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The effect of motivation and self-efficacy against mathematics learning achievement in hybrid learning

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Abstract

The coronavirus disease 2019 pandemic still leaves problems, one of which is in the world of education. Online learning has not become the optimal alternative for learning mathematics, especially for elementary school students. Hybrid learning is learning that integrates face-to-face learning and online learning. Learning by including limited face-to-face meetings can be one of the considerations to deal with the characteristic needs of elementary school students. Therefore, the purpose of this study is to examine the effect of elementary school students' mathematics learning motivation in hybrid learning on their learning achievement, the effect of elementary school students' mathematics self-efficacy in hybrid learning on their learning achievement and also the effect of elementary school students' motivation and mathematics self-efficacy in hybrid learning on learning achievement. The method used is regression analysis using SPSS 23.0. Previously, the prerequisite test and normality test were carried out. This research was conducted in 5 schools with a sample of 132 elementary school students. After the research was conducted, the results showed that partially the motivation and self-efficacy variables of students' mathematics influenced students' achievement. The variable of mathematics self-efficacy affects the achievement of 20.1%. Mathematics self-efficacy affects the achievement of 20.7%. Meanwhile, the two independent variables also influence the learning achievement of elementary school students, which is 23.6%. From these data, it can be seen that the variables of mathematics self-efficacy and student learning motivation together have a more significant effect than their partial effect on elementary school students' learning achievement.

Keywords: Hybrid learning, learning motivation, mathematics self-efficacy, learning achievement.

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1. Introduction

The echo of students' skills to face 21st-century learning and the era of Society 5.0 has resonated in the world of education in the last decade. These skills are related to the achievement of 4C competencies, which include the ability to think critically, think creatively, communicate and collaborate (Dwinta, 2020). Various learning model innovations are also trying to obtain the best learning outcomes. However, it cannot be ignored that the current pandemic is a significant problem, including in the world of education, from elementary to high school, not only in Indonesia but in all parts of the world. Various learning innovations that were previously prepared with the framework of offline or face-to-face learning in schools were suddenly 'frozen' due to conditions that made it impossible for offline learning to be held in schools for the safety of all parties. The hallway at the school is quiet from the bustle of students and all their knick-knacks. The classroom was suddenly empty because learning was replaced with online learning from their respective residences. Especially when the circular letter from the government regarding the implementation of education policies in the emergency period for the spread of corona virus disease (COVID-19) provides recommendations for all implementation of the learning process to be carried out online from home in academic units by using various learning resources through communication, information and media technology support and has reasonable goals (Abdul Rozaq, 2020; Tatminingsih, 2021). Inevitably, policymakers and education implementers are trying to move quickly to overcome this problem. Learning innovations arranged in an online framework have also begun to be developed to save the boat of education in Indonesia and the rest of the world.

In the era of COVID-19, the need for innovative solutions to optimise educational efforts is increasing (Almarzooq et al., 2020). Around 45 million school students carried out distance learning both online and offline during COVID-19 to keep their lives on track during the school closure period. However, the problem has not been resolved, and some challenges remain. It was noted that 35% of the students surveyed submitted reports saying the internet connection was poor (UNICEF, 2020a). The biggest challenges are a lack of focus, an unsupportive learning environment and distractions from other family members. Disturbances and obstacles also occur: as many as 80% of the children want to go back to school; children are bored with their teacher's work; and the majority of students are not happy with distance learning (Purwanto et al., 2020). Meanwhile, from a family perspective, few feel the burden that the family must bear through the online learning process, which is considered quite burdensome (Euis, 2021). In addition, from the teacher's point of view, it is not an easy thing to change the preparation and teaching habits from the offline system (face to face) to online learning. The packaging of materials, learning methods, and ways of providing online materials, evaluation systems must quickly adjust to the situation. In reality, not all teachers are ready to deal with this. On the other hand, some subject characters are also complicated to give online, one of which is mathematics. Another threat to education related to pandemic conditions is learning loss due to extended online learning in elementary schools. Learning loss is a condition in which students lose knowledge and skills, either ordinary or extraordinary, or academic decline, which occurs due to prolonged gaps or the unsustainability of the implementation of education (Le Thu Huong & Teerada, 2020). Some researchers and practitioners agree that the absence of students from going to school hinders the improvement of skills, adds to the gap in learning, thereby causing a decrease in student learning levels (Le Thu Huong & Teerada, 2020). Therefore, an assessment of policies needs to be carried out to evaluate the distance learning system carried out in schools at all levels of education (UNICEF, 2020b).

