the Neutral category (category 3), suggesting that some students feel indifferent toward face-to-face learning—possibly because they have become accustomed to online learning or are not particularly affected by the teaching method used. However, there is still a small portion of students who do (18 respondents) is a clear indication. In addition, as many as 17.2% (5 respondents) stated Disagree, so that overall there were 79.3% of respondents who showed rejection. This figure reflects a fairly high level of dissatisfaction with the aspects of social interaction and skill development that were assessed.

Meanwhile, only a small portion of respondents gave positive or neutral responses. There were 10.3% (3 respondents) who selected Strongly Agree, and another 10.3% (3 respondents) who chose Neutral or Somewhat Agree. Interestingly, there were no respondents (0%) who selected the Agree category, which typically reflects a moderate level of agreement. Thus, this data strongly indicates a widespread issue or dissatisfaction regarding social interaction

FINDING

This section presents the findings based on responses from 60 elementary school students, evenly divided into two groups: 30 students who participated in face-to-face (offline) learning and 30 students who engaged in online learning during the COVID-19 pandemic. The data were analyzed to identify differences in students' motivation to learn mathematics, based on five key indicators: (1) Learning Motivation and Independence, (2) Learning Methods and Media, (3) Online Learning Experience, (4) Face-to-Face Learning, and (5) Social Interaction and Skills.

Learning Motivation and Independence

Students in the offline learning group demonstrated relatively higher levels of intrinsic motivation. Among this group, 33.3% strongly agreed and 30% agreed with statements reflecting learning motivation and independence. This indicates that over 63% of offline learners showed high levels of motivation to learn mathematics. In contrast, the online group exhibited slightly lower motivation levels, with 23.3% strongly agreeing and 26.7% agreeing, totaling 50% with positive responses. The remainder gave neutral or negative responses, suggesting a gap in self-directed learning capabilities, especially among students in online settings.

Learning Methods and Media

Students in both groups responded neutrally to this indicator. In the offline group, 53.3% chose neutral responses, 23.3% responded positively, and 23.4% negatively. The same pattern was also found by the online group, with 50% of respondents neutral, 26.7% positive, and 23.3% negative. This finding shows that the learning methods and media used in the two methods do not have a significant impact on student motivation or students do not have strong preferences regarding these aspects.

Online Learning Experience

From the group of students who studied online, their responses were quite varied. Most, around 53.3%, chose a neutral answer, which means they felt so-so or could not say whether they liked this learning method or not. In addition, 23.3% felt that online learning was quite enjoyable, but on the other hand there were also 23.4% who felt it was not suitable. This shows that online learning does not necessarily make all students feel enthusiastic or comfortable. Maybe because some have difficulty accessing the internet, the teachers teach differently, or because they rarely chat directly with the teachers.

Face-to-Face Learning

This indicator received the most positive responses. Among the offline group, 40% strongly agreed and 33.3% agreed that in-person instruction increased their engagement and comprehension. Only 6.7% strongly disagreed, while 20% responded neutrally. These consistently positive responses indicate that face-to-face learning remains the most effective mode for delivering mathematics content and maintaining student motivation.

Social Interaction and Skills

The final indicator revealed significant challenges in the development of social aspects, especially among students in online learning. A total of 79.3% of respondents disagreed or

strongly disagreed with statements related to peer interaction and social engagement in mathematics learning. Only 10.3% of respondents responded positively. These results indicate that the online learning environment can limit opportunities for peer engagement, and can have a negative impact on students' motivation and emotional engagement in the learning process.

The results we got from comparing statistical results tests conducted on students, it turned out that there were quite visible differences between the two groups of students. The numbers obtained show that the difference is indeed significant and not just a coincidence (because the p-value is below 0.05). The group that studied directly in class had higher motivation scores in almost all points assessed. From the results that have been obtained, it can be said that learning directly at school can make children more enthusiastic about learning mathematics. Unlike online learning which sometimes feels less than optimal and makes students easily bored or unfocused.

CONCLUSION

From the results of this study, it can be seen that students' motivation in learning mathematics is very different between those who study in direct classes and those who study online. Children who study face-to-face seem more enthusiastic, more independent, and more easily interact with teachers or friends. Meanwhile, many who study online are less enthusiastic, perhaps because of the lack of direct communication and limited assistance from teachers. This shows that learning in school directly is still more effective in making students truly involved and interested in mathematics lessons, especially at the elementary school level.

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