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Mother as a Teacher at Home: Challenges and Opportunities for Parental Involvement in Online Mathematics Learning for Elementary School Students

Abstract

Apart from changing learning and teaching habits, the COVID-19 pandemic has also affected the way parents involve themselves in learning from home. This study explores the challenges parents face when participating in online learning during the COVID-19 pandemic and what ways can be done to encourage students to learn mathematics online. We use multiple case studies to achieve research objectives. This study involved eight mothers of children in elementary school. Six of them are housewives, and the rest are government employees. Semi-structured interviews were used to gather data. Aside from technical constraints such as the availability of internet networks and infrastructure, the findings of this study show that technological literacy and parental involvement in cognitive, emotional, social, and pedagogical aspects are still lacking. We discussed four key findings, including issues with network

availability and technological literacy, issues with parents' routine work and how to accompany their children, parents' beliefs about mathematics, and parental involvement in cognitive, affective, social, and pedagogical aspects. Finally, the parents' learning community must be accommodated, developed, and assisted for their involvement to be more effective.

Keywords: *COVID-19, learning from home, parental involvement, elementary school, online mathematics learning*

Introduction

The COVID-19 pandemic has altered students' learning habits, teaching approaches, and learning resources. Students must learn from home, mediated by assignments, blended learning, e-learning, online learning, or other related methods. In learning from home, the role that schools or teachers usually carry out is likely to shift and more or less be taken by parents. That way, teachers need to communicate more intensively with parents to ensure teaching and learning activities continue to run well even though students are at home. On the other hand, parents are expected to be actively involved in their children's learning at home and function as teachers at home. Therefore, the role of parents in achieving learning goals is essential (McMullen & de Abreu, 2011).

The issue of parental involvement in learning mathematics is interesting in mathematics education research. Several studies reveal that the experience (McMullen & de Abreu, 2011), practice (Jay et al., 2018; Silver et al., 2021), attitude (Cui et al., 2021; Silver et al., 2021; Wilder, 2017), support and control (Purnomo et al., 2022; Silinskas & Kikas, 2019; Zhou et al., 2020) of parents on learning mathematics have a significant influence on their children's mathematics learning.

McMullen and de Abreu (2011) examined mothers' involvement in their children's school mathematics education. The perspectives of two groups of White-British university-educated mothers were explored. The study also investigates the influence of mothers' personal histories on direct participation in contemporary learning approaches. In another study, Jay et al. (2018) examined parents' attitudes and beliefs about supporting their children's mathematics learning with a diverse sample of parents, what forms of support are given, how difficult it is, and how to handle it. Several studies (Harper et al., 2021; Panaoura, 2021; Purnomo et al., 2021) have explored parental involvement in online learning

during the COVID-19 pandemic. For example, Harper (2021) analysed data from tweets, the hashtag *#mathathome*, and survey responses from parents to determine who supports continuous mathematics learning at home and to investigate the type of mathematics taught there. On the other hand, the other two studies employed questionnaires to investigate the role of parental involvement in their children's online mathematics learning. However, this research, as well as that contained in the literature, is still hardly discovered that focuses on how parents (particularly mothers) are involved in online mathematics learning, what challenges they face, how they overcome them, and how they might improve.

Our research focuses on parents' beliefs, attitudes, and knowledge, as well as what supports and hinders their involvement in online mathematics learning. Variations in parental involvement in their children's learning provide an important picture for determining the best strategy for maximising parents' role in their child's development.

Panaoura (2021) divides parental involvement into two categories: when they are at home and when they interact with the school. These two types are frequently out of sync when learning is done offline. When their children are in school, parents fully believe that everything is the responsibility of teachers and schools, and they carry this perception into their involvement at home. It becomes a problem when learning mathematics has to be done online. As a result, this research focuses on how problems in online mathematics learning are addressed.

The parental involvement in online mathematics learning is important to explore because the concept of mathematics itself is related to the context of everyday life, other fields, and the structure of mathematics itself, requires activity, focuses on the process, and requires a variety of tools or media to deliver mathematical concepts and their application. When the emphasis on learning mathematics is on the process, it can be very challenging for students, teachers, and parents to learn mathematics online.

Research Questions

This study explores parents' experiences when they are involved in their children's online mathematics learning. Specifically, we answer the following questions:

1. What are parents doing to involve their children's online mathematics learning?
2. How do parents find it difficult to involve their children's online mathematics learning?
3. How do parents negotiate or avoid the difficulties they experience?

The three questions above focus on facilities, time management, understanding, and motivation (Wardani & Ayriza, 2020). Facilities in this context are facilities provided by parents in their child's online learning, both in terms of learning, mathematics content, and technology. We also wanted to know how parents manage their time involved in online mathematics learning and how parents keep their children motivated in online mathematics learning.

