



Influence of Online Learning on Mathematical Competence During the Covid-19 Pandemic: A Case Study of Primary School Students in Addis Ababa City, Ethiopia

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Abstract

During the COVID-19 Pandemic, this study aims to explore how to increase the mathematics competence of primary school learners using online learning. Pretest-posttest pre-experimental design is used in this investigation. The study's population consisted of students in a grade 4 class in one of Addis Ababa's sub-cities, Arada. The sample, which consisted of 50 students overall, was chosen by random sampling guidelines. The instrument used a test of mathematical competency and an online questionnaire regarding preferred methods of learning. Microsoft Excel and SPSS version 26 were used in the data analysis to compute descriptive and inferential statistics. The results show that online education is effective during the COVID-19 Pandemic, even though there are still many difficulties and problems with its implementation. The results of the t-test support the sig. is 0.000. As a result, there are differences in mathematical competency before and after the COVID-19 Pandemic online learning. The N-Gain score of 0.34 in the medium category also supports this. This study is likely to help educators construct successful online learning and improve mathematical competency, particularly in elementary schools.

Keywords: online learning; mathematical competency; COVID-19 pandemic; elementary school.

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1. Introduction

The 2019–2020 school years will not see the face-to-face, online-based learning necessary for implementing learning in primary schools. More than 190 educational systems worldwide experienced significant disruptions as a result of the COVID-19 epidemic, affecting more than 90% of all schoolchildren worldwide [1]. Following the World Health Organization's designation of COVID-19 as a pandemic on March 12, 2020, schools in Ethiopia were forced to close on March 16, 2020, due to the virus. On 3 April 2020, the Ethiopian Ministry of Education issued a 'Concept Note for Education Sector COVID-19 Preparedness and Response Plan.' The response plan's goal is to secure the continuation of general education, which was disrupted by the COVID-19 pandemic, and to help the attempt to restrict the virus's spread. "The strategies provide recommendations for the continuity of learning at all levels while schools are closed due to COVID-19, including the use of digital technology such as e-learning secondary education and multi-media channels for primary schools," according to the Ministry of Education's response plan (p. 5).

Following the school closures and the Ministry of Education's reaction plan, the respective city education bureaus have launched education continuity using various media, including educational radio programs and television learning programs offered by the Ministry of Education. Furthermore, several private schools, mainly in urban areas, have focused on engaging parents and kids in learning through Telegram, a mobile application comparable to WhatsApp but more extensively used in Ethiopia.

The COVID-19 epidemic has given birth to online learning, often known as e-learning. However, the term "online learning" has been around for quite some time. According to [2], as cited in [3] online learning, e-learning, distance learning, or distance education is "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (n. p.). The term has been defined as an educational field that focuses on pedagogical methods paired with technology to order to educate students who do not attend physical classrooms [4]. Additionally, it refers to "planned and organized teaching and learning in which learners are geographically and temporally isolated from teachers or facilitators" [5].

Rapid changes occurred in the industrial revolution development, and this has recently become a significant issue in many nations [6]. The advent of the internet of things, cloud computing, big data, cyber security, artificial intelligence, Blockchain, and robots has been influenced by the fourth industrial revolution [7] [8]. Information technology's quick advancement is another indicator of these developments. To achieve sustainable development goals like health, clean water and sanitation, clean energy, sustainable cities, and climate action, technology in the era of the industrial revolution 4.0 is predicted to have an impact until 2030 [9]. As a result, this also has an impact on education [10] in the 21st Century changing the perspective of learning from a teacher-centered system to a more student-centered one, including focusing on using information technology as part of inquiry-based learning [11].

Education has been impacted by modern technological advancements. It is also one of the fundamental requirements that every person in society has [12]. The educational environment has altered as a result of new

technology and applications used in classroom instruction [13]. A fundamental transformation in life is also brought about by technology, particularly in 21st-century education. It is regularly utilized as an internet service [14]. Teachers that are adept at both pedagogy and technology as a vital component of learning are needed to fulfill this function. For technology to be subconsciously incorporated into teaching, teachers must have the proper attitude about its use [15]. The future teacher and student approach focuses on learning systems as a practice that is interconnected and involves teachers and students as parts of the learner in new ways. Technology resources are crucial in developing strategies for fostering connections between instructors and students [16]. Students view the use of technology in school as being very beneficial, which encourages collaboration and learning engagement [17].

