Teacher's World: Journal of Education and Research
Vol. 48 (University of Dhaka Centennial Special Issue), June 2022

E-ISSN 2959-5738 (Online);
ISSN-L: 0040-0521 (Print)

Exploring the Challenges of Mathematics Teaching-learning Process at Primary School Level During COVID-19

Rubaiya Sharmin[1], Md. Abdul Halim[2] and Tamanna Sultana[3]

Abstract

Due to COVID-19 pandamic, students all over the country had to get detached from the normal flow of education. The non-government schools of the urban areas started online education using mainly Zoom and WhatsApp media platforms. This study explores the challenges experienced by both teachers and students during the COVID-19 pandemic while involved in the mathematics teaching-learning process. The study followed an exploratory case study research design. Qualitative data were collected through semi-structured interviews via zoom/ mobile phone meetings with 10 primary school teachers and 20 students of primary level and analysed thematically. Also, 10 online primary mathematics classes were observed for data triangulation. This study explored three perspectives curriculum-related challenges, teacher's challenges and students' challenges. It is found that appropriateness of the content, alignment of contents concerning time schedules, curriculum objectives and teaching strategies proposed in the curriculum are the major curriculum-related challenges faced by teachers while conducting mathematics classes online. Besides, delivering the lecture, managing the class, assessing students, teachers' lack of technological knowledge and availability of physical facilities were also identified as challenges in terms of teachers' perspective. Another finding of this study is that students faced different challenges (e.g. technological, motivational, collaborative work, homework, feedback, and home environment) while learning through an online platform. Based on the study's findings, the practical implications for academic institutions, curriculum developers, teachers' trainers and policymakers have been articulated.

Keywords: COVID- 19, Online education, Challenges, Mathematics, Primary education

Corresponding email: rubaiyasharmin@du.ac.bd

Received : 25 July 2022 **Reviewed:** 10 November 2022

Suggested Citation: Sharmin, R., Halim, M. A. & Sultana, T. (2022). Exploring the Challenges of Mathematics Teaching-learning Process at Primary School Level During COVID-19. *Teacher's World: Journal of Education and Research, 48(1)*.

DOI: https://doi.org/10.3329/twjer.v48i1.67546

Introduction

The world has come to a standstill due to the outbreak of COVID-19. In line with that, the government of Bangladesh declared nationwide school closures on March 17, 2020, as the cause of this disease. Bangladesh has a large primary education system, with 18 million children

[1] Education Discipline, Khulna University
[2] Institute of Education and Research, University of Dhaka
[3] Institute of Education and Research, University of Dhaka

in 0.13 million primary-level educational institutions (BANBEIS, 2018). In alignment with the national lockdown, this vast mass of students has become detached from the normal flow of education for nearly 1.5 years. During this pandemic, students are bound to attend online classes from home. In this new situation, teachers and students faced several challenges. According to Abdullahi et al. (2020), challenges prevalent in the online teaching-learning process in Mathematics are- Teachers' online delivery technique, problems submitting mathematics homework online, and teachers' incapacity to interact with the students throughout the online mathematics class. Teaching mathematics through distance poses a significant challenge anywhere in the world as it is difficult to deliver the lecture interactively (Haankuku, 2018). Due to the absence of hands-on activities, it is difficult to conceptualise abstract mathematical ideas, which is vital, especially for young children (Ojose, 2008). Thus, this study explores the challenges the primary teachers and students face during the online-based mathematics teaching-learning process. To fulfil this aim, the following research questions are explored:

1. How do teachers face curriculum-related challenges while teaching primary mathematics online?
2. What challenges do primary teachers experience during online mathematics teaching?
3. What are the challenges students face in learning mathematics online?

Literature Review

Research shows that a subject like mathematics necessitates constant face-to-face involvement between the teacher and the students (Rao, 2020). According to Rao (2020), students struggle to understand the intricate metrics concealed in the formulas as the teacher puts mathematics formulas on the whiteboard and explains them step by step. During this pandemic situation though education was provided through an online platform in many counties, numerous challenges were revealed to implement this, such as shortcomings in online teaching infrastructure, a lack of teacher experience, information gaps, complex home environmental difficulties, a lack of discipline, and less effective online education processes (Hermanto and Srimulyani, 2021).

In a study, Yohannes et al. (2021) claimed that students found mathematics challenging to understand through online learning, and teaching mathematics was complicated. Furthermore, they added, the nature of abstractness of mathematics made it difficult for the teachers to communicate with their students. According to Andriyono and Herman (2020), in online teaching, teachers struggled to find the correct teaching materials to deliver because they could not be displayed and explained immediately, so they had to be photographed and then emailed to students. They argued that several obstacles occurred during this teaching-learning process. For instance, the distribution of subject matter files is disrupted by unstable internet networks, and students' internet quotas may run out, which causes them to end the lesson faster and not learn as much as they could. Andriyono and Herman (2020) also stated that students

cannot grasp the mathematics concept by reading materials online since they are used to asking teachers directly.

Kalogeropoulos et al., (2021) argue that lack of peer support as well as collaborative work are the major problem in a remote learning situation. In a study, Firmanti and Yuberta (2021) also identified further problems with remote learning. They claimed that many students fail to turn in assignments on time. Furthermore, as the quantity of assignments grows, it becomes more difficult for students to collect assignments within the grace time (Wulantina et al., 2020), and sometimes parents are uninformed of assignments, how to check for them, or when they are due (An et al., 2021; Clausen et al., 2020).

