

Online Learning: How Does It Impact on Students' Mathematical Literacy in Elementary School?

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Abstract

This study aims to find out how to improve elementary school students' mathematical literacy in online learning during the COVID-19 Pandemic. This study uses a pre-experimental method with a one-group pretest-posttest design. The population in this study were grade 5 students in one of the sub-districts in Bandung. The sample used random sampling criteria with a total of 50 students. The instrument used a mathematical literacy test and an online learning perception questionnaire. The data analysis measures descriptive and inferential statistics using Microsoft Excel and SPSS version 25. The results show that online learning during the COVID-19 Pandemic is going well, although in its implementation, there are still various obstacles and problems. Based on the results of the t-test that the sig. is 0.000. So, there are differences in mathematical literacy skills before and after online learning during the COVID-19 Pandemic. This is also supported by the N-Gain score of 0.35 in the medium category. This research is expected to contribute to education to create effective online learning and improve mathematical literacy skills, especially in elementary schools.

Keywords: online learning, mathematical literacy, COVID-19 pandemic, elementary school

1. Introduction

1.1 Online Learning

The development of the times during the industrial revolution 4.0 experienced rapid changes, and this has become an important issue in recent years in various countries (Tinmaz, 2019). Industrial revolution 4.0 has impacted on the emergence of the internet of things, cloud computing, big data, cybersecurity, artificial intelligence, Blockchain, and robots (Eleyyan, 2021; Hussin, 2018). The rapid development of information technology also marks this as part of these changes. Technology in the era of the industrial revolution 4.0 is predicted to have an impact until 2030 to achieve sustainable development goals such as health, clean water and sanitation, clean energy, sustainable cities, and climate action (Min et al., 2019), so this also has an impact on education (Noh & Karim, 2021). Education in the 21st Century changes the perspective of learning, which was originally a teacher-centered system to a more student-centered system, including focusing on using information technology as part of inquiry-based learning (Garba et al., 2015).

Technological changes that occur today have affected education. It is also one of the necessary needs for individuals in society (Serin & Bozdağ, 2020). The emergence of various technology and applications in classroom learning has changed the educational landscape (Mormah & Basse, 2019). Technology also brings fundamental life changes, especially in learning in the 21st Century. It is often used as an online service (OECD, 2016). This requires the role of teachers who not only understand and master pedagogy, but also technology as an integral part of learning. The right attitude towards the use of technology in education among teachers is needed to bring about the unconscious integration of technology (Atabek, 2020). The future teacher and student approach are about learning systems as a practice that is interconnected and engages students and teachers as aspects of the learner in new ways, and technological resources play a very important role in developing ways to create connectedness for students and teachers (Ito et al., 2013). The use of technology in education is considered a very positive thing by students (Lowther et al., 2008) then supports and creates collaboration and engagement in learning (Scalise, 2016).

Recently, technology in education has become an integral part and cannot be separated. Previously, teachers used technology very rarely because they lacked confidence even though they had adequate abilities (Mahdum et al., 2019). This change is based on the COVID-19 Pandemic, which requires everyone to use technology in learning. The COVID-19 Pandemic initially occurred in December 2019 in Wuhan City, China (Yilmaz et al., 2021), spread all over the world in early 2020 (Purwadi et al., 2021), and affected all areas of social life (Caglayan, 2021). The COVID-19 Pandemic has threatened the health of individuals. Even the worst impact could be death. The death rate from COVID-19 is due to the fact that the infected person has severe acute respiratory syndrome (Zheng et al., 2020). Due to the very fast spread of the virus, various countries have implemented preventive policies to avoid negative impacts, including social restrictions, self-quarantine, travel restrictions, international flight cancellations, domestic travel restrictions, and curfew restrictions (Güzel et al., 2020). This clearly has an impact on aspects of social life, including in Indonesia. The COVID-19 Pandemic has also had a very significant impact on education (Agormedah et al., 2020; Lu & Zhou, 2020), schools are considered vulnerable places to be exposed to the risk of transmitting the virus, and almost every country chooses to close schools (Lau et al., 2021; Zincirli, 2021), and this has an impact for the next 2 years (Kissler et al., 2020). This drastically changed the way of learning and teaching, from the beginning face-to-face in class had to change to distance learning or learning from home (Means & Neisler, 2020; Yamamoto & Altun, 2020; Misirli & Ergulec, 2021), this is the best way for education to respond to the global challenges posed by COVID-19 (Duc-Long et al., 2021), and this will accelerate the link between technology and the educational process (Rodés, 2021). The use of technology has become a necessity during the COVID-19 Pandemic, and students have begun to use digital tools extensively both in lessons at school and at home (Öztürk, 2021).