Technology in education has recently evolved into a crucial component that cannot be isolated. Teachers used technology relatively infrequently in the past despite having excellent skills because they lacked confidence [18]. The COVID-19 Pandemic, which mandates that everyone use technology in learning, is the basis for this development. The COVID-19 Pandemic began in Wuhan City, China, in December 2019 [19], expanded to the rest of the world in early 2020 [20], and had an impact on all spheres of social life. The COVID-19 Pandemic has put people's health in danger. Even death could result from the worst hit. The fact that the infected person has severe acute respiratory syndrome contributes to the COVID-19 fatality rate [21].

Numerous nations have put preventive measures in place due to the virus's rapid spread, including social limitations, self-quarantine, travel restrictions, cancellation of international flights, internal travel restrictions, and curfew restrictions [22]. There is little doubt that this affects several facets of social life, including in Indonesia. Since schools are thought to be particularly susceptible to the risk of virus transmission, the COVID-19 Pandemic has also had a significant impact on education [23] [24]. As a result, almost every country has decided to close schools [25] [26] and this has had an effect for the following two years [27]. This fundamentally altered how people learned and taught; instead of face-to-face instruction in a classroom, this forced people to learn remotely or at home [28]. This is the best way for education to address the global challenges posed by COVID-19 [29], and it will hasten the integration of technology into the During the COVID-19 Pandemic, technology use has become essential, and kids have started utilizing digital resources heavily in both classroom and home settings.

Since they are closely related to educational technology, distance learning, and online learning have developed into ideas that are being tested and frequently discussed in the field of education, particularly in Indonesia [30]. This makes them ideal for use as a learning system in schools by teachers around the world during the COVID-19 Pandemic [31]. Online learning is referred to linguistically as "remote learning," "e-learning," and "mixed learning" [32]. Then, according to [33], online learning was initially defined as a system of learning that makes use of computer and internet-based technology. There are many different online learning tools available, including Whatsapp, Google Meet, Google Classroom, and Zoom Meetings. With the use of the internet network, learning during the COVID-19 Pandemic is focused on a knowledge transfer system using video, audio, graphics, text communication, and software [34]. Online education is seen to be beneficial. When learning activities cannot be carried out through face-to-face contact, teachers can utilize social media and learning applications as an alternative to reach students. In addition, students have more opportunities to have

access to a variety of learning online resources [35]. Despite being an ideal policy, online learning is highly challenging to implement [36], which causes a learning gap [37]. Additionally, not all teachers are proficient in using technology to enhance learning, as seen by their challenges in maintaining control over students' academic pursuits [38]. The teacher thinks that the attitude toward online learning is terrible. The availability of facilities, the usage of the internet and networks, the design, implementation, and evaluation of learning, as well as parent collaboration, are among the many flaws and difficulties that many claims prevent online learning from being effective, according to 80% of respondents [39]. The network is very inadequate or even nonexistent in rural areas, according to additional studies, and some students there will have internet issues [40]. The following are some of the challenges faced by teachers when instructing students online, according to [41].

The issues listed below are regularly encountered and act as barriers to learning. Several factors need to be taken into account while introducing online learning, particularly in elementary schools, according to [42].