There are various recommended learning strategies to overcome these problems, one of which is learning hybrid strategies. Hybrid learning is aligned to increase student participation in distance education (Triyason et al., 2020). Some schools, including elementary schools, have adopted a policy to

add limited offline meetings with health protocols between online learning that has been carried out, with mutual agreement between parents and teachers. Hybrid learning integrates innovative discoveries and technological advances through online learning systems through interaction and participation with traditional learning (Washington et al., 2020). This learning strategy combines online learning or e-learning with face-to-face learning, thus allowing students to meet face-to-face in class and students who are far from various locations to be able to study together (Raes et al., 2019). Thus, this learning strategy can facilitate situations that require learning to be carried out online and the learning needs of elementary school students for face-to-face meetings (offline), thus involving students in an active learning environment (Li et al., 2021). Several studies show that hybrid learning can develop student competencies (Dwijonagoro & Suparno, 2019; Muchsini, 2020), which is indicated by the contribution of hybrid learning to student competencies by 72% (Dwijonagoro & Suparno, 2019). On the contrary, hybrid learning in mathematics can promote continuity of teaching and increase student retention (Zein et al., 2019). Hybrid learning is designed to integrate online and face-to-face learning activities to strengthen, complement and support each other and not treat online methods as a duplication of learning in class or as an addition (Park et al., 2019). Hybrid learning is a combination of two or more systems or elements to present material in learning, which consists of three components, namely face-to-face or conventional learning, online learning and independent learning (Park et al., 2019). This is relevant and adequate to be implemented by elementary school students. Hybrid learning has proven to be a useful learning method and a new learning experience for students (Faradita & Rahmawati, 2022). With this hybrid learning, students have the opportunity, although limited, to construct their understanding of the face-to-face learning that they do, as explained by a study that students can construct their understanding of the learning received (Singh et al., 2021). Hybrid learning is an alternative to online learning carried out during the COVID-19 pandemic because hybrid learning takes into account learning styles and academic culture and can minimise stress (Muchsini, 2020). Hybrid learning should be fun learning and increase students' creativity and independence, provided that the implementation follows applicable rules. Hybrid learning can be done through initiative, interaction, independence, incentives and improvement, which is seen as more effective (Handayani & Utami, 2020). Hybrid learning methods rely on self-motivation, self-regulation, self-discipline and the ability to communicate effectively (Fitriyana et al., 2018). Through interaction in the online phase of this hybrid learning, technology-based learning offers innovative methods to train students' self-efficacy and can affect student achievement (Rafiola et al., 2020). This online phase basically changes the way learning content is delivered, which removes the physical constraints of traditional learning on students (Xiao et al., 2020). While face-to-face learning meets the needs of students related to the characteristics of elementary school students, which is following the theory presented by Jean Piaget on concrete operational theory, also Bruner's theory which states that there are three different stages of representation in elementary school students, namely enactive, iconic and symbolic, and individuals acquire these stages one by one, in the order of enactive to iconic to symbolic, until in the end, they can understand the three stages of understanding (Marsigit et al., 2022).

In learning, the motivational factor has an important influence because it determines student learning outcomes, in this case what makes work or study behaviour full of initiative, creative and directed (Pratiwi & Wuryandani, 2020). The expected consequence of learning is being able to connect knowledge and application in everyday life. If students already know the benefits of what they are learning, then they will be motivated to learn (Asmara & Ardiyanti, 2019). The construction of motivation can also predict a person's intellectual development (Bergold & Steinmayr, 2018). In Schunks' opinion, motivation is a process or way to create a goal that can impact and provide support to an individual or a person immediately to all activities or activities of the person concerned (Eccles &