Distance learning and online learning have become concepts that are being tested and are often discussed in the field of education, especially in Indonesia (Herwin et al., 2021), this is very suitable for use as a learning system in schools by teachers around the world during the COVID-19 Pandemic (Sali, 2020), and it is closely related to educational technology (Hergüner et al., 2021). Online learning is linguistically defined as “mixed learning”, “e-learning” and “distance learning” (Isaac et al., 2019). Then, Baig (2011) explained that initially, online learning was described as a learning system that uses computer and internet-based technology. Some online learning applications are very varied, such as zoom meetings, google classroom, Google Meet, Whatsapp, and others. Learning during the COVID-19 Pandemic is directed at a knowledge transfer system using the support of the internet network through video, audio, images, text communication, and software (Basilaia & Kvavadze, 2020). Online learning is felt to have a positive influence. Teachers can innovate the use of social media and learning applications to approach students, which can also be implemented as an alternative in the learning process when learning activities cannot be carried out through face-to-face interactions, besides that students have more opportunities to have access to many learning website resources (Febriani et al., 2020). The fact that online learning is an ideal policy but very difficult to implement (Andarwulan et al., 2021), and this results in a learning gap (UNESCO, 2020). Then, not all teachers have adequate abilities to apply technology to learning, including teachers’ difficulties in controlling student learning activities (Efriana, 2021). The teacher views that the perspective on online learning is very bad. 80% state that online learning is ineffective because many weaknesses and obstacles were found, these obstacles are 1) availability of facilities, 2) use of the internet and networks, 3) planning, implementation, and evaluation of learning, and 4) collaboration with parents (Fauzi & Khusuma, 2020). Other research also shows that some students living in rural areas will experience internet problems, so the network is very poor or even non-existent (Nashruddin et al., 2020). According to Song et al. (2020) some of the teachers’ difficulties in teaching online are as follows.

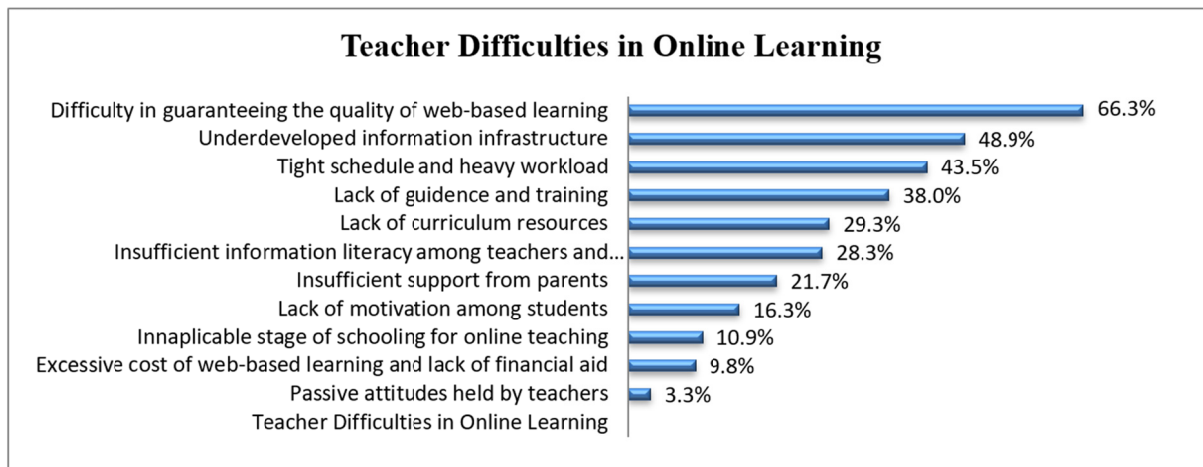


Figure 1. Teacher difficulties in online learning

The problems above are often found and become obstacles to the learning process. According to Fauzi et al. (2021) several things must be considered in implementing online learning, especially in elementary schools. These components can be seen in Figure 2 below.