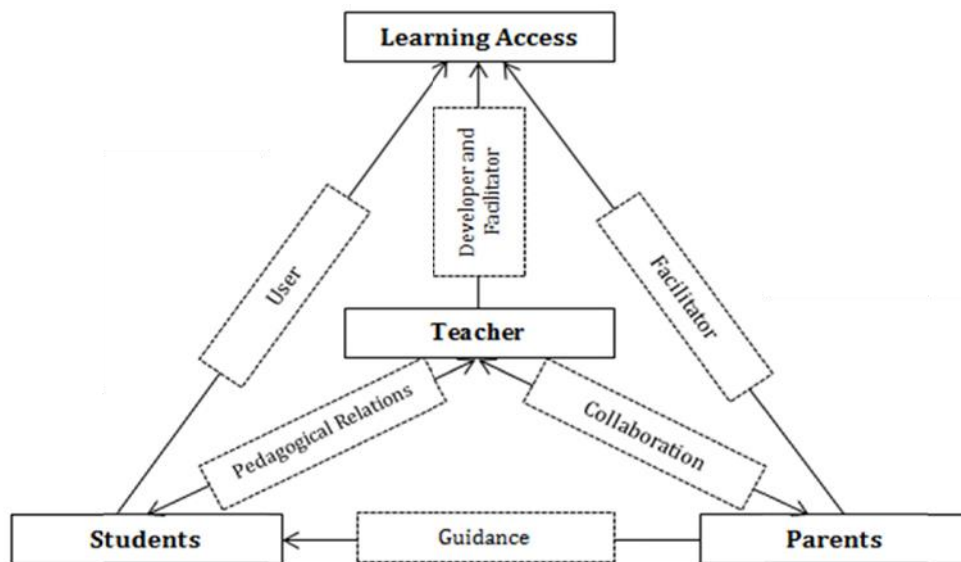


Figure 1: The key to the success of online learning in elementary school.

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.

1.1 Mathematical Competence

A COVID-19 achievement of the competencies that students must master is unaffected by the pandemic. By condensing the curriculum and picking practical implementation-ready resources, several subjects are still taught in schools. The role of mathematics in schools has been reexamined in many countries as a result of curriculum reforms. This has changed how mathematics is chosen and organized in schools and increased the

focus on mathematical thinking processes [43]. Mathematics is one of the most important subjects to be taught to students at school [44]. The context of mathematics is closely related to other fields, such as engineering, finance, transportation, etc., and this is the main focus of the study of mathematics in the implications of human life, making it one of the most crucial subjects to be taught to students in schools [45]. Additionally, learning mathematics can foster positive attitudes toward the subject, boost self-esteem, foster curiosity, help students understand the history of the subject's development and how it has shaped human thought, conduct research, improve knowledge creation and use, and forge connections between mathematics and the arts and aesthetic experiences [46].

Numerous studies on mathematics education and related issues have been conducted recently [47]. Students, parents, and instructors all report finding mathematics to be a challenging subject to understand [48]. The challenges are frequently due to cognitive variables, such as pupils' incapacity, lack of preparedness, lack of experience, and lack of comprehension of mathematical concepts [49]. In addition, a lot of students have negative perceptions of mathematics as a difficult subject since they've had poor experiences with inexperienced math professors in the past [50]. Even though elementary school students are in the stage of development of thinking that is not yet formal and is still relatively concrete, mathematics is delivered deductively and abstractly, which is why elementary school pupils perceive it as difficult [51,52] Claims that children have only received one-way information from their teachers when learning mathematics, which results in very low levels of understanding and connection. Mathematical literacy is one of the most crucial abilities for students to master in the 21st century, and the literature on mathematics education contains numerous meanings that are strongly tied to it [53].

Understanding the function of mathematics in the real world is made possible by mathematical literacy [54]. To cope with the modern world's complexity and problems, this becomes a necessity for each person in daily life [55]. Understanding the use of mathematics in daily life is another benefit of mathematical literacy. According to [56], mathematical Competence refers to a person's wise readiness to respond to all problems in mathematics that are relevant to particular situations. On the other hand, numeracy and quantitative literacy are also terms used to define mathematical literacy. In English-speaking nations like England, Australia, and New Zealand, the term numeracy is more frequently employed, but in the United States, the terms quantitative literacy and mathematical iteration are used [57]. By focusing on the competence of process, substance, and context, mathematical literacy emphasizes the use of mathematical reasoning, mathematical concepts, procedures, and mathematical facts to explain and predict occurrences. Formulating, using, and interpreting mathematical ideas are the three components of mathematical literacy [58]. [59] Identified seven indicators of mathematical literacy competence: 1) mathematical communication skills, 2) mathematization, 3) representation, 4) reasoning and arguments, 5) selecting problem-solving strategies, 6) using language and symbolic operations, formal and technical, and 7) using mathematical tools. One of the qualities assessed by the Program for International Student Assessment is mathematical literacy (PISA). The PISA test is used to gauge how well the educational system is preparing pupils for their future [60]. When assessing the educational system, particularly in terms of student literacy, the PISA test is utilized as a reference. The PISA test results show that developing countries' children have very poor levels of mathematics literacy. With an OECD average score of 387. This demonstrates that Indonesian students' mathematics competency scores are still below the established average. The Ethiopian