Andriyono and Herman (2020) argue that studying online could be more active based on what kind of techniques have been used by teachers. Lintuman and Wijaya (2020) claimed that teachers frequently concentrated solely on the content delivered, showing videos with explanations, denying pupils the opportunity to convey what they knew and understood. They suggested when watching the videos, the teachers should turn instruction into a genuine dialogue so that the students feel included in the mathematical conversation.

Research shows that assessment is another crucial aspect for teachers while teaching online. Teachers find it difficult to offer grades because students' capacity is not readily apparent. After all, the task is not permanently assigned to students who work independently (Andriyono and Herman, 2020). According to Yohannes et al. (2021), the significant difficulties were engaging with pupils and offering feedback. They added that these barriers arose because most online learning media or platforms were only one-way, preventing direct interactions between teachers and students. Furthermore, because teachers were used to paper-based grading methods, providing feedback on student achievement in soft files was difficult and time-consuming. According to Sengilakar and Kurtogluerden (2021), it was stressed that providing instant feedback by following the student's actions is critical for the mathematics lesson. Still, there is not enough time or appropriate conditions in distance education to do so.

However, regarding grouping students in online media, Calder et al. (2021) stated that breakout rooms in Zoom appeared to be the most effective platform for students to communicate in collaborative mathematics problem-solving in online classrooms. While speaking about students' performances during the assessment, Spitzer & Musslick (2021) stated that, in 2019, students who were classified as low-performing in a physical classroom showed improved performances in an online class more than students who were classified as high-performing. As a result, it is unclear if more substantial incentives contributed to the improved performance of low-performing students in this study. They added that it is probable that when kids learned at home, they were less distracted by other students, teachers, or even potentially stressful classroom circumstances, allowing them to focus better on their problem sets.

During the Covid-19 epidemic, instructors' online learning is directed by a reduced curriculum that includes the selection of necessary competencies for students (Herwin et al., 2021). According to Herwin et al. (2021), teachers can shorten curricular components by selecting competencies considered vital for their pupils throughout the implementation of online learning during the pandemic. They included that these efforts are a way to adjust learning to the situation; on the other hand, it is vital to consider that most teachers need to gain expertise in curriculum studies. They further said this is undoubtedly a need to orient all teachers on how to adapt the curriculum as best they can to the changing pandemic environment and integrate ICT into classroom activities. According to Yohannes et al. (2021), the lesson topic became one of the issues teachers encounter when teaching mathematics through online learning. Besides, teachers face a problem in providing engaging, effective, and efficient learning in the present climate of online learning (Hutasoit, 2021). According to Rao (2020), during Covid-19, however, the entire world must teach all topics online. He added many online platforms for mathematics are available today. Still, the reality is that most teachers and students are not only unprepared for online teaching and learning but also lack the expertise to use online apps and software.

Teachers' and students' readiness and readiness on technology are another issue of online teaching–learning. According to Andriyono and Herman (2020), students' understanding of using devices as a learning medium is difficult. They included a lack of readiness of parents to guide pupils at home when online learning is taking place. They further said students, parents, and parents are all less adept at using technology. According to Purba (2021), the effectiveness of students' online mathematics learning results is also influenced by their motivation to learn. She said because virtual space is limited in online learning, it is challenging for teachers to control and sustain the learning climate

Marpaung and Nasution (2021) argue that students will be glad to be enthusiastic and earnest in participating in mathematics learning in the classroom if the teacher adopts a diversified learning approach and can stimulate student learning (Marpaung and Nasution, 2021). Mailizar et al. (2020) identified various variables (e.g. teachers' lack of experience with remote learning, a lack of mastery of e-learning, or a lack of time) as challenges for instructors when teaching and learning during the COVID-19 pandemic. According to Yohannes et al. (2021), the most prominent issue teachers faced was that schools needed to provide clear direction on how to utilize online learning on a technical level.

According to Rasmitadila (2020), not all parents have cell phones or laptop computers, and Internet signals, particularly in the suburbs, are weak. He said if these technical constraints cannot be solved, problems can occur, implying that student participation in learning is not optimal. According to Andriyono and Herman (2020), not all have access to electronic devices, so not all students know the homework. They also claimed that another effect of learning during this pandemic era is the time the school is closed. They referred because primary school

students are active and joyful to move, those who are used to studying in school activities with their friends, but during this pandemic period, students are compelled to stay at home exclusively, pupils felt saturated. While a substantial number of pupils struggled to understand mathematics class during the pandemic, most of them enjoyed learning mathematics (Tezer et al., 2021).

Against this backdrop, this study aims to explore the challenges teachers and students at the primary level faced in online Mathematics classes during this pandemic in Bangladesh. The study also examines teachers' curriculum-related challenges while conducting online Mathematics classes.

Conceptual framework

In a study, Assareh and Bidokht (2011) identified four barriers to online teaching-learning. They are the learners, the teacher, the curriculum and the school. According to them, the learner, which has subdivisions like financial problems, motivation, assessment of their progress, isolation from peers, inadequate skills and experience in distance learning, affection and social domain, while the teacher has subdivision barriers like lack of adequate knowledge about e-teaching environment, a difficulty for assessment of different domain progress. In the case of curriculum, the barriers are ambiguity, quality, resources, teaching process, and evaluation, as the schools are organizational and structural factors. Anthony Picciano proposed an integrated model of an online learning community - A Multimodal Model for online education (2017). This model consists of seven components- Content, Social/emotional support, Dialectic/ questioning, Evaluation/ assessment, Collaboration and Reflection. Content is the most important component of delivering instruction. In this model, content for online education includes digital images, course learning management systems, text, video, audio, games etc. Social/ emotional support is provided by the instructor to the learners to keep them motivated. Dialectical/ questioning is the Socratic method that allows teachers to probe students and ignite critical thinking. The electronic discussion board and voice thread forum may narrow a discussion to specific points. Reflection is a pedagogical strategy that allows the students to share what they learn with peers and teachers. Blogs and Blogging, as group work or individual journaling activities, have yielded appropriate tools for such purposes. Self-paced/ independent study is necessary for the students to be able to solve problems on their own. Adaptive software programs such as EdApp, Adaptemy, Realizeit, Cogbooks etc. can be used for such purposes. These adaptive software programs are mainly used in stand-alone mode for self-study, where teachers avail themselves whenever the students require a tutor. Student collaboration can be done using mobile technologies, Wikis, where student-generated content will be shared with the class for peer review. Papers from wikis can be transferred easily from one group to another group or from one class to another class. Evaluation/ assessment of the students' learning can be conducted by e-portfolios using images, videos and audio clips. Besides, assignments, essays,

