



The effects of Covid-19 on mathematics learning areas

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Highlights

- The online learning concept, which is used in common in all learning areas and mathematics teaching.
- Research on distance learning, which has become a reality of our daily lives due to the Covid-19 pandemic, in mathematics and other learning area are being carried out.
- Distance learning allows simultaneous communication, immediate intervention, rapid feedback, and opportunities to solve problems.

Article Info: Research Article

Keywords: *Covid-19 pandemic, Distance learning, Mathematics education, Mathematics learning areas, Teacher education.*

Abstract

The Covid-19 pandemic, which has affected our lives as a global pandemic, also profoundly affected the mathematics teaching processes like other areas. Therefore, this study aims to identify secondary school mathematics teachers' opinions about mathematics teaching in distance learning format, which has become a reality due to the Covid-19 pandemic. The study is conducted using the convenience sampling method with 39 secondary school mathematics teachers (21 females, 18 males) in the 2020-2021 academic year. The phenomenological method is preferred in the study conducted using qualitative research methods. The data are collected using a survey that includes eight open-ended questions formed by consulting experts and conducting a literature review. The data are analyzed using the content analysis method. Accordingly, the researchers analyzed the questionnaire form's data according to the codes on the coding sheet. Concordantly, this study presents the advantages and disadvantages, conveniences, and challenges of distance learning, which has become a reality due to Covid-19.

1. Introduction

Covid-19 Global Pandemic and Education

The Covid-19 pandemic started in Wuhan City of China in December 2019 and became a severe threat terrorizing humanity in four months (WHO, 2020). Significant changes have occurred in our daily lives and alterations injected into learning processes due to the Covid-19 pandemic, and there has been a significant transformation all over the world (Zhao, 2020). With the rapid spread of the pandemic, concepts such as flexible working hours, teleworking, curfew, quarantine and social distance have been introduced to our lives and educational institutions such as grade schools and universities, where social distance cannot be ensured and close contact may be high, have been closed for face-to-face education (Bozkurt & Sharma, 2020; Gupta & Goplani, 2020). In addition, educational and academic meetings were canceled within the scope of different measures (Özkoçak et al., 2020). In the meantime, serious measures have been taken. A significant portion of teaching processes have been transformed along with mathematics teaching.

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Even though strict measures have been taken in education along with other areas, deaths due to Covid-19 increased globally, and this situation intensified concerns (Acar, 2020). The pandemic became even riskier for the elderly and people with comorbidities, and it affected everybody from various ages and economic levels, regardless of their race (Alpago & Oduncu-Alpago, 2020; WHO, 2020). The closure of educational institutions and the interruption of face-to-face education have disrupted the schooling of almost half of the students (1.6 billion) in various age groups worldwide (UNESCO, 2020; UNICEF, 2020). The distance learning decision taken temporarily at the beginning of the pandemic continued for a long time since the pandemic spread worldwide (Moorhouse, 2020). The teachers who had an active role within the process experienced various challenges, and the process affected the academic atmosphere, and the pandemic had an important impact on teaching and learning culture (Irwan & Santaria, 2020). The Covid-19 global pandemic, directly and indirectly, affected the countries' teaching processes, educational activities, and learning conditions.

Distance Learning in Mathematics

Rapid developments within technology has facilitated online mathematics teaching or the distance learning processes (McBrien et al., 2009). Distance learning is not only just a structure or a pedagogical element but also a system that includes different learning tools of communication methods for a direction (O'Keefe et al., 2020). Distance education is a planned learning and teaching process in which the learner and the teacher communicate with the help of technology in different environments (Moore & Kearsley, 2012). Li et al. (2014) stated that distance learning is an important means to ensure equal opportunities. In distance education, the lessons must be taught on online platforms, and it is imperative to use technology correctly to make the lessons meaningful in mathematics and other disciplines (Anderson, 2009; Moore & Kearsley, 2012). Most of the terminology (online, open, web-based, computer mediated, blended learning) used for distance learning in mathematics and other teaching processes, express the ability to use a computer that is connected to a common network, and the opportunity to learn anywhere and anytime, using any method (Cojocariu et al., 2014).

The online learning concept, which is used in common in all learning areas and mathematics teaching, is expressed as a tool that can render the teaching and learning processes more student-centered, innovative and flexible. Online learning is defined as the ability to use different devices with internet access (mobile phones, computers, and others.) for learning experiences in synchronous or asynchronous environments. Students can also employ these platforms, anywhere, to learn from and interact with teachers and other students (Singh & Thurman, 2019). While the synchronous learning environments offer the possibility to have concurrent interactions between the students and teachers and enable the students to participate in a live lesson, and give immediate feedback; same possibilities do not apply for asynchronous learning environments. Immediate feedback and interventions are not possible in an asynchronous learning environment since the learning content is not concurrent like live lessons (Littlefield, 2018). On the contrary, distance learning allows simultaneous communication, immediate intervention, rapid feedback, and opportunities to solve problems.