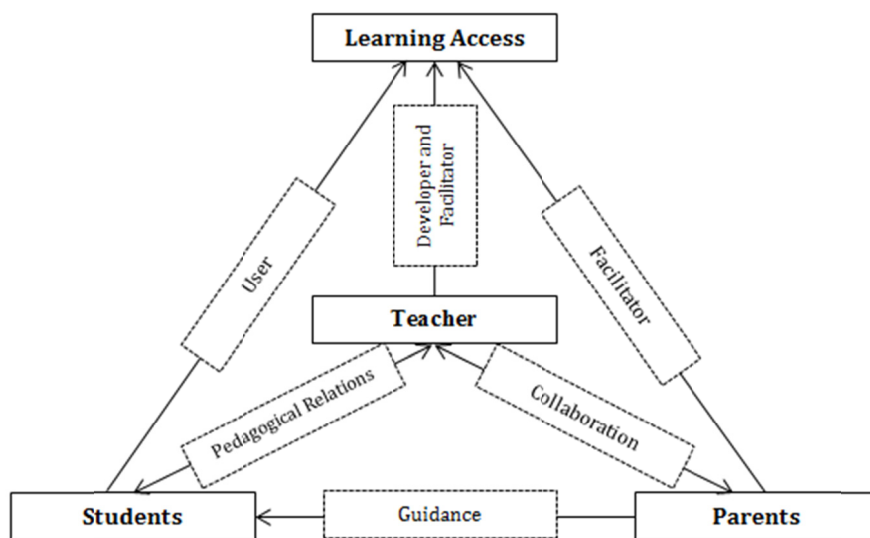


Figure 2. The key to success of online learning in elementary school

There are several important components in implementing online learning in elementary schools: teachers, students, parents, and learning access. Teachers have a central role in organizing online learning in elementary schools. There are at least 3 key roles for teachers, namely 1) pedagogical relations with students, 2) collaboration with parents, and 3) developers and facilitators of access to learning.

1.2 Mathematical Literacy

The COVID-19 Pandemic situation does not change the achievement of competencies that students must master. Some subjects are still taught in schools by simplifying the curriculum and choosing essential materials that can be implemented. In many countries, curriculum reforms have initiated a reconsideration of the importance of the nature of mathematics in schools leading to changes in the selection and organization of mathematics content and an increased emphasis on mathematical thinking processes (Manfreda Kolar & Hodnik, 2021).

Mathematics is one of the most important subjects to be taught to students at school (Abu-Hilal & Abed, 2019),

because the context of mathematics is closely related to other fields, for example, engineering, finance, transportation, etc., and this is the main focus of the study of mathematics in the implications of human life (Asli & Zsoldos-Marchis, 2021). The importance of learning mathematics is also because mathematics lessons can develop positive attitudes toward mathematics, instill self-confidence, develop curiosity, understand the history of the development of mathematics and its role in building human thinking, conduct research, develop the production and use of knowledge, and create relationships between mathematics with art and aesthetic feelings (Doğan, 2021).

Mathematics learning and its problems have been widely studied in recent years (Erdik, 2019). Mathematics as a difficult subject to understand (Markovits & Forgasz, 2017) experienced by students, parents and teachers. The difficulties often found are related to cognitive factors, namely the lack of ability, readiness, practice, and knowledge of students about mathematical concepts (Szűcs & Mammarella, 2020). Furthermore, many students perceive mathematics as a challenging school subject because they have negative impressions they receive from the past, having had bad experiences with less qualified mathematics teachers (Abdullahi et al., 2021). Mathematics is considered difficult by elementary school students because the delivery is done deductively and abstractly, even though elementary school students are at the stage of development of thinking that is not yet formal and is still relatively concrete (Widodo & Kartikasari, 2017). According to Turmudi (2008) Mathematics learning so far is taught to students in an informative manner, Students only get one-way information from the teacher, so the level of understanding and degree of attachment is very low. The literature on mathematics education contains several meanings closely related to mathematical literacy (Bolstad, 2019), and it is becoming one of the most important skills to be mastered by students in the 21st century.

Mathematical literacy provides awareness and understanding of the role of mathematics in the real world (Genc & Erbas, 2019). This becomes an individual need in daily life in facing the complexities and challenges of the times (Manfreda Kolar & Hodnik, 2021). Mathematical literacy also helps a person understand the role of mathematics in everyday life. Niss and Højgaard (2019) defines mathematical literacy as a person's insightful readiness to act appropriately and respond to all mathematical challenges related to certain situations. On the other hand, mathematical literacy is also defined as numeracy and quantitative literacy. The term numeracy is more commonly used in English-speaking countries, such as England, Australia, and New Zealand, while quantitative literacy and mathematical iteration are used in the United States (Geiger et al., 2015).