oral classroom presentations etc., can also be used to assess students' learning. Also, weekly class discussion on electronic discussion boards provides the teacher with an electronic record, which the teacher may use later to review how the students have participated in online classes and thus evaluate them based on their active participation.

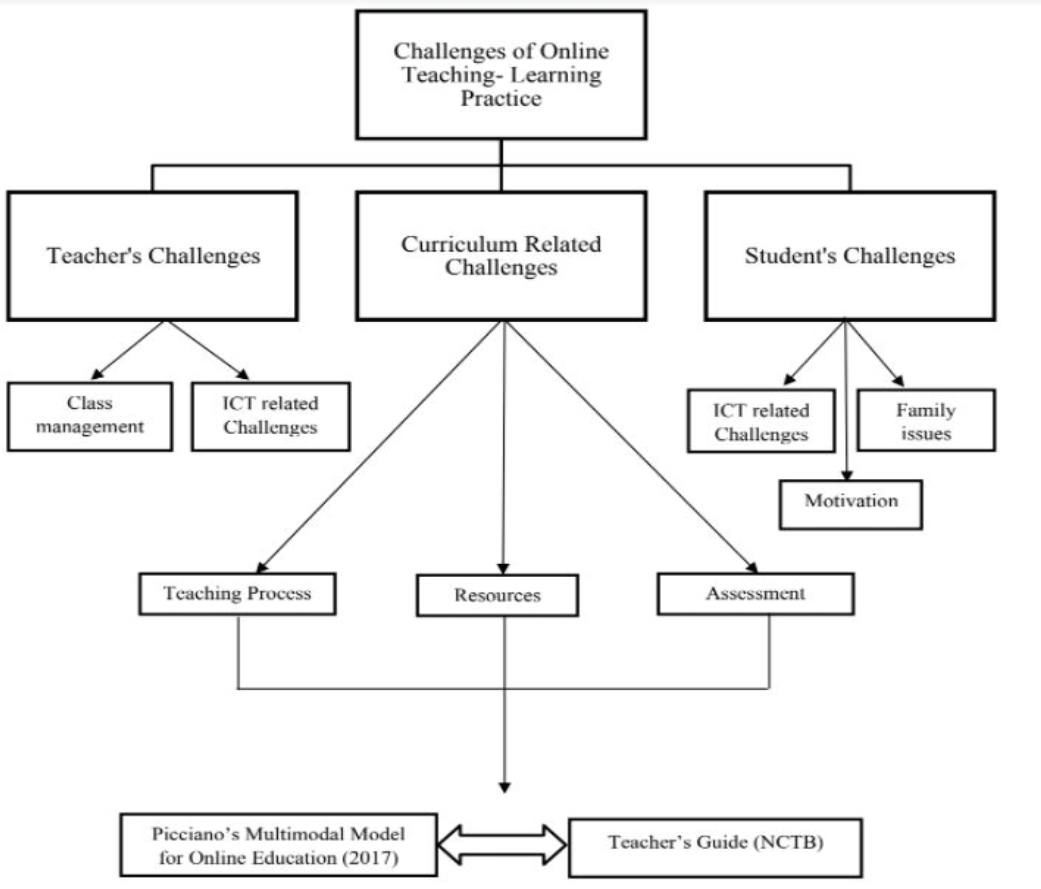

Figure: Conceptual Framework

Based on the literature discussed above, we developed a conceptual framework (Figure 1). In Bangladesh, there are no prescribed guidelines for online education. However, primary teachers are provided with Teacher's Guide books published by the National Textbook and Curriculum Board. According to guidelines provided by the teacher's

guide of primary level Mathematics (class 1-5), the overall teaching method in a traditional classroom includes the following sequence- providing the concept of content to the students, giving motivation to the students, asking the students to try to solve mathematical problems on their own, providing attention to weak students, holding question-answer and group discussion sessions about the possible ways to solve the problem so that students may reflect their opinion, teaching how to solve the mathematical problem using teaching aids like photo, graph, chart, paper model, card, scale, table etc., providing classwork (individually or as group work), to assess student's learning, providing appropriate feedback, and finally end the class by providing homework. Although this guideline is not for the online classroom but rather for the traditional classroom, this is the only teaching guideline provided to the primary teachers that they ought to follow. Combining the above-mentioned concepts, the conceptual framework is constructed. We have developed this conceptual framework so that it may guide us to address the challenges that the teachers and students of primary level are facing in online Mathematics classes. Our conceptual framework is divided into three major components, which are further divided into several sub-components. In light of this framework, we intend to look for the answers to our research questions.