Research Methodology

In this study, researchers examined cases faced by parents, especially maternal involvement in online mathematics learning, due to the COVID-19 pandemic. Thus, case studies were adopted to achieve the research objectives. The subjects in this study were eight mothers who had elementary school children in two suburban districts in Indonesia. They were selected by convenience sampling in which the eight mothers were neighbours and close relatives of each researcher willing to be involved voluntarily and had children at the elementary school level who were implementing learning from home. Most respondents are housewives with an age range of 30–45 years. Six out of eight respondents live in suburban areas, and two live in rural areas. Only two respondents have a bachelor's background, and one is an elementary school teacher.

The data were collected using semi-structured interviews. The interview protocol adapted the findings of previous studies (Wardani & Ayriza, 2020) that have four concerns, namely learning facilities, time management, content knowledge, and learning motivation. The interviews were recorded using the Mobile application for transcription. In addition, we also interviewed the children of each respondent to cross-check or synchronise the answers obtained from their mothers.

We employed the three steps in processing and analysing data. First, the interviews were recorded and transcribed, then coded by each researcher independently based on interesting patterns and supported by data sources. Second, researchers collaboratively compare the results of the code. Finally, the researchers together set the codes under the main themes.

Research Results

This section presents the findings classified according to the components used for the interviews, namely learning facilities, time management, content knowledge, and learning motivation.

Learning Facilities

Based on the results of interviews, parents stated that they had facilitated their children in learning mathematics online. Parents indeed provide smartphone facilities, but their children do not fully own them. It is an obstacle for children whose parents work, especially two children whose mothers are Civil Servants. Furthermore, 5 out of 8 parents stated that unstable signals are still obstacles to online learning concerning communication signals (*R1: ...yes, sometimes there is not, Miss if the light goes out, the signal is not there*). It is also related to the geographical location and the provider used by the respondent. The influence of rainy weather also affects the strength of the communication signal used by respondents. Five parents also said their children were more skilled and mastered the applications used than themselves in using them at home (*R4: ... I can't, Ms, to be honest, my son is smart...*).

The last is related to media and teaching aids. Considering that mathematics learning has unique characteristics and is simultaneously online, it is necessary to use media and teaching aids to construct knowledge and skills. However, almost all respondents stated that they only used tools available at home to help understand children's material (*R8: ...pen, pencil, and notebook; R3: I just used whiteboard...*). Its use is also limited to listening to the teacher and mathematical calculations, more dominated by the paper and pencil strategy.

Time Management

We asked parents how they manage their children's study time and their child's study schedules. The results showed that all parents accompany their children to learn mathematics. If not accompanied by parents, their children will not do their homework (*R2: I take a lot of time for my child because if I do not take my time, I'm sure my child won't be doing it.*)

Respondents who are housewives mostly accompany their children to study in the morning until noon, while respondents who work accompany their children when they come home from work or at night. Most parents do not have a specific schedule for learning mathematics, but it is adjusted to the schedule of mathematics lessons at their respective schools (*R2: ...I adjusted it according to the schedule at the school. For example, if mathematics is Tuesday and Wednesday, Tuesday and Wednesday, I teach math children...*). Some accompany their children to study during their holidays. Moreover, most parents control their children's math assignments, but some control only when their children find it difficult.

Content Knowledge

Two respondents have children in lower elementary grades, saying they already understand the mathematical content that will be taught to children, so it is easier to explain. However, six other respondents who have children in upper elementary grades said that they still do not understand the material that will be taught to their children (R3: ...*I do not understand some of the mathematics contents because my child is in 5th grade, and some are already complex*). The parents said that they had to learn before explaining again to their children (R8: ...*I do not understand the math that children learn, so I will try to learn it first, Mrs. I watch YouTube and then explain it to my kids*).

How teachers and parents deliver mathematics content is different. Teachers are more patient than parents – it is a fact in the field. From the interviews that the researchers obtained, almost all parents answered that they were annoyed with their children because they repeatedly explained the material presented (R2: ...*sometimes I also feel irritated because being taught cannot keep going*; R2 (child): ...*yes, my mother is irritated, I cannot go on*).

The parents' solution to explaining mathematics to their children is to increase the portion of the exercise to answer questions. All agreed that adding exercise improves a child's understanding and skills (R5: ...*more practice questions and provide other ways/formulas that are easier for children to understand...*).

While parents perceive that extending the duration of practice questions helps their child understand, they also agree that it is important to emphasise learning mathematics, not the result (R1: ...*the process, Mrs. The children are told how to do it first. The result depends on whether they remember it or not*; R8: ...*More emphasis on the process. If the result is good, but the child does not know how, it is useless, so the procedure for the child to do the problem becomes the point*). However, the process in this context is to explain the procedure for performing calculations, not the process of building knowledge and skills in the future, as is the case with the objectives of learning mathematics.