Mathematical literacy includes mathematical reasoning, mathematical concepts, procedures, and mathematical facts and these aspects are used to explain and predict phenomena by emphasizing the competence of process, content and context. The method of competence in mathematical literacy is to formulate, use, and interpret (OECD, 2014). According to OECD (2016), there are seven indicators of mathematical literacy competence, namely: 1) mathematical communication skills, 2) mathematization, 3) representation, 4) reasoning and arguments, 5) choosing strategies to solve problems, 6) using language and symbolic operations, formal and technical, and 7) using mathematical tools.

Mathematical literacy is one of the competencies measured through the Program for International Student Assessment (PISA). The PISA test is carried out with the aim of how the education system can prepare students for real-life (Haara et al., 2017). The PISA test is used as a reference in evaluating the education system, especially in student literacy. Based on the PISA test results, Indonesian students' mathematical literacy is very low. Indonesia obtained a score of 379 with an OECD average score of 487 (OECD, 2018) This shows that the mathematical literacy score of Indonesian students is still below the predetermined average score. The low PISA score results are the basis for policy-making by the Indonesian government to implement the national assessment system. This national assessment policy will be implemented in 2021 for all elementary, junior high, and high school levels to improve students' various literacy skills, especially in mathematics.

1.3 State of the Art and Research Goal

During the COVID-19 Pandemic, mathematical literacy is one of the most important things and must still be taught to all students through online learning. In some studies that online learning is considered an effective learning system (Larson & Vontz, 2018; Wei & Chou, 2020) to help convey learning objectives (Rahman, 2014) and have a significant impact on learning outcomes (Bower, 2019; Gonzalez et al., 2020). Online learning is considered effective because it is widely applied in higher education. In addition, online learning is applied within a certain period and not continuously. The significant differences in this study are: 1) online learning is applied in elementary schools and continuously during the COVID-19 Pandemic, 2) The online learning pattern is new and different research from the others, so it is very important to study every aspect of it, and 3) There is still little research to see the relationship between mathematical literacy and online learning in elementary

schools during the COVID-19 Pandemic. This research is expected to make a real contribution to education to create effective learning during the COVID-19 Pandemic, especially in improving elementary students' mathematical literacy skills. This research is also expected to be a study for other researchers related to online learning and mathematical literacy in elementary schools.

2. Method

2.1 Research Design

This research has used a quantitative approach with a pre-experiment method. The design has used the One Group pretest-posttest Design. Pre-experiment is considered very good in controlling extraneous variables that jeopardize the validity of one group. The pretest-posttest design involved one group, namely the pretest (O1), then treated (X), then the posttest (O2). The success of the treatment was determined by comparing the pretest and posttest scores (Gall et al., 2010). The treatment in this research is online learning which refers to the opinion Fauzi et al. (2021) regarding the learning system during the COVID-19 Pandemic. regarding the learning system during the COVID-19 Pandemic. Online learning was applied to measure mathematical literacy on the volume of shapes (cubes and blocks) in grade 5 elementary school.

2.2 Population and Sample

The population in this study were all 5th grade elementary school students in one of the sub-districts in Bandung. The sample is selected based on the basic abilities these students have the same as other students. Another similarity can also be seen in the facilities owned, the curriculum used, and the admission of new students to the school using the same system, namely the zoning system. So that the randomly selected students are considered representative of the population.

2.3 Instrument

This study uses a mathematical literacy test instrument to learn the volume of shapes (cube and block) in grade 5 elementary school. Mathematical literacy tests were conducted to determine the extent of students' ability to solve mathematical problems, especially those related to mathematical literacy. The tests carried out in this study were in the form of multiple-choice questions (20) and essays (5), with the questions arranged based on indicators of mathematical literacy. Students are given a questionnaire instrument to evaluate online learning. The instrument contains pedagogical relations between teacher-student, guidance from parents to students, and the use of access to learning during online learning. Online learning questionnaire using a Likert scale. According to Dawes (2008), The Likert scale has criteria for strongly disagree, disagree, normal/usual, agree, and strongly agree.