Methodology

This study adopted qualitative research (Creswell, 2012) as the purpose of the study is to explore the respondents' experiences to have an in-depth understanding of their challenges. An exploratory form of case study design is conducted (Yin, 2003) in this study. 10 primary school teachers and 20 students of primary level are chosen conveniently as samples (Creswell, 2012), and 10 online primary mathematics classes are observed. For collecting data, we have chosen two registered non-government primary schools (RNGPS) in Dhaka city where five teachers (involving both male and female) and 10 students (considering both male and female) are selected from each school. As the children of grade five are more capable of answering the questions correctly than those of lower grades, we have taken all 20 students from grade five.

For collecting data, semi-structured questionnaires (all questions are open-ended) were prepared separately for both the teachers and students. According to Creswell, "In qualitative research, you ask open-ended questions so that the participants can best voice their experiences unconstrained by any perspectives of the researcher or past research findings" (p. 218). For the respondent's convenience, the questions were translated into Bangla while providing them to participants. To check the instrument's validity, the tools were taken to an expert for further corrections and modifications. After that, the tools were piloted by two teachers and two students to ensure the validity of the instruments. Since it was a pandemic, we could not go

outside due to the lockdown to interview face-to-face. That is why we collected the data over mobile phone/ zoom apps (according to the participants' preference).

Data Analysis & Findings

Collected data were transcribed and analyzed in line with the study's objective. Following Miles and Huberman (1994), we coded (descriptive) all those data into concepts that represented the factors (sub-themes), which are the challenges faced by teachers and students in online mathematics teaching-learning situations. After a close and repetitive observation within and across the data set for each participant, we observed patterns among the factors. We grouped similar patterns of factors into three major themes (Miles and Huberman, 1994): *curriculum Related challenges, teacher's challenges,* and *student challenges* which were deducted based on the conceptual framework of the study (Table 1). Finally, a narrative was conducted to provide insights into how the factors influenced the primary mathematics teaching-learning process on online.

Table 1: Major themes and sub-themes derived from the data

Themes	Sub-themes
Curriculum related Challenges	Appropriateness of content for online education
	Improper alignment of content with respect to time schedule
	To implement the objectives of curriculum
	Unsuitable teaching strategies with respect to online education
Teacher's challenges	To deliver the lecture
	To manage the class
	To assess students
	Lack of technological knowledge
	Lack of physical facilities
Student's challenges	Technological challenges
	To be motivated
	To collaborate with peers
	To do the home task
	To get effective feedback
	Unsuitable home environment

Curriculum-related challenges

Our analysis shows that *content alignment concerning time schedule, contents itself, implementation of objectives of curriculum and teaching strategies* proposed in the curriculum are the major curriculum-related challenges teachers face when conducting online classes.

It is found that geometry, measurement, mathematical symbols, fraction, decimals, data distribution, word problems (average, percentage) are the contents found difficult by teachers to teach on an online platform. According to them, word problems are challenging to teach via online media as such types of problems are related to practical life, and teachers need to make the students imagine at first and then go for calculation which is a bit challenging over the online platform. Besides, they feel that hands-on activities are vital for geometry class which is quite unlikely in online teaching-learning situations. One of the teachers (T10) stated, "*In the case of geometry, it is asked to draw a circle with a 3.5 cm radius. I cannot show them by holding their hand, where to start on the scale, how to hold the compass".*

Our analysis shows that teachers struggle to complete the syllabus's contents within the prescribed schedule. They think the content proposed in the curriculum is not adequately suitable for online classes due to the short period. One of the teachers claim that

> *... in online class, we get only four days per week, so we are in a hurry to complete the syllabus within this short time, as a result, we, too, do not get enough opportunity to wait for student's reflection (T4)*

Implementing the objectives of the curriculum is another challenge identified by the teachers. It is found that teachers believe that although the goals and objectives of the curriculum can be achieved, they are not fully satisfied with them. For instance, one of the teachers, T6, stated, "*We can only ensure that the students are learning calculation, but we are still determining if they can implement their knowledge in their practical life. But if it were a physical classroom, we could have ensured it".*

Moreover, some teachers opined precisely that the goals and objectives of the curriculum could not be implemented because of the fact that it is impossible to do group work and use real-life objects in an online class.

It is found that teachers believe that the curriculum contents are consistent with the use of technology. Still, they feel that group work, classwork, homework, feedback, assessment, and student-centric activities mentioned in the curriculum need to be following online education. According to the teachers, while providing group work in online classrooms, they need help seeing what their students are writing or how they solve math. Teachers only can see their faces over the camera. Teachers claim that although they use breakout rooms for involving students in a group activity, but only the good students do group work and the average and weak students need help to do it.

Teacher's challenges

According to table-1, *delivering the lecture, managing the class and assessing students, teachers' lack of sufficient technical knowledge and lack of physical facilities* are major challenges faced by the teacher while conducting online classes.

Our analysis shows that teachers need help to deliver the lecture as in online classes, they need to write in large fonts to be visible to the camera. That is why teachers need to rub the board halfway through math. So the teachers cannot ensure that the students can capture the entire math in their minds. The teachers teach the students by keeping all of them muted. So when the teacher rubs the board, nobody is behind to say, "teacher, please wait, I have not finished yet". So, slow writers cannot learn the whole content. Furthermore, they firmly believe that the teaching aid might be ineffective via online platforms. If the student gets disconnected, he misses out on the part where I have shown the teaching aid. Although the teacher shows natural objects, the students cannot take them in their hands and handle them manually. One of the teachers said that

> *In geometry, I can only draw the 90 degrees of angle on the board using a protector. But I cannot show the student by holding their hand exactly how the protector is to be placed on the copy to draw the angle. Using teaching aid is not effective enough (T3).*

Our analysis shows that in physical classrooms, teachers have several scopes to motivate students, whereas, in online classes, they can only motivate students by words. One of the teachers argued that