Wigfield, 2020; Junita et al., 2021). Therefore, learning mathematics is important because it is a positive action for students to realise the expected goals. If students do not own this motivation, the learning undertaken is not meaningful and does not achieve the expected goals because motivation is needed in achieving achievement (Wedhayanti et al., 2020). According to Santrock, motivation in the learning process can be divided into two, namely: intrinsic motivation and extrinsic motivation. Intrinsic motivation comes from students, such as the desire to acquire knowledge, the desire to achieve learning goals, the drive to meet learning needs and so on, while extrinsic motivation comes from outside the students, such as the demands of parents, a comfortable learning environment, fun learning (Puspitarini & Hanif, 2019). Internal motivation is more about doing something for its own sake. At the same time, external motivation is more about doing something to get something else. This external motivation is usually influenced by reward or punishment (Pratiwi & Wuryandani, 2020). Besides motivation, inappropriate learning tactics will also have an impact on self-efficacy. Self-efficacy is a person's belief in the ability to control and perform the actions needed to create mathematical evidence (Regier & Savic, 2019). Students with high self-efficacy will have confidence that they can complete the existing task even if they get a complicated task (Ningsih & Hayati, 2020). Motivation and self-efficacy in these students can affect student achievement as Bandura stated that there is a relationship between self-efficacy and the achievement of student learning outcomes (Sihaloho et al., 2018). Learning achievement is one measure to show success (Setiawan et al., 2020). Mathematics learning achievement is a change in behaviour obtained through students' experience of various problem-solving activities, including activities to formulate hypotheses, investigate the relationship of two events, collect data, perform arithmetic operations, generalise and others. Thus, the concept of mathematical theory will be well understood (Sudjana, 2016). Student achievement is influenced by internal and external factors. Internal factors that affect learning achievement come from within the students themselves such as psychological factors, both innate and non-innate. While external factors come from outside the students themselves such as curriculum, methods, social and social conditions, environment, teachers, cultural conditions and so on (Rahayu, 2020). Learning achievement can be seen as an indicator of the quality of knowledge that has been recognised by students, including as an indicator of students' intellectual and absorption capacity, as well as learning achievement information that can be used as feedback for improving science and technology (Aisyah, 2014). Based on the current phenomena in accordance with the explanation above, this study was conducted to determine the effect of self-efficacy and motivation in hybrid learning on elementary school students' mathematics achievement.

2. Method

This study uses a survey method, so this type of research based on the method is included in survey research. The independent variables used are students' motivation and self-efficacy in learning mathematics; the dependent variable is the mathematics learning achievement of elementary school students. Data collection techniques used are questionnaires and tests, which are then analysed using multiple linear regression analysis. This study uses a population of fourth-grade elementary school students in cluster II of Pleret District. They are registered in the even semester of the 2020/2021 school year with 203 students.

In taking samples from each school, they used the proportional random sampling technique. The use of the sample in this study refers to the Krejcie Table with a population of 203, so the sample used is 132 students with a significant level of 5% (0.05). The motivation and self-efficacy instruments used were developed by researchers and modified using a Likert scale score guideline. The rating scale used is the ordinal scale, which is a rating scale that mentions the category and reveals the rating of the construct being assessed (Sugiyono, 2010). Each statement in the questionnaire contains four

alternative answers, including always (A), often (O), sometimes (S) and never (N). The instrument for the achievement test used is a multiple choice test. Before the data collection process, the instrument will first be checked by expert judges; then an empirical test will be carried out to test the validity of the instrument items on each variable using the product-moment correlation formula.

Before the research was conducted, to ensure that the sample came from a normally distributed population, a prerequisite test was conducted, namely the normality test, and to determine whether the two variables had a significant linear relationship or not, a linearity test was performed. The normality test used the Kolmogorov–Smirnov statistical test at a significance of 0.05 using SPSS 23 for Windows, while the linearity test used Levene's statistical test at a significance of 0.05 using SPSS 23 for Windows. The MANOVA test can be continued if it has a homogeneous variant; it can be seen if the significant level obtained is more than 0.05, while the relationship between variables is shown in Figure 1.