government's decision-making to implement the national evaluation system is based on the poor NLAs score results. For all elementary, junior high, and high school levels, this national assessment policy will be put into place in 2021 to enhance varied reading skills, particularly in mathematics.

1.2 The goal of Article

Mathematical competency is one of the most crucial skills to teach all children through online learning during the COVID-19 Pandemic. According to several studies, online learning can effectively communicate learning objectives [61] and significantly influence learning outcomes [62]. As a result of its widespread use in higher education, online learning is seen as beneficial. Additionally, online learning is used sometimes rather than 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 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.

1.3 Effects of COVID-19 on Ethiopian Primary School Children

Due to school closures, millions of Ethiopian kids have been forced to adjust to a new style of learning and living that is drastically different from the nation's traditional educational system. Children have gone through such an astonishing experience since the beginning of 2020 when COVID-19 started to disturb every aspect of life in Ethiopia and everywhere else in the world. The next sections will go over the various ways that the epidemic has affected students.

1.4 Interruption to the Formal Education

The education sector in Ethiopia has been devastated by COVID-19 [63]. The first and most direct impact was related to school closure, disrupting the formal education of primary school children across the country. As a result, about 2 million primary school children in Ethiopia have been unable to attend school as normal and have lost a large amount of instructional time [64]. [65] Highlighted that students from rich or middle-income families managed to access other learning options with their parental financial support; on the contrary, students who are from underprivileged families could not enjoy the same opportunities. After schools were shut down and conventional learning became impossible, students were practically shut out. During the school closure, a lot of children from very poor families were found to work to contribute to familial income and help with extra household chores [66].

Thus, they faced the risk of not returning to school and forgetting what they have learned when schools are allowed to reopen [67].

2. Method

2.1 Research Design

In this study, a pre-experiment procedure was combined with a quantitative methodology. The One Group pretest-posttest Design was employed in the process. Pre-experiment is regarded as particularly effective in containing extraneous factors that threaten the reliability of one group. One group participated in the pretest-posttest design: the pretest (O1), the treatment (X), and the posttest (O2). By comparing the results from the pretest and posttest, the effectiveness of the treatment was assessed [68]. According to [69] assessment of the learning system during the COVID-19 Pandemic, online learning is the treatment in this study. About the COVID-19 Pandemic's educational system. In primary school grade 4, the volume of shapes (cubes and blocks) was used to measure students' mathematical competency.

2.2 Population and Sample

All fourth-grade from one of Addis Ababa Arada sub-city made up the study's population. Based on these students' shared fundamental skills with other students, a sample was chosen. Another similarity can be found in the facilities that are used, the curriculum that is taught, and the way that new students are admitted to the school utilizing the same system, namely the zoning system the students who were chosen at random were regarded as representative of the general population.

2.3 Instrument

The volume of shapes (cube and block) is taught in grade 4 elementary school in this study using a mathematical competency exam tool. Tests of mathematical competency were administered to students to measurement their level of proficiency in dealing with mathematical issues, particularly those about competency. In this study, multiple-choice questions (20) and essays (5) were used as the testing formats, and the questions were arranged according to markers of mathematical competency. To assess online learning, students are given a questionnaire.