> *We used to have a shop set in the classroom. The students used to play their role as a shopkeeper or customers. That is how they used to remain motivated throughout class time. But in online classes, we are solely dependent on imagination. Like I am just asking them to imagine, I am not sure if they are imagining or not (T4)*

Teachers found it difficult to apply multiple strategies in the online classes as it is very time-consuming to follow different learning methods of the children. As a result, teachers cannot differentiate students and teach them according to their own style. One of the teachers said that

> *Suppose math can be solved in many ways, like the solvent method (holding x, y), or using word format or the unitary method, etc. Every student gets to choose whichever way they feel comfortable doing the math. So, showing math in various ways takes more time in class, leading to doing 3/ 4 classes over the same topic. Time is the main issue here (T6).*

Our analysis shows that classroom management is a challenging factor for teachers while teaching on an online platform. According to our observation, the mobile screen goes off

whenever the teachers try to look at the students to observe who is not attentive. It also hampers the teacher's attention in the class. One teacher (T2) expressed, "*Although I see from my side that the student is staring attentively at me, in reality, the student is engaged in games in another tab of the screen".*

Besides, we observed that all students tried to speak at a time; as a result, nobody could hear anyone properly. It becomes chaos. Moreover, even if the teachers try to utilize teaching aid in online classes, they need to establish effective communication with the students. One teacher opined that-

> *Suppose if I make them show a real object on the table, I have kept the camera close to the object so that the student can watch it properly. But at that time, the student could not see my facial expressions because it was not on camera. As a result, there remains a communication gap (T9.)*

Our analysis shows that in online classes, students did not receive effective teacher feedback and complete their homework correctly. Most of the teachers argued that they do not get the scope to provide feedback on students' copies in online classes. As a result, we observed that the teacher could not correct the math at the "pin-point" where the student had made a mistake. Moreover, the teachers can't ensure whether the students do their homework alone. Besides, since the exam has taken online, it is a big concern whether the students have maintained academic integrity in their exams.

> *Some of my students neither performed well in online classes nor could they pass the exam in the past in a physical classroom, but now they are getting even the highest marks in online exams (T9).*

Though question/ answer and discussion sessions are very important to assess students, most teachers argued that in online classes, conducting discussion sessions is tough as more than one student tries to speak at a time, nobody can be adequately heard, and the classroom becomes chaos. Furthermore, we observed that when the teacher asks a question to one student, the others go out of focus. At that time, only the teacher and the student is in the conversation rather than the whole class being in the discussion. Weak students remain silent. Teachers cannot even identify weak or silent students.

Besides, some teachers don't have the scope to engage the fast learner with another complex math. Thus, when one student completes the task early, he/she just sits idle and gets bored while teachers wait for the slower learner to finish the task. As one of the teachers (T5) mentioned, *"In physical class, I used to keep trying to make the weak students understand the topic, but in the online class, I do not have the flexibility to compel them to do something, otherwise, they will become irregular".*

Our analysis also identifies teachers' technological knowledge as another issue for online teaching-learning. Teachers who have ICT skills such as knowledge about power-point presentations, animation, and graphics, there don't face significant challenges. But the number of such teachers is deficient. Since teachers did not get professional training about conducting classes effectively through an online platform like zoom apps, they only depend on YouTube tutorials or consulting with colleagues to update themselves. One of the teachers (T8) claims that, *"We are habituated using only a tangible object as a teaching aid. We do not have the skill to use digital content as a teaching aid".*

Teachers also mention that physical facilities for online teaching are not sufficient. The schools did not give the teachers financial support to buy internet packages or arrange devices. The teachers did not even get their salary within due time. As another teacher (T7) claimed, *"I had to bear the cost of buying the tripod, webcam, and payable software. But how many teachers are out there who are willing to spend from their own pocket to provide better service to the students?"*

Furthermore, as the accessible version of the zoom app is valid only for 40 minutes, it is pretty impossible for a teacher to conduct class effectively with this limited span of time. According to them, all the students take an average time of 5-7 minutes to join class, and after losing 5/7 minutes' teachers have to hurry to complete the tasks according to the lesson plan. Sometimes when teachers cannot complete a topic within the class time, they ask students to rejoin in the next zoom session of another 40 minutes. But only some students rejoin the class.

Students' challenges

While concerning students' perspective, our analysis founds several challenging factors, e.g. technological issues, feeling motivated, collaborating with peers, doing the homework, getting effective feedback, and an unsuitable home environment.

Most students claim they cannot clearly hear the teacher's instructions due to network problems. Moreover, they often disconnect from the class automatically because of load-shedding. One of the students (S6) argued, *"Due to the electricity problem, we have to miss out on some classes as we cannot attend without Wi fi connection".*

It is also found that students feel demotivated in the online class as they do not get the opportunity to communicate with their peers and fail to get the scope of friendly competitions they used to do during the physical classes. One of the students (S17) said, *"We used to compete in a physical class about who can do the math earlier and correctly and show to the teacher. That was fun. But now I feel so alone".* Similarly, another student (S6) expresses his feelings, "*I can talk with the teacher only, not with my friends. I can only see them".*

Our analysis shows that students need help to do their homework while the teaching-learning process is conducted through online platforms. According to them, in a face-to-face class, a

teacher would have provided the homework during class time, thus they could ask the teacher instantly about how to do the homework. But in online class, it is not possible. One of the students (S8) said, *"But now, the teacher posts the homework photo in our WhatsApp group anytime he wants, and then we do not have the scope or interest to ask the teacher how to do the homework properly"*.