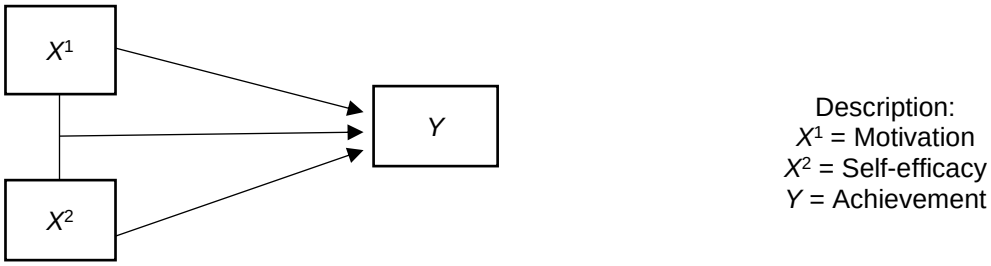

Figure 1. *Relationship Between Variables*

The hypotheses of this study are as follows: (1) there is an influence of learning motivation on elementary students' mathematics learning achievement; (2) there is an effect of self-efficacy on elementary students' mathematics learning achievement; and (3) there is an effect of motivation and self-efficacy on elementary students' mathematics learning achievement.

3. Results and discussion

The data collection results were carried out through a questionnaire for the variables of student learning motivation and self-efficacy. To collect data on student achievement variables, test instruments were used. This study uses a population of fourth-grade elementary school students in cluster II of Planet Bantul sub-district, who are registered in the even semester of the 2020/2021 school year, totalling 203 students. These schools include SD Negeri Kanggotan, SD Negeri Pungkuran, SD Negeri Putren, SD Negeri Kauman and SD NU Pemanahan. Based on the Krejcie table, a sample of 132 students was obtained, which was then used as the subject of this study.

Furthermore, the prerequisite test was carried out, namely the normality test and linearity test for each independent variable, namely motivation and self-efficacy mathematics on the mathematics learning achievement of elementary school students. To find out if the distribution of the data has a normal distribution, from the analysis using the Kolmogorov–Smirnov statistical test at a significance of 0.05 using SPSS 23.0 for Windows, it shows a positive motivation data with extreme differences of 0.043 and an asymp. sig. = 0.200. Self-efficacy shows a positive data with the most extreme differences of

0.035 and an asymp. sig. = 0.200. If the asymp. sig. value is more significant than 0.05, it can be concluded that the data from this study is normally distributed. The linearity test between motivation and learning achievement shows the deviation from the linearity value of 0.525 > 0.05. The linearity test between learning self-efficacy and learning achievement shows the deviation from the linearity value of 0.97 > 0.05. This result proves that the data of each independent variable has a significant linear relationship with the dependent variable. The analysis test which shows that the research data is normal and linear brings the research to the next stage, which is to analyse the data to test the research hypothesis and see the effect between the variables.

Table 1. The Coefficient of Determination of the Variable X^1 to Y

Model summary				
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.449[a]	0.201	0.195	11.285

[a] Predictors: (Constant), MSE.

In Table 1, it can be seen that the coefficient of determination (R^2) is 0.201 or 20.1%. This figure shows that the self-efficacy variable (X^1) affects achievement (Y) by 20.1%, while the remaining 79.9% is influenced by other variables not examined in this study or other variables outside the regression equation.

Table 2. The Coefficient of Determination of the Variable X^2 to Y

Model summary				
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.455[a]	0.207	0.201	11.244

[a] Predictors: (Constant), motivation.

In Table 2, it can be seen that the coefficient of determination (R^2) is 0.207 or 20.7%. This figure shows that the motivation variable (X^2) affects achievement (Y) by 20.7%, while the remaining 79.3% is influenced by other variables not examined in this study or other variables outside the regression equation.

Table 3. The Coefficient of Determination of the Variables X^1 and X^2 to Y

Model summary				
Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.486[a]	0.236	0.224	11.080

[a] Predictors: (Constant), self-efficacy, motivation.

In Table 3, it can be seen that the coefficient of determination (R^2) is 0.236 or 23.6%. This figure shows that the motivation variable (X^1) and self-efficacy (X^2) affect Y's achievement by 23.6%, while the remaining 76.4% is influenced by other variables not examined in this study or other variables outside the regression equation. Multiple correlation analysis between X^1 and X^2 with Y produces a multiple

correlation coefficient (Ry12) of 0.486. From the multiple correlation coefficient above, the coefficient of determination R^2 = 0.236 or 23.6%, which means there is an effect of X^1 (motivation) and X^2 (self-efficacy) together on the dependent variable (achievement learning mathematics). The results of testing all proposed hypotheses can be concluded that the overall research hypotheses formulated are acceptable. Thus, it means that 23.6% of mathematics learning achievement can be explained by the variables of learning motivation and mathematics self-efficacy of elementary school students. As for getting information about the research hypothesis that has been set, it is by paying attention to Tables 4 and 5.