The tool includes information on parent-student communication, access to learning during online learning, and pedagogical relationships between teachers and students. Employing a Likert scale, an online quiz on learning. The Likert scale, according to [70], comprises criteria for agreeing, disagreeing, normal/agreeing to, and strongly disagreeing.

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

2.4 Data Analysis

The study's source of data is quantitative information gleaned from student test scores on mathematical literacy. The average pretest and posttest scores were used to generate descriptive statistics, which were then used to generate quantitative data. Calculating the score of improving pupils' mathematical literacy as shown by normalized Gain score analysis also yields descriptive statistics. In addition, three accomplishment criteria low, medium, and high are used to assess pupils' progress in developing their mathematical competency. The normalized Gain is determined using the following formula:

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

Table 2: Below describes Category N-Gain.

Interval	Category
N-Gain > 0.7	High
0.3 < N-Gain ≤ 0.7	Medium
N-Gain ≤ 0.3	Low

The percentage of online learning evaluation questionnaire responses that have been provided to students is also determined using descriptive statistics. Here is the data analysis.

Table 3: The data analysis of the 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

To examine differences in mathematical literacy before and after online instruction, inferential statistics were used. Testing the hypothesis in the pretest and posttest groups is one of the steps in the inferential statically. The pretest was conducted to determine whether the data were normalized using the Kolmo-normalized Smirnov test and to determine whether the variance was homogeneous using the Levene test. The mean difference test utilizing the t-test or Mann-Whitney is the hypothesis test employed in this investigation. Using SPSS version

26, the inferential statistical test was conducted.

3. Results

Online instruction in primary schools differs from that in higher institutions. Many variables are factors that support the success of online learning during the COVID-19 Pandemic, especially in improving students' mathematical competency skills in elementary schools. One of the accomplishments in the learning process is the existence of a good teacher-student relationship. To provide students with engaging and fulfilling learning opportunities, the relationship is developed within a didactic and pedagogical setting. The survey findings on the interactions between teachers and students during the COVID-19 Pandemic are listed below.

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

Students consistently engage in online learning activities, as seen in the table above. This is so that everyone can participate in educational activities, which can only be done online mode. However, students prefer direct instruction over online instruction since it is simpler to connect and communicate when learning in person. Additionally, occasionally pupils fail to comprehend the teacher's clarifications and directives throughout a lesson. Students find it challenging and believe it is less successful because of this, but the teacher still supports the students so that they can study online despite the challenges. Online learning has produced good learning outcomes, according to the students. The amount of parental engagement is still significant in elementary school online learning, which is one of the most obvious aspects of the program. Parents have a crucial part in assisting kids with their education. Collaboration between teachers and parents is essential for the success of online learning. The results of the student survey on parents' assistance to kids 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

According to the table above, parents assist in directing, encouraging, and supporting children as they learn online. Parents are also very devoted and communicate with their children frequently while they are learning online.

Access to education is crucial to the success of online learning. Here, "learning access" refers to the availability of technology resources such as mobile phones or laptops, applications used, network access, media, instructional materials, and teacher-prepared modules. The table below lists the survey findings about access to learning usage.

Table 6: Survey results on the use of learning access.

Indicator	Percent	Information
During my studies, 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

According to the table above, technology will play a critical role in fostering effective learning throughout the Pandemic. But the reality is that some kids' technology is still not supported for educational activities. This is because parents are unable to give instructional resources owing to financial constraints. Students believe that using various applications and learning tools is a crucial component, and the teacher does a great job of preparing these elements. Students have realized that in reality, network access frequently limits online learning.

Even in Ethiopia, research on mathematical literacy has recently become critically relevant, with studies particularly measuring students' numeracy skills or mathematical literacy from elementary to high school. During the COVID-19 Pandemic, students receive math literacy instruction before and after online study. The outcomes of descriptive statistics on students' mathematical competency levels before and during online instruction are shown below.

Table 7: Descriptive statistics of student mathematical competency.