They also express that since teachers show recorded classes, they could have gotten more effective feedback and their queries. One of the students (S10) said, *"Tick and cross are all that we get. Teacher does not make us understand the logic behind it"*.

Students also indicated an unsuitable home environment to be another challenging factor. They often feel distracted due to the noise created by the household's children. One of the students (S6) argued, *"My little brother shouts, cries, and comes here frequently while I am doing my class, which distracts me"*.

Discussions and Implications

In this section, we summarised and discussed findings regarding three research questions (RQs) that we aimed to address in this study.

RQ 1: How do teachers face curriculum-related challenges while teaching primary mathematics online?

This study found that teachers face significant challenges in implementing the curriculum's objectives as the teaching-learning techniques such as group work, classwork, homework, feedback, assessment, and student-centric activities guided by the curriculum are not conducted following online education. These findings align with (Herwin et al., 2021) where it is stated that the national curriculum's substance or competencies could not be delivered entirely because of a quick shift from face-to-face offline learning to online learning based on information technology integration in learning activities. Moreover, some of the curriculum contents (e.g. geometry, measurement, mathematical symbols, fraction, decimals, and word problems (average, percentage, data distribution) were found difficult to teach via online platforms due to the lack of applying hands-on activities to connect math with real life This finding goes in line with (Yohannes et al. 2021). Our study also shows that teachers struggle to complete the syllabus within the prescribed schedule, as the content proposed in the curriculum is not adequately suitable for an online class. Moreover, some teachers opined precisely that the goals and objectives of the curriculum could not be implemented because it is impossible to do group work and use real-life objects in online classes. Though Calder et al. (2021) claimed that using a breakout room for group work is effective for online teaching-learning, our findings are inconsistence with this as teachers argued that while providing group work in online classrooms, they only can see students rather than their work and only good students have involved in the activities.

RQ 2: What challenges do primary teachers experience during online mathematics teaching?

This study found that teachers face challenges in delivering lectures due to network issue. For instance, sometimes the teacher's mobile screen became hazy as a result, students could not see the writing clearly, and sometimes the voice of the teacher was unclear to the students, which hampered the effective teaching-learning. This finding goes in line with (Hermanto and Srimulyani, 2021), who stated that subjects and courses involving calculations and practices were ineffective if simply delivered through online learning, and educational institutions and stakeholders faced obstacles such as limited internet connection and a lack of social engagement. The study also revealed that teachers fail to communicate with students effectively due to a lack of eye contact and direct interaction, thus the teachers are uncertain whether the students understand the Mathematical content or not. According to Rao (2020), a subject like mathematics necessitates constant face-to-face involvement between the teacher and the students so that the teacher can pay attention to the pupils' facial expressions and quickly clarify any doubts they may have and lack of interaction can be viewed as a challenge in online Math class.

It is found that the use of teaching aids in online math classes is a challenging factor for both teachers and students. Teachers face challenges in developing digital teaching aids like video, animations etc., as it is time-consuming and sometimes costly (e.g. use of a discussion board, or digital board as a teaching aid). Besides, teachers' lack of ICT skills makes the situation harder. As students could not handle the teaching aids manually, they could not be appropriately benefited from them. Also, due to a lack of face-to-face interaction between the teacher and students, the impact of teaching aids in learning math is shallow in online classes. These findings align with (Andriyono and Herman, 2020) where it is stated that students find it challenging to grasp the math material provided to them in online classes since they cannot directly ask the teacher about the material due to a lack of direct interaction with the teacher.

Our study shows that in online classes, teachers have very limited scopes to motivate students, unlike in physical classrooms. According to Purba (2021), the effectiveness of students' online mathematics learning results is also influenced by their motivation to learn. She said because virtual space is limited in online learning, it is challenging for teachers to control and sustain the learning climate. Our study found that teachers found it difficult to apply multiple strategies in online classes according to students' learning styles as it is very time-consuming to follow different learning methods of the children. Thus, this teaching method fails to ensure students' active participation. According to Marpaung and Nasution (2021), students will be glad to be enthusiastic and earnest in participating in mathematics learning in the classroom if the teacher adopts a diversified learning approach and can stimulate student learning. This study also revealed that teachers struggle to manage the class. Whenever teachers try to look at the students to observe who is not attentive, the mobile screen goes off. It also hampers the teacher's attention in the class. These findings are consistent with the finding of Andriyono and Herman

(2020). Our study shows that in the online classes, students did not get effective feedback from the teacher as the teacher could not correct the math at "pin-point", where the student has made mistakes in their copy. These findings align with (Yohannes et al. (2021), who stated that due to a lack of direct interaction, the teachers find it challenging to provide feedback to students as they have habituated to pen-paper-based assessment. However, according to Sengilakar and Kurtogluerden (2021), the reason behind ineffective feedback in online classes includes a lack of enough time. The study also found that teachers are in a dilemma on students' fairness about homework and exam. These findings align with Andriyono and Herman (2020), who stated that it is difficult to provide grades to students as it is uncertain whether the students have done their assignments on their own or not. Besides, since the exams have taken online, it is a big concern whether the students have not taken illicit activities in the exams or not. However, this opinion contradicts Spitzer & Musslick (2021), who stated that in 2019 before the pandemic, students who were classified as low-performing improved more than students who were classified as high-performing.