Table 1. The Likert Scale

Assessment criteria	Positive scale	Negative Scale
Strongly disagree	0	4
Disagree	1	3
Neither disagree nor agree	2	2
Agree	3	1
Strongly agree	4	0

2.3.1 Data Analysis

The type of data in this study is quantitative data obtained from the results of students' mathematical literacy tests. Quantitative data were obtained by calculating descriptive statistics from the average pretest and posttest scores. Descriptive statistics are also obtained by calculating the score of increasing students' mathematical literacy seen through normalized Gain score analysis. At the same time, the achievement and improvement of students' mathematical literacy are determined by three achievement criteria: low, medium, and high. The formula used to calculate the normalized Gain is as follows:

$$\text{Normalized Gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Maximum Score} - \text{Pretest}} \quad (1)$$

According to Meltzer (2002), the N-Gain category is divided into 3: high, medium, and low. The details are described in Table 2 below.

Table 2. Category N-Gain

Interval	Category
$N\text{-Gain} > 0.7$	High
$0.3 < N\text{-Gain} \leq 0.7$	Medium
$N\text{-Gain} \leq 0.3$	Low

Descriptive statistics are also used to calculate the Percentage of online learning evaluation questionnaire results that have been given to students. The data analysis is as follows.

Table 3. The data analysis of online learning questionnaire

Percentage	Positive Scale	Negative Scale
0%–20%	Very Not Good	Very good
21%–40%	Not good	Well
41%–60%	Enough	Enough
61%–80%	Well	Not good
81%–100%	Very good	Very Not Good

Inferential statistics were conducted to analyze differences in mathematical literacy before and after online learning. The steps taken in the inferential analysis are to test the hypothesis in the pretest and posttest groups. Before testing the hypothesis, a prerequisite test was carried out as a data normality test through the Kolmogorov-Smirnov test and a homogeneity test of variance through the Levene test. The hypothesis test used in this study is the mean difference test using the t-test or Mann-Whitney. The inferential statistical test was carried out using SPSS version 25.

The flow of this research is described below.

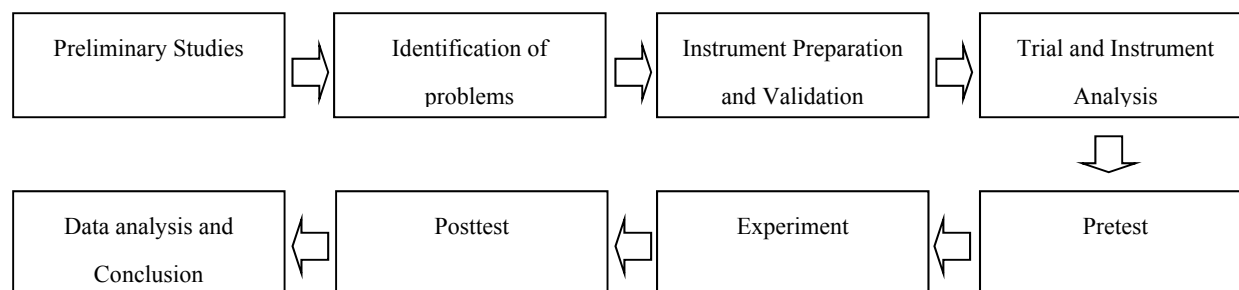


Figure 3. Research flow

3. Results

Online learning in elementary schools is different from higher education. Many variables are factors that support the success of online learning during the COVID-19 Pandemic, especially in improving students' mathematical literacy skills in elementary schools.

3.1 Pedagogical Relations Between Teacher-Students

One of the successes in the learning process is the existence of a good teacher-student relationship. The relationship is built in a didactic and pedagogic context to create students fun and meaningful learning conditions. The survey results on teacher-student relationships during the COVID-19 Pandemic are as follows.

Table 4. Survey results on teacher-student relationships in online learning

Indicator	Percent	Information
I always follow online learning activities	87	Very Good
I have difficulty following online learning	48	Enough
During online learning, the teacher helps me in the learning process	82	Very Good
I have difficulty understanding the teacher's explanations and instructions	52	Enough
I feel that learning activities are less effective	54	Enough
During learning activities, I have difficulty communicating with both students and teachers	42	Enough
During online learning, the learning outcomes are satisfactory	74	Well

Based on the table above, students always participate in online learning activities. This is because the online mode is the only way that can be done to participate in learning activities. But if you have to compare face-to-face learning with online, students choose direct because it is easier to interact and communicate. Then, sometimes students also don't understand the explanations and instructions from the teacher during learning. This makes it difficult for students to do online learning, and they also think it is less effective, but from these difficulties, the teacher helps so that the learning can still be carried out. The learning outcomes shown by students during online learning are considered good.

3.2 Guidance from Parents

One of the most visible things in online learning in elementary schools is that the portion of parental involvement is still large. Parents have an important role in guiding children when learning. For online learning to be carried out properly, the collaboration between teachers and parents is needed. The student survey results on parents' role in helping children are as follows.