Learning Motivation

Results of an interview with parents show that all parents constantly remind their children to take online learning and or do mathematics assignments. Six out of eight parents said that if the child was lazy to study, the parents gave punishment to the child in the form of not being allowed to play or pocket money (R7: ...*Yes, the punishment is usually not giving pocket money or not being allowed to play...*).

Parents believe that reward and punishment are a strategy to grow students' motivation to learn mathematics online. The practice of both is also easy to apply in dealing with the situation and condition of their child.

Discussion

Almost all participants in this study experienced problems, especially related to unstable networks, and were burdened with additional costs beyond their basic needs. Policymakers should consider how best to distribute facilities and infrastructure to support online education. Difficulties in operating gadgets and online learning applications are also obstacles parents face in assisting their children in studying at home.

Online learning makes most parents inevitably have to take the time to accompany their children to learn, especially in mathematics. In addition, the child's self-regulated is also not good. Parents and teachers need to build students' self-regulation from an early age because it functions to manage thoughts and feelings to enable goal-directed action, regulate behaviour, control impulses and solve problems constructively (Murray et al., 2015). Thus, it is very plausible that students with good self-regulated learning are also associated with good adaptability, including learning mathematics online. Future researchers are expected to be able to examine the relationship between self-regulated learning and adaptability in online mathematics learning more comprehensively.

Fostering interest and motivation in children's learning is also an obstacle experienced by parents while accompanying children to learning from home. It is certainly a significant obstacle, given that building children's motivation is a powerful way to shape children's good academic results (Wardani & Ayriza, 2020). Regardless of which is first to be stimulated, between internal or external motivation. However, in practice, most parents and educational practices in schools generally are more likely to take on the role of external motivation first. The form of parental motivation is the provision of rewards and punishments.

We borrow students' cognitive, emotional, and social engagement (Leis et al., 2015; Rimm-Kaufman et al., 2015) to represent parental involvement in learning mathematics. Cognitive involvement in this context is related to parents' understanding of the mathematical concept itself, while emotional involvement is how parents' attitudes and how to involve themselves in developing students' attitudes toward mathematics. Social involvement is also important for parents to establish communication between themselves, schools, other parents, and their children. In

addition, we also add pedagogical involvement to represent the parents' method of conveying mathematical concepts.

The knowledge of parents' mathematics content in our sample is weak, especially in the upper elementary grade. This case is an obstacle in learning mathematics online, and teachers have a role in bridging it. Process-oriented learning instructions by teachers are more needed to instil mathematical concepts and encourage parents to be actively involved in it. Parents' content knowledge is important in their cognitive involvement in explaining students' mathematical concepts. In addition to mathematical understanding, parents must involve themselves in pedagogical and emotional aspects even though they are not educated. These two aspects synergise with cognitive involvement for children's success in learning mathematics at home. This statement is in line with the findings of this study that parents are impatient in dealing with their children. In contrast to the teacher's teaching method, which explains mathematical contents slowly, gradually, and maybe repeatedly, parents want their children to understand with just one explanation. Impatience in conveying information prevents children from receiving information. Regarding social involvement, parents must form or empower communities that monitor, control, and support learning goals. This community can also propose training and mentoring activities to improve and improve parents' knowledge and skills cognitively, affectively, and pedagogically. Therefore, further researchers need to examine the role of this social involvement on other aspects of parental involvement.

We also highlight findings regarding parental beliefs about mathematics. This study indicates that parents believe they have provided useful media or teaching aids for their children's mathematics learning. However, the tool is limited to writing and calculating. Parents also stated that adding a portion of practice questions was the best way to provide understanding to students. These beliefs can be classified as beliefs about instrumental mathematics learning, namely those that focus on results using short-term memory-oriented methods, such as memorisation and exercises (Purnomo, 2017; Purnomo et al., 2016).

Although it is still a hypothesis, we assume that parents' beliefs about mathematics, apart from their experiences in school, are also related to the practice used by teachers who focus on emphasising exercises. Meanwhile, teachers' practices reflect their beliefs in teaching mathematics (Beswick, 2012). Understanding the philosophy and theory of learning mathematics for teachers helps direct their beliefs that align with the objectives of learning mathematics. Therefore, further research needs to examine teachers' and parents' beliefs about mathematics.

Conclusions

This study examines the involvement of parents in online mathematics learning. The findings of this study indicate that facility constraints, especially internet infrastructure, are obstacles to the smooth online learning of mathematics. Literacy, especially technology and information, is also a focus that needs to be improved by both parents and teachers. We highlight the need for increased cognitive, emotional, social, and pedagogical parental involvement to successfully teach mathematics online to their children. The parent community and communication with the school, teachers, and students are important to find the right strategy based on each school's characteristics. This community can also propose or provide training and mentoring activities to increase parents' cognitive, affective, and pedagogical knowledge and skills. As a result, further study is needed to investigate the impact of this social involvement on other dimensions of parental involvement.

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