Our study found that conducting discussion session is difficult on an online platform as during this session, the class become chaotic, and nobody can be heard correctly. Besides, when the teacher asks a question to one student, the others go out of focus. At that time, only the teacher and the student is in the conversation rather than the whole class being in the discussion. Weak students remain silent, and teachers cannot even identify weak or silent students. The reason behind ineffective discussion in online math classes is discussed in the study of Lintuman and Wijaya (2020), who discovered that teachers frequently concentrated solely on the content delivered, denying pupils the opportunity to convey what they knew and understood. Besides, the study revealed that teachers don't have the scope to engage the fast learner with other complex math when they complete the task early. Thus, fast learners sometimes just sit idle and get bored while teachers wait for slower learners to finish the task. Our study also showed that very few teachers don't face significant challenges in teaching online as they are good at ICT. But this scenario is not in general. Since teachers did not get any professional training on effective teaching via platforms like zoom apps, they only depend on YouTube tutorial or consulting with colleagues to update themselves. The finding is consistent with the findings of Mailizar et al. (2020), who stated that teachers' lack of experience with online learning, a lack of mastery of e-learning, or a lack of time management make the situation more challenging for the teachers to teach during the COVID-19 pandemic. Also, Rao (2020) states that most teachers and students are not only unprepared for online teaching and learning but also inexpert in using online apps and software. The lack of supportive physical facilities for online teaching is also identified as a challenging factor in this study. It is found that not only schools provide financial support to buy internet packages or arrange devices, but also teachers did not get their salary in due time. This finding goes in line with Yohannes et al. (2021), who stated that the biggest issue teachers faced was that schools did not provide clear direction on how to utilize online learning on a technical level. Our study shows furthermore, as the accessible version

of the zoom app is valid only for 40 minutes at a time and all the students take an average time of 5-7 minutes to join class, it is quite impossible for teachers to conduct class effectively with this limited span of time.

RQ 3: What are the challenges students faces in learning mathematics online?

This study found that due to network issues, the students cannot hear the teacher's instructions clearly, and load-shedding causes the students to get automatically disconnected from the class. These findings align with the finding of Rasmitadila (2020) who stated that internet signals, particularly in the suburbs, are weak. If these technical constraints cannot be solved, problems can occur, implying that student participation in learning is not optimal. This study further found that the students feel demotivated in the online class since they don't get the opportunity to communicate with peers and involved in friendly competitions that they used to do during the physical classes. This finding is consistent with the findings of Andriyono and Herman (2020) who they stated that primary school students are active and joyful to move, they are used to studying in school activities with their friends, but during this pandemic period, students are compelled to stay at home exclusively, pupils feel saturated. This study also revealed that students face challenges in homework activities in online Mathematics classes, unlike the face-to-face class, they don't get the chance to ask the teacher about the assigned work during class time. The challenges regarding homework go in line with Firmanti and Yuberta (2021), who claimed that many students fail to turn in assignments on time. Furthermore, as the quantity of assignments grows, it becomes more difficult for students to collect assignments within the grace time (Wulantina et al., 2020), and sometimes parents are uninformed about assignments, how to check for them, or when they are due (An et al., 2021; Clausen et al., 2020). This study found that since teachers showed recorded classes, the students did not get effective feedback as well as comments on their queries. This finding goes in line with Yohannes et al. (2021), who stated that the primary difficulty was engaging with pupils and offering feedback through only one-way online learning media, preventing direct interactions between teachers and students. Furthermore, authors said, because teachers were used to paper-based grading methods, providing feedback on student achievement in soft files was difficult and time-consuming. According to Sengilakar and Kurtogluerden (2021), it was stressed that providing instant feedback by following the student's actions is critical for the mathematics lesson as there is not enough time or appropriate conditions in distance education to do so. Finally, the study found that home environment is unsuitable for learning as the students often feel distracted due to the noise created by their younger siblings. This finding goes in line with Purba (2021), who stated that students find it harder to concentrate on their studies because the learning environment is less suitable at home.

This study reflects light upon the challenges faced by the teachers and students of the primary level in the teaching-learning process of mathematics. Utilizing the findings of the study, the curriculum experts can modify the mathematics curriculum to bring it in alignment with online

education. This study recommends designing a separate curriculum with redefined goals and objectives for online education to effectively cope with any emergency, such as a pandemic. This study also recommends redesigning the Teacher's Guide wita detailed guidelines about content delivery and assessment process, which will be appropriate for an online class. Further recommendations include- redesigning contents like geometry, measurement, word problems etc., in correspondence with online education system, increasing teacher-student contact hour prescribed in the curriculum as online class is very time-consuming, and introducing alternative hands-on activities suitable for online education. This study can be utilized by the teacher trainers to develop the ICT-based professional skills of the teachers, such as training the teachers about the use of online platforms like zoom, google meet, google classroom, camscanner etc. This study also recommends training teachers about online-based pedagogical skills, such as using online-based teaching-learning materials and appropriate content delivery and assessment methods in online classrooms. To mitigate students' challenges in online classrooms, this study recommends that training about participating effectively in online classrooms should be provided to both students and their parents. The findings of this study might be helpful to the policymakers to bring notable changes in the policy, such as collaborating with telecommunication companies to supply consistent internet connections in urban and rural areas that are too free of cost to make online education in mathematics feasible for all the teachers and students.

Conclusion

This study explores the challenges of the primary mathematics teaching–learning process during the Covid-19 period. Through this study, we found three significant perspectives of challenges – curriculum-related challenges, teachers' and students' challenges. Teachers found it difficult to implement the objectives of the curriculum as contents, teaching-learning, and assessment techniques are not suitable for online platforms. Teachers' technological knowledge and availability of physical facilities are also dominating factors for conducting online mathematics classes. The primary level of education is very crucial as at this level, the foundation of p education is developed, and students learn the basics of mathematics which prepares them for future life. Unfortunately, at such a crucial stage, the primary level students had to go for online education where the direct interaction between the teacher and students was absent. The challenges students faced in online math classes might hamper their basic foundation of mathematics. Although teachers tried hard to provide full effort to conduct classes via online platforms, the teaching-learning process was ineffective due to several challenges.