	N	Min	Max	\bar{x}	Sd	Var	N-Gain
Pretest	50	18	73	37.84	14.82	219.89	0.34
Posttest	50	30	93	59.08	16.69	278.48	

According to the table above, the posttest's minimum score was 30, and the pretest's minimal score was 18. The posttest's maximum score was 93, while the pretest average score on the pretest was 37.84, while the average score on the posttest was 59.08, increasing the mathematical literacy score to 21.24. This is also supported by the N-Gain test results, which show a gain in mathematical competency of 0.34 or in the low category for students who get online instruction.

By performing normality and homogeneity tests, a pre-test for the inferential statistics was carried out.

The normalcy test's findings are listed below.

Table 8: Tests of normality.

Kolmogorov-Smirnov ^a				Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pretest	0.092	50	0.200*	0.977	50	0.448
Posttest	0.098	50	0.200*	0.981	50	0.599

The value of sig. is determined by the table above. Pretest values are 0.448 post-test values are 0.559. The result is higher than 0.05. This demonstrates a regularly distributed distribution of the pretest and posttest results. The homogeneity test was then conducted, and the findings are as follows.

Table 9: Test of homogeneity of variances.

Levene Statistic	df1	df2	Sig.
0.869	1	98	0.353

Based on the table above, it can be concluded that mathematical literacy has a sign homogeneity value of 0.353 or higher and less than 0.05. This demonstrates the homogenous criteria used to determine the mathematical competency score. The average score of mathematical literacy abilities for those who obtained online learning during the COVID-19 Pandemic is tested using a parametric test known as the t-test when the data is normal and homogeneous. The table below shows the results of the t-test.

Table 10: T-test results.

Levene's Test t-test for Equality of Means									
For Equality of Variance									
F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
							Lower	Upper	
Score Equal variances assumed	0.353	-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	

According to the table above, the value of the 2-tailed sign is 0.000. It can be said that during the COVID-19 Pandemic, students' mathematics competency skills improved both before and after receiving online instruction.

4. Discussion

In March 2020, Ethiopia experienced the COVID-19 Pandemic, which has altered all facets of society, including schooling. Virtual and online classes require almost all teaching and learning activities to be updated

and adjusted [71]. The teacher still needs to develop the pedagogical relationship even though the learning is being done digitally so that the kids still feel that they can learn despite the COVID-19 Pandemic. To help students reach the predetermined learning objectives, teachers must motivate, encourage, and support them. Teachers must also make learning enjoyable for children to combat the stress levels that they feel, as stress is said to have been a significant issue in education since the COVID-19 Pandemic [72]. This occurred because pupils became bored with learning. After all, it was done online for almost two years. For the content to be delivered to pupils effectively and clearly, teachers must be able to learn carefully themselves. At the very least, effective online learning is possible if this pedagogical relationship can be established.

In primary school, parents continue to play a significant role in mentoring their children. According to [73], parents' responsibilities include helping their kids learn at home and school. Knowing children's learning styles and challenges will help you begin mentoring and supervising them at home while providing for their specific requirements. Teachers and parents need to work together effectively, especially when it comes to addressing challenges and barriers to learning. Parents must pay close attention to the challenges their students experience and work to solve them all [74]. Communication between parents and children will help children succeed in school [75]. However, because collaborative activities are connected with teamwork and unwelcome decision-making, not all teachers find them beneficial and interesting [76]. The collaboration of teachers and parents will result in various breakthroughs, particularly in overcoming student hurdles. One of the learning-enriched schools, according to [77], is the function of cooperation.

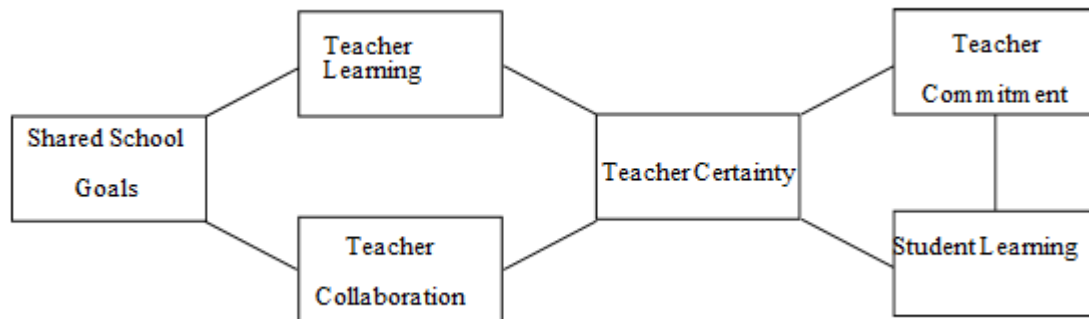


Figure 2: Learning-enriched schools.