Table 5. Survey results on the role of parents in online learning

Indicator	Percent	Information
During the study, I was assisted by my parents at home	86	Very Good
I always communicate with parents regarding learning	81	Very Good
My parents and I are committed to active learning	82	Very Good
My parents motivate me to learn actively in online learning	85	Very Good

Based on the table above, parents are involved in guiding, helping, and motivating children during online learning. Parents are also very committed and intensively communicate with children during online learning.

3.3 User of Learning Access

Learning access is very supportive of the success of online learning. Learning access here is the availability of technological equipment facilities such as mobile phones or laptops, applications used, network access, media, teaching materials, and modules prepared by the teacher. The survey results on the use of access to learning are described in the table below.

Table 6. Survey results on the use of learning access

Indicator	Percent	Information
The technology used supports me in learning activities	71	Good
Learning applications are very varied and meaningful so that they support the learning process	83	Very Good
I often have problems with network access	69	Not Good
The teacher provides media, teaching materials, and modules to support the learning process	85	Very Good
The media, teaching materials, and modules used helped me to understand the content of the lesson	82	Very Good

Based on the table above, technology during the Pandemic is very important in supporting successful learning. However, the fact is that there are still some students whose technology is still not supported for learning activities. This is due to the inability of parents from an economic perspective to provide learning tools. Then, students feel that using various applications and learning tools is a very important factor, and the teacher also prepares these components very well. In practice, online learning is often constrained by network access, and students have recognized this.

3.4 Mathematical Literacy

Mathematical literacy has become very important to be researched recently, even in Indonesia, specifically conducting studies that measure numeracy abilities or mathematical literacy from elementary to high school. Mathematical literacy is given to students before and after online learning during the COVID-19 Pandemic. Below are the results of descriptive statistics on students' mathematical literacy skills before and after online learning.

Table 7. Descriptive statistics of student mathematical literacy

	N	Min	Max	\bar{x}	sd	Var	N-Gain
Pretest	50	18	73	37,84	14,82	219,89	0,35
Posttest	50	30	93	59,08	16,69	278,48	

Based on the table above, the minimum score obtained at the pretest was 18, and the posttest was 30. The maximum score for the pretest was 73, and the posttest was 93. The average pretest score was 37.84, and the posttest score was 59.08, which increased the mathematical literacy score, equal to 21.24. This is also evidenced by the results of the N-Gain test that the mathematical literacy of students who receive online learning increases with a score of 0.35 or in the medium category.

A prerequisite test was carried out to test the inferential statistics, namely by conducting normality and homogeneity tests. The results of the normality test are as follows.

Table 8. Tests of normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,092	50	,200 [*]	,977	50	,448
Posttest	,098	50	,200 [*]	,981	50	,599

Based on the table above that, the value of sig. The pretest is 0.448, and the posttest is 0.559. The score is greater than $\alpha = 0.05$. This indicates that the pretest and posttest scores are normally distributed. Then, the homogeneity test was carried out with the following results.

Table 9. Test of homogeneity of variances

Levene Statistic	df1	df2	Sig.
,869	1	98	,353

Based on the table above that the value of sig. Homogeneity in mathematical literacy is 0.353 or greater than $\alpha = 0.05$. This indicates that the mathematical literacy score has homogeneous criteria. When the data is normal and homogeneous, a parametric test is carried out, namely the t-test, to test the difference in the average score of mathematical literacy skills who receive online learning during the COVID-19 Pandemic. The results of the t-test can be seen in the table below.

Table 10. T-test results

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower		Upper
Score	Equal variances assumed	,869	,353	-6,729	98	,000	-21,2400	3,15649	-27,50395	-14,97605
	Equal variances not assumed			-6,729	96,654	,000	-21,2400	3,15649	-27,50504	-14,97496

Based on the table above that the value of sig. (2-tailed) is 0.000. It can be concluded that there was an increase in students' mathematical literacy skills before and after getting online learning during the COVID-19 Pandemic.