References

Abdullahi, U., Sirajo, M., Saidu, Y., & Bello, U. (2020). Stay-At-Home Order and Challenges of Online Learning Mathematics during Covid-19 Case in Nigeria. *IOSR Journal of Research & Method in Education (IOSRJRME)*. 10. 10-17. 10.9790/7388-1004061017.

An, Y., Kaplan-Rakowski, R., Yang, J., Conan, J., Kinard, W., & Daughrity, L. (2021). Examining K-12 teachers' feelings, experiences, and perspectives regarding online teaching during the early stage of the COVID-19 pandemic. *Educational Technology Research and Development*, 69(5), 2589-2613. https://doi.org/10.1007/s11423-021-10008-5

Andriyono & Herman, T., (2020). Problematic elementary school teachers in the process of learning Mathematics online during covid-19 pandemic. *Proceedings The 3rd International Conference on Elementary Education*, 3 (1).

Assareh, A. & Bidokht, H. (2010). Barriers to e-teaching and e-learning. *Procedia Computer Science*, 3, 791-795.

Calder, N., Jafri, M., & Guo, L. (2021). Mathematics education students' experiences during lockdown: Managing collaboration in e-learning. *Education Sciences*, 11(4), 191. https://doi.org/10.3390/educsci11040191

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson.

Firmanti, P. and Yuberta, F. (2021). Changes in the Mathematics learning process during the covid-19 pandemic at junior high school in Bukittinggi. *Journal of Educational Studies.*

Haankuku, U. (2018). Challenges of Learning Mathematics by Distance a Case Study of Public and Private Universities in Zambia. *International Journal of Science and Research (IJSR)*. Volume 7. September 2018,926 - 933. 10.21275/ART20191331.

Hermanto, Y. & Srimulyani, V. (2021). The challenges of online learning during the covid19 pandemic. *Jurnal pendidikan dan pengajaran*

Herwin, H., Hastomo, A., Saptono, B., Ardiyansyah, A. R., & Wibowo, S. E. (2021). How elementary school teachers organized online learning during the Covid-19 Pandemic? *World Journal on Educational Technology: Current Issues*. 13(3), 437- 449. https://doi.org/10.18844/wjet.v13i3.5952

Hutasoit, L. (2021). *The effects of distance learning on students' mathematical communication skills during the covid-19 pandemic.* Medan: Sage Journals

Kalogeropoulos, P., Roche, A., Russo, J., Vats, S., & Russo, T. (2021). Learning mathematics from home during covid-19: insights from two inquiry-focused primary schools. *Eurasia Journal of Mathematics, Science and Technology Education*, 17(5), em1957. https://doi.org/10.29333/ejmste/10830

Lintuman, A., & Wijaya, A. (2020). Keefektifan model pembelajaran berbasis inkuiri ditinjau dari prestasi belajar dan kepercayaan diri dalam belajar matematika siswa SMP. *Jurnal Riset Pendidikan Matematika*, 7(1), 13-23. doi:https://doi.org/10.21831/jrpm. v7i1.17878

Marpaung, N. & Nasution, A. (2021). *Literature study of students 'mathematic problem solving ability during blood learning in the era of covid-19.* Medan: Sage Journals

Ojose, B. (2005). Applying Paget's theory of cognitive development to mathematics instruction. *The Mathematics Educator*, 18(1), 26-60.

Purba, Z. (2021). *Effectiveness of online learning outcomes of student mathematics during the covid-19 pandemic period*. Medan: Sage Journals

Rao, T.S. (2020). Mathematics online teaching-learning methods, advantages and challenges during Covid-19: A critical study on teachers and learners. *Educational Quest: An Int. J. Edu. A l. Soc. Sci.*, 11(4), 175-181.

Rasmitadila (2020). The perceptions of primary school teachers of online learning during the COVID-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*,7(2), 90-109

Sengilakar, S., & Kurtogluerden, M. (2021). Distance education experiences of secondary school math teachers during the pandemic: A narrative study. *Turkish Online Journal of Distance Education*, 19-39. https://doi.org/10.17718/tojde.961809

Spitzer, M., & Musslick, S. (2021). Academic performance of K-12 students in an online learning environment for mathematics increased during the shutdown of schools in wake of the COVID-19 pandemic. *Plos One*, 16(8), e0255629. https://doi.org/10.1371/journal.pone.0255629

Tezer, M., Cavus, S., Orkun, M. A. & Ture, A. (2021). Examination of opinions of elementary school students on Mathematics course in the COVID-19 pandemic process. *International Journal of Learning and Teaching*, 13(1), 42– 53. https://doi.org/10.18844/ijlt.v13i1.5279

Wulantina, E., Ikashaum, F., Mustika, J., Merliza, P. & Loviana5, S. (2020). Self-efficacy of mathematics students on e-learning during covid 19 pandemic.

Yohannes, Y., Juandi, D., Diana, N. & Sukma, Y. (2021). Mathematics teachers' difficulties in implementing online learning during the COVID-19 pandemic. *Journal of Hunan University*, 48(5).

Teacher's World: Journal of Education and Research

ISSN 0040-0521 eISSN 2959-5738

Full-text articles available online on:

- *Bangladesh Journals Online (BanglaJOL):* https://www.banglajol.info/index.php/TWJER
- *Dhaka University Journals (DUJ):*http://journal.library.du.ac.bd/
- IER Website (Under Publication Tab):https://ierdu.edu.bd/?page_id=389

Published by

Institute of Education and Research
University of Dhaka

Funded by