Collaboration between teachers and parents will help students learn more effectively. As a result, parents play an important role in their children's growth and development. Parents have an impact on their children's cognitive, social, behavioral, and emotional development, as well as their school preparation, aiding learning and adaptation to the environment when they start school. Children require family assistance for optimal growth and quality schooling [78].

During the COVID-19 epidemic, the use of technology in learning is an unavoidable reality [79]. Teachers play an important role in integrating technology into classroom teaching and learning. Teachers and students engage in teaching and learning activities while attempting to attain pedagogical goals through the use of modern

technology. The COVID-19 Pandemic has pushed the school system into a state of technology-mediated teaching activities [80]. This is what makes technology a factor in the success of the school system during the COVID-19 Pandemic.

The use of numerous applications will enable students to have easier access to learning. The availability of multiple learning programs employed for learning needs during the COVID-19 Pandemic demonstrates this. Whatsapp, Google Meet, Zoom, Cisco Webex, and other applications are available. Online learning necessitates the use of media as a learning aid, specifically the use of multiple applications to support the delivery of learning materials [81]. Use the Whatsapp app to connect with parents and Zoom to teach children when teaching mathematical competency. The Zoom application was chosen because it offers numerous benefits for learning during the COVID-19 Pandemic. Among the features are video and audio, sharing screens, breaking rooms, security, scheduling, and so on. When utilizing the Zoom application, teachers must also produce various media and teaching materials to help students grasp the content presented during Zoom meetings, and students believe that this is a component that helps them understand the learning material. Network access is also critical in facilitating learning during the COVID-19 Pandemic. Learning will be tough if technology and programs enable it, but it will be impossible if there is no network access [82]

Before online learning, students encountered numerous obstacles in solving tasks, particularly those involving story questions. They frequently express questions symbolic manner, or they are provided with tale questions. Nonetheless, the aptitude indications they develop only use the algorithms they have been taught. Students expect that such questions will never be found in textbooks or prepared by the teacher, thus they are perplexed when addressing these difficulties, which include the presentation of non-routine tale questions. [83] Explain that students have trouble solving story issues, and other study shows that students have difficulty solving non-routine questions. In order for kids to learn, teachers must be able to create authentic scenarios that are relevant to their everyday lives. Students will benefit from having this information to better comprehend the issues at hand. This also has a lot in common with what Freudenthal said about mathematics as a human activity. This idea is supported by the theory of meaningful learning as well. David Ausubel frequently explains how issues that are local to the student's area might motivate them to take an active role in their education. [84] Asserts that meaningful learning occurs when students apply what they have learned to comprehend and resolve issues in novel contexts.

Students also lack the ability to generalize, estimate, and prove using mathematical reasoning techniques. In mathematical reasoning, the hypotheses are not closely related. Students have trouble drawing broad conclusions. It is evident from the students' poor comprehension of the questions. The issue of estimations made by students is the next issue, and incorrect student proofs are the final issue. This is so because the two requirements were not met, which led to the inaccuracy of the student-produced proof. Choosing problem-solving techniques is another aspect of mathematical literacy that is closely related to this. The difficulty of these students is closely related to the use of principles in mathematics, which is characterized by students' difficulty in carrying out discovery activities about something and determining relevant factors, resulting in students' inability to abstract the patterns that exist in the problem. Elementary school children frequently have poor mathematical reasoning abilities [85].