4. Discussion

4.1 Pedagogical Relations Between Teacher-Students

Since the COVID-19 Pandemic occurred in Indonesia in March 2020, this has changed all aspects of life, including education. Almost all teaching and learning activities must be modified and adapted to online/virtual classes (Listyani, 2021). Even though the learning is done virtually, the teacher must still build the pedagogical relationship so that students feel they can still learn in the COVID-19 Pandemic. Teachers must provide motivation, encouragement, and also assistance to students to achieve the learning objectives that have been determined. In addition, teachers must also create a fun learning so that they can overcome the stress level experienced by students because stress is believed to have become an important concern in education since the COVID-19 Pandemic (Oducado et al., 2021). This happened because learning was carried out through online mode for almost 2 years, and this made students feel bored. Teachers must also be able to prepare to learn carefully so that the delivery of the material can be received well and clearly by students. If this pedagogic relationship can be built well, then at least online learning can be done well.

4.2 Guidance from Parents

The role of parents is still much involved in guiding children in elementary school. According to Maryani et al (2018) The part of parents is to provide learning assistance for children both at home and at school. Mentoring and supervision at home can be started by knowing children's learning styles and obstacles, then accompanying them according to their needs. Teachers must be able to collaborate with parents, especially in overcoming problems and obstacles in learning. Parents must give full attention to the obstacles that students have and try to overcome all the difficulties they face (Marrell et al., 2011). Communication between parents and children will contribute to the success of children in school (Rimm-Kaufman & Pianta, 2000). However, not all teachers find collaborative activities good and interesting because they are associated with collaboration and unwanted decision-making (Hayes & Kelly, 2000). The teacher-parent collaboration will create several innovations, especially in overcoming student obstacles. According to Fullan (1991) One of the learning-enriched schools is the role of cooperation.

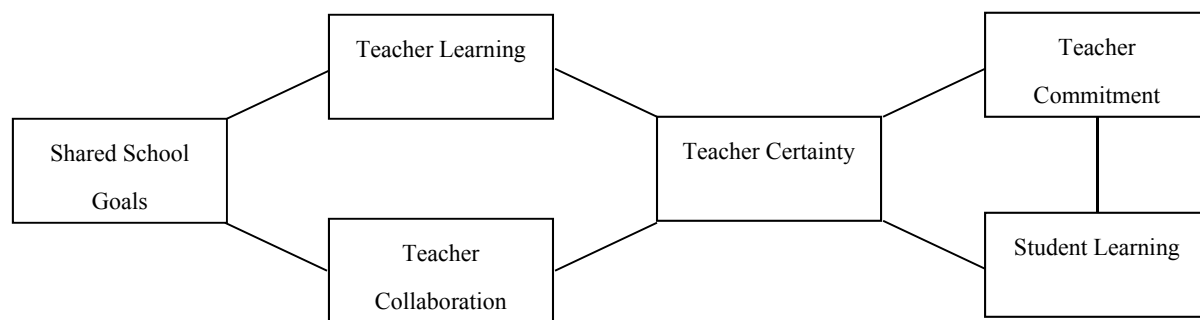


Figure 4. Learning-enriched schools

Collaboration between teachers and parents will support the success of learning. So in learning, parents have a large portion in the growth and development of children. Parents impact the development of cognitive, social, behavioral, and emotional skills and school readiness, facilitating learning and adaptation to the environment when they start school. Children need support from families for healthy development and quality education (Öngören, 2021).

4.3 User of Learning Access

The use of technology in learning is an unavoidable reality during the COVID-19 pandemic (Türkmen & Öntürk, 2021). Teachers play a big role in using technology in teaching and learning in the classroom. Teachers and students carry out teaching and learning activities by trying to apply new technology to achieve pedagogical goals. The COVID-19 Pandemic has pushed the education system to enter the state of teaching activities mediated by technology (Adov & Mäeots, 2021). This is what makes technology a factor in the education system's success during the COVID-19 Pandemic. The use of various applications will encourage students to be

able to access learning more easily. This can be seen from the availability of various learning applications used for learning needs during the COVID-19 Pandemic. The applications are Whatsapp, google meets, zoom, Cisco Webex, and others.

Online learning needs media as a learning tool, namely by using various applications to facilitate the delivery of learning materials (Gunawan et al., 2021). In teaching mathematical literacy, use the Whatsapp application to communicate with parents and zoom to teach students. The zoom application was chosen because it has various advantages in carrying out learning during the COVID-19 Pandemic. The benefits include multiple features, including video and audio, share screens, breaking rooms, security, scheduling, etc. In using the zoom application, teachers also need to create various media and teaching materials to make it easier for students to understand the material given during zoom meetings, and students believe this to be a factor that helps them know the learning material. Network access is an equally important factor in supporting learning during the COVID-19 Pandemic. Learning will be difficult if technology and applications support it, but without network access (Gunawan et al., 2021).