Theoretical Framework

The studies that aim to determine the opinions of teachers who work effectively in mathematics learning areas along with other learning areas on the pandemic period and distance learning has increased since the beginning of the pandemic (Irwan & Santaria, 2020; Görgülü-Arı & Hayır-Kanat, 2020). Fauzi and Sastra-Khusuma (2020) studied primary school teachers' opinions on online learning during the Covid-19 pandemic. The study elaborated on topics such as the teachers' understanding of online learning contexts, the availability of tools and systems, networks and the internet, planning, implementing, assessing the learning processes, and cooperating with parents. Bakioğlu and Çevik (2020) researched the opinions of science teachers, Bayburtlu (2020) investigated the views of Turkish language teachers, Özkaral and Bozyiğit (2020) explored the approaches of secondary social studies and geography teachers, Duban and

Şen (2020) researched the opinions of class teachers on distance learning, in a general manner. Irwan and Santaria (2020) studied the quality assurance challenges teachers face in Indonesia during the Covid-19 pandemic. Hebebcı et al. (2020) highlighted the importance of continuing distance learning in accordance with teachers' opinions. In addition, it was stated that it is vital to provide equal opportunities while planning and programming distance learning, especially infrastructure and interaction problems have been experienced, the technical and technological content knowledge is lacking, and the effective distribution of distance learning should be supported. Lau et al. (2020) stated that successfully implementing distance learning is linked with meeting the infrastructure and equipment needs completely. One of the most important problems teachers have regarding distance learning is the lack of interaction and implementation issues (Hebebcı, et al., 2020; Jin, 2005).

Research on distance learning, which has become a reality of our daily lives due to the Covid-19 pandemic, in mathematics and other learning area are being carried out, and this concept becomes more important as days pass. These studies assess the teaching processes from different perspectives and aim to solve the problems. It is foreseen that elaborating on problems faced, especially in mathematics teaching during distance learning due to such large-scale and global crises, will contribute to the distance learning activities to be more systematic in the future. Assessing teachers' views about mathematics learning areas, asking about their opinions and suggestions are thought to direct to future compensatory training, and provide essential data during curricula preparation. It is anticipated that evaluating the distance learning process of secondary school mathematics lessons within the framework of learning areas, determining teachers' difficulties, and taking their opinions will also guide the curricula revision in the future.

Purpose of the Study and Research Questions

This study aims to determine secondary school teachers' opinions about online mathematics education, a format that is introduced into our lives due to the Covid-19 pandemic. Answers to the following questions were sought in line with this aim.

1. What are the most challenging and the most comfortable learning area that the secondary school mathematics teachers have taught?
2. What are the secondary school mathematics teachers' opinions on numbers and operations, geometry and measurement, algebra, data processing, and probability learning area?
3. What do secondary school mathematics teachers recommend about the mathematical learning areas in distance learning?

2. Method

The qualitative research methods were used in the study since the study aims to determine the secondary school mathematics teachers' opinions about learning areas in the distance learning for mathematics introduced into our lives due to the Covid-19 pandemic. Therefore, the phenomenology research design, which is frequently preferred for qualitative studies, was used. Phenomenology aims to identify all the participants' opinions and experiences regarding a phenomenon (Creswell, 2007). Before the implementation period of the study was carried out, the participants were asked to fill out a voluntary participation form to obtain the following consent: I have been informed about the purpose and process of the study, and I agree to participate in this study voluntarily. In this context, the secondary school mathematics teachers' opinions about learning areas in the distance learning for mathematics introduced into our lives due to Covid-19 pandemic were discussed.

2.1. Participants

The participants consisted of 21 female and 18 male secondary school mathematics teachers, 39 in total, selected based on the appropriate sampling method. Nine of these teachers had 1 to 5 years, 7 had 11 to 15 years, and 8 had more than 16 years of professional experience. The data sources for the phenomenology

research are the individuals or groups that go through the focus phenomenon of the study, and who can express or represent this phenomenon (Yıldırım & Şimşek, 2016). Accordingly, the appropriate sampling method was preferred for determining the study group due to timing issues and the current pandemic. The appropriate sampling method is adopted as a convenient method in terms of being economical and useful in terms of saving time and labor (Büyüköztürk, 2015).

2.2. Measuring Tool

The researchers prepared an open-ended questionnaire form. The construct and content validity of the draft form prepared after the literature review was ensured by asking four expert faculty members in mathematics education. The questionnaire form consisted of seven open-ended questions asking secondary school mathematics teachers' opinions on different content area such as numbers and operations, geometry and measurement, algebra, data processing, and probability. In addition, the questionnaire form also consisted of one question asking the recommendations of secondary school mathematics teachers about the learning areas of distance learning. The reliability percentage formula of Miles and Huberman (1994) is used to determine the reliability of the 8-question questionnaire form. The Reliability Percentage is calculated using the $(P) = \frac{\text{consensus}}{\text{consensus} + \text{disagreement}} \times 100$ formula. The reliability value being 70% and higher is a good indicator for the reliability of the research. The reliability of the questionnaire form was calculated as 88% resulting in the qualitative data being reliable.

2.3. Data Analysis

The content analysis method was used for analyzing the data obtained within the research scope. The content analysis method is a frequently preferred method for qualitative research, and this method enables the data to be effectively compared and arranged by categorizing (Cohen, et al., 2007). The content analysis aims to examine spoken or written content systematically and objectively (Tavşancıl & Aslan, 2001). A systematic presentation is achieved using this method through the coding of the obtained data by analyzing according to the predefined themes or categories (Yıldırım & Şimşek, 2016). Accordingly, the researchers analyzed the questionnaire form's data according to the codes on the coding sheet. The teachers were coded as K₁, K₂, K₃, etc. The researchers evaluated the coding of each item after a consistency check. Thus, the obtained findings were presented to the readers with the help of frequencies.

3. Findings

The