Online learning is offered by implementing the ideas described by [86] regarding pedagogical relationships between teachers and students, parental supervision to pupils, and the utilization of access to learning during online learning. The results of the online learning survey show this in general. The teacher employs the Zoom application in the execution of learning so that students are actively and interactively participating in the learning process. Using the application, teachers can now directly explain to pupils, who can now also see and listen. These students can also talk about how to solve the issues, making the application incredibly useful for online learning, particularly for enhancing students' mathematical literacy. Teachers then utilize the Whatsapp Group application to establish communication with parents and children so that any information regarding the implementation of online learning may be informed on the application.

The teacher also creates learning tools to assist pupils in understanding the subject that will be presented. The material presented must be carefully organized so that students can answer problems. Students are typically asked non-routine mathematical literacy questions with context. As a result, to order to learn, pupils must be provided with non-routine problems. When students are given difficult or non-routine questions, they will experience confusion; this is a common thing in the learning process that students experience cognitive conflicts, and this is called disequilibrium in the learning process, where students must understand the context of the problem through information and new experience [87], so the impact is confusion and difficulty in solving problems.

It is the teacher's responsibility to clarify things for students who are unsure. It is referred to as scaffolding in Vygotsky's theory. This is described as giving pupils support before eliminating it so they can independently assume responsibility for solving the issue [88]. Students will benefit immensely from the function of scaffolding in discovering answers to their learning challenges. As a result, when scaffolding is used effectively, students will achieve equilibrium or balance in their understanding of the context of a particular problem, and this is where the learning process takes place. Students' mathematical competency skills improved after engaging in online learning, as seen by a jump in the medium category. During the COVID-19 Pandemic, the only method to learn is online. If online learning is employed in accordance with the idea, learning loss will be reduced and students' reading abilities will improve. The importance of growing mathematical competency cannot be overstated since diverse talents, such as problem-solving, reasoning, and argument will be useful for students in mathematical competency skills [89].

5. Conclusion

According to the description above, students who obtain online learning have a higher level of mathematical competency. This can be seen from the value of sig. T-test of 0.000. This is also corroborated by a rise in the N-Gain score of 0.34, which is in the medium range. This demonstrates that the growth was prompted by optimizing the role of online learning, and the critical elements for the success of online learning stated in Figure 2 formed a new paradigm in online learning in elementary schools, particularly during the COVID-19 Pandemic. This study is aimed to promote successful learning during the COVID-19 Pandemic and increase primary school students' mathematics competency.

6. Limitations

Online learning is a completely new way of learning for most Ethiopian students [90]. [91] Stressed that, due to resource shortages, Ethiopian educational institutions, teachers, and students were not ready for the transformation from traditional teaching and learning methods to online learning. According to [92], there are three common distance learning modes in Ethiopia: online platforms, educational television programs, and take-home lesson packages. For primary school students, these learning modes do not accord with their learning nature and previous learning environments which are face-to-face, collaborative, engaging, and activity-based. Hence, online learning poses challenges for them to adapt.

Another limitation for Ethiopian primary school children was that they did not have the necessary learning devices required for online learning. According to a needs assessment by [93], parents of primary school children were unable to afford technological tools, such as smartphones, tablets, cable TV, and other expenses for their children to study online. [94] Further emphasized that the challenge was worse for rural primary school children since their parents could not afford appropriate learning devices for them. As a consequence, many primary school students in rural areas have lost the opportunity to continue their education.

This indicates the limited internet access at home, which equates to less chance for students to continue their education through online learning. Without internet access, online learning is impossible. When the demand for the internet increased, problems with internet connectivity occurred [95]. [96] Argued that the internet speed in rural areas is slow and inadequate, making some Ethiopian students unable to study online.

Another stumbling block to online learning is concerned with the inadequacy of parental support. It was found by [97] that caregivers or parents did not have sufficient content knowledge as to what their children learn. They also did not have sufficient time to support their children's learning at home, not to mention their limited ability to use different technological devices and platforms. Without sufficient parental support, Ethiopia is obviously in a difficult and disadvantaged position when it comes to online learning.

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