Table 4. Regression Coefficient of Effect of Variables X^1 and X^2 on Y

Coefficients[a]

Model		Unstandardised coefficients		Standardised coefficients		
		B	Std. error	beta	*t*	Sig.
1	(Constant)	33.861	6.891		4.914	0.000
	Learning Motivation	0.436	0.180	0.273	2.420	0.017
	Self-efficacy	0.269	0.122	0.249	2.209	0.029

Table 5. Summary of Variables X^1 and X^2 to Y

ANOVA

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	4,893.770	2	2,446.885	19.931	0.000[b]
	Residual	15,836.858	129	122.766		
	Total	20,730.629	131			

[a] Dependent variable: learning achievement.

[b] Predictors: (Constant) self-efficacy and learning motivation.

Table 4 provides information that the regression equation is 33,861 + 0,435 X^1 + 0,269 X^2. The regression equation interprets that the variables X^1 and X^2 have a positive effect on *Y*. The influence of learning motivation on mathematics learning achievement is shown in Table 5, where the significance value is 0.017 < 0.05. This is supported by the value of t_{count} = 2.42 > t_{table} = 1.96. Hence, hypothesis 1, namely the influence of learning motivation on learning achievement, is accepted. This result is in line with previous research which concluded that there was a significant relationship between student learning motivation and student achievement (Sari & Utaminingsih, 2018). As explained above, motivation is the driving force for students who encourage learning activities so that learning objectives can be realised. This is in line with what Clayton Alderfer said that learning motivation is the tendency of students to carry out learning activities that are driven by a desire to achieve the best possible achievement or learning outcomes (Khairani et al., 2020). And in a study it was stated that there was a significant influence between motivation and student achievement. This means that if students have motivation in learning, their learning achievement will be high. Conversely, if students are poor in learning, their learning achievement will be low. Therefore, there is an influence of learning motivation on students' mathematics learning achievement in hybrid learning in elementary schools.

The effect of self-efficacy on mathematics learning achievement is shown in Table 4, where the significance value is 0.029 < 0.05, with t_{count} = 2.209 > t_{table} = 1.96, which indicates that hypothesis 2, namely the influence of self-efficacy on student achievement, is accepted. This is in accordance with what Bandura said (Wilson & Janes, 2008) that positive feelings about self-efficacy can improve student achievement. Self-efficacy is a good predictor in determining student academic achievement (Basith et al., 2020). It is also supported by a study (Su et al., 2021) which examined the relationship between mathematics self-efficacy and mathematics achievement in elementary school students from grades 3, 4 and 5. The study showed a significant relationship between self-efficacy mathematics and mathematics achievement in grade 3 and continues to increase for grades 4 and 5. The influence of self-efficacy on learning achievement can be explained that students with low self-efficacy towards certain tasks think more about their personal shortcomings than thinking about completing tasks, which in turn will hinder the successful performance of completing tasks (Muklis et al., 2016). The consequence of hybrid learning is the use of technology, where students can access learning materials anywhere and anytime, making students' self-efficacy increase (Fitriyana et al., 2018), which in turn affects student achievement. The influence of motivation and self-efficacy simultaneously on student achievement can be obtained based on the analysis and shown by the *F*-test in Table 3, where the significance value is 0.000 < 0.05, supported by the F_{count} > F_{table} (0.05;2;129) = 19,931 > 3.00. This shows that motivation and self-efficacy in hybrid learning simultaneously have a positive effect on elementary students' mathematics learning achievement or in other words, hypothesis 3 is accepted. These results are in accordance with previous research, which showed that self-efficacy and student learning motivation, both partially and simultaneously, had an effect on learning outcomes (Monika & Adman, 2017). Self-efficacy determines how a person feels, thinks, motivates himself and behaves (Deliana et al., 2019). It has been explained that mathematics learning achievement is a change in behaviour that is obtained through the experience of students from various problem-solving activities, so that the concept of mathematical theory is obtained well (Sudjana, 2016). Learning achievement is said to be perfect if it meets three aspects, namely cognitive, affective and psychomotor. On the contrary, it is said to be unsatisfactory if a person has not been able to meet the targets in these three criteria (Khairani et al., 2020). These aspects include self-efficacy and motivation. So it can be concluded that motivation and self-efficacy are one of the factors that help achieve good elementary school mathematics learning achievement.