4.4 Mathematical Literacy

Before online learning, students still found many difficulties in solving problems, especially those related to story questions. The presentation of questions they often do is symbolic, or they are presented with story questions. Still, the indicators of ability they develop only apply the algorithms that have been taught. Students assume that such questions have never been found in textbooks and have never been prepared by the teacher, so students are confused in solving these problems, including the presentation of non-routine story questions. This is also explained by Aminah and Kurniawati (2018) that students have difficulty solving story problems or in other research also demonstrates that students sometimes have problems solving non-routine questions (Özcan et al., 2017; Siniguián, 2017). In learning, teachers should be able to create real situations related to the context of students' lives. This will help students understand the context of the problems presented. This is also closely related to what is described by Freudenthal (1971) about mathematics as a human activity. This principle is also by the theory of meaningful learning. David Ausubel often discusses that contextual problems close to the student's environment can stimulate students to be actively involved in learning. According to Mayer (2001) Meaningful learning is when students use the knowledge they have learned to understand and solve problems by transferring them to new situations.

In addition, students are also unable to use mathematical reasoning skills, namely generalizing, making estimates, and proving. The conjectures in mathematical reasoning are not well connected. Students have difficulty making generalizations. It can be seen from the inability of students to understand the questions well. Next is the problem of students making estimates, and the last one is related to the wrong proofs made by students. This is because the two last things were not fulfilled, resulting in the evidence produced by students being wrong. This is also closely related to one of the indicators of mathematical literacy about choosing problem-solving strategies. The difficulty of these students is closely related to the use of principles in mathematics which is marked by the difficulty of students in carrying out discovery activities about something and determining relevant factors, resulting in the inability of students to abstract the patterns that exist in the problem. The low ability of mathematical reasoning is often found in elementary school students (Munawaroh et al., 2019).

Online learning is provided by applying the principles explained by Fauzi et al (2021) about pedagogical relations between teacher-students, guidance from parents to students, and the use of access to learning during online learning. Overall, this can be seen from the results of the online learning survey. In the implementation of learning, the teacher uses the zoom application so that students are actively and interactively involved in the learning process. Teachers can explain directly, and students can see and listen now using the application. Those students can also discuss solving the problems given so that the application is considered very effective in online learning, especially in improving students' mathematical literacy skills. Then, to build communication with parents and students, teachers use the Whatsapp Group application so that all information in implementing online learning can be informed on the application.

The teacher also prepares learning materials to help students understand the material to be given. The material provided must be arranged properly so students can solve problems. Mathematical literacy questions given to students usually have context, and their content is non-routine. So in learning, students need to be presented with non-routine problems. When students are given difficult or non-routine questions, students will experience confusion, this is a common thing in the learning process that students experience cognitive conflicts, and in the learning process, according to Piaget, this is called disequilibrium, where students must understand the context of the problem through information and new experience (Lovatt & Hedges 2014) so that the impact is confusion

and difficulty in solving problems. When students are confused, the teacher's job is to provide guidance. In Vygotsky's theory it is called scaffolding. This is defined as providing assistance to students, then reducing the assistance so that students can independently take over responsibility for solving the problem (Baxter & Williams, 2010). The role of scaffolding will greatly assist students in finding solutions to learning problems. So when scaffolding is implemented properly, students will experience equilibrium or balance in understanding the context of a particular problem, and this is where the learning process occurs.

After online learning, students experienced an increase in their mathematical literacy skills, even if it was seen from the rise in the medium category. Online learning is the only way to be applied during the COVID-19 Pandemic. If online learning is used according to the principle, this will minimize the occurrence of learning loss and increase students' literacy skills. The importance of increasing mathematical literacy cannot be avoided because, in mathematical literacy skills, various abilities will be useful for students, namely higher-order thinking skills such as problem-solving, reasoning, and argument (Canbazoğlu & Tarim, 2020).

5. Conclusion

From the explanation above, it can be concluded that there is an increase in the mathematical literacy ability of students who receive online learning. This can be seen from the value of sig. T-test of 0.000. This is also supported by an increase in the N-Gain score of 0.35, which is in the medium category. This shows that the increase was motivated by optimizing the role of online learning, and the key elements for the success of online learning that have been described in Figure 2 became a new paradigm in online learning in elementary schools, especially during the COVID-19 Pandemic. This research is expected to create effective learning during the COVID-19 Pandemic and improve elementary school students' mathematical literacy skills.

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