Based on the results and discussion, it can be concluded that the three hypotheses in this study are accepted, namely 1) the effect of learning motivation on students' mathematics learning achievement in hybrid learning in elementary schools; 2) the effect of self-efficacy on students' mathematics learning achievement in hybrid learning in elementary schools; and 3) the effect of motivation and self-efficacy on students' mathematics learning achievement in hybrid learning in elementary schools. This positive effect shows that hybrid learning can be an alternative solution in resolving the impact of online learning. Based on information obtained from interviews related to the determination of this hybrid learning policy, this learning is implemented through a mutual agreement between the parents or guardians of the students and the school. So face-to-face learning is limited to various conditions combined in online learning that has been implemented. This learning is consistent with the results of a study that says that online programmes are programmes where at least 80% of the programme content is delivered online, and hybrid programmes are programmes where between 30% and 79% of programme content is delivered online (Martin et al., 2020). It shows that the percentage of online learning in hybrid learning can be reduced due to the integration of face-to-face learning.

The effect of learning self-efficacy and motivation in hybrid learning on mathematics achievement can be caused because face-to-face meetings are indeed needed for elementary school students. It

refers to Piaget's theory of cognitive development which describes the stages in which children, in general, develop a conceptual understanding of the world according to their maturation and active experiences. Elementary school-age children (aged 6–11 years) can use logic to understand relationships or relationships, but only on concrete or real people, objects or events (Rodriguez, 2020). In addition, at elementary school age, students are taking a type of mathematics teaching called school mathematics. Ebbutt and Straker says that school mathematics can be defined, and its implications for teaching are as follows: mathematics is a search for patterns and relationships; creative activities involving imaginative thinking, intuition and innovation/discovery; methods of solving problems; and means of communicating information or ideas (Harini, 2021). Therefore, face-to-face meetings are needed for elementary school students because of the importance of instilling mathematical concepts in elementary schools through these face-to-face meetings. Through hybrid learning, students can build their understanding of the learning they receive (Indriani & Pasaribu, 2022). Of course, the hope is that students become motivated and have self-efficacy which in turn can affect elementary school students' math achievement. This refers to previous research which showed that hybrid learning had an effect on students' mathematics learning achievement, which was indicated by students being more active in solving the problems given and students being more daring to communicate opinions and questions (Ramdhani et al., 2020). An implication of the application of hybrid learning, namely building students' motivation and self-efficacy, is that it affects the mathematics achievement of elementary school students. For the continuation of hybrid learning with good motivation and self-efficacy, of course, teacher readiness is needed in carrying out this learning as well as cooperation and participation between students' parents and teachers that are well established, so that it will have a positive impact on students' achievement in learning mathematics. Teachers are also expected to be able to maximise the technology platforms that are currently developing to maximise the teaching and learning process from home (Niemi et al., 2020). It is a limitation that this research was carried out during a pandemic with all the limitations of learning. It can be further reviewed for hybrid learning in this elementary school, which can be used as an alternative to learning in normal conditions. This is related to a study (Barrón-Estrada et al., 2010) which states that with hybrid learning, students are able to be creative and collaborative in solving problems; of course, these competencies are needed in the face of current developments.

4. Conclusion

Based on the research conducted, it was found that the motivation in hybrid learning affects the mathematics learning achievement of elementary school students, as well as the mathematics self-efficacy in hybrid learning affects the mathematics learning achievement of elementary school students, while the percentage of the greatest influence is the variable of motivation and self-efficacy in hybrid learning simultaneously on the mathematics learning achievement of elementary school students. Therefore, it is necessary to consider hybrid learning to overcome the problems of online mathematics learning in elementary schools.

5. Recommendation

Hybrid learning is a form of learning that can be used as an alternative to learning that is applied in post-COVID-19 pandemic conditions. Limited face-to-face meetings can be integrated into online learning that has been carried out previously so that the needs of elementary school students for elementary school mathematics learning can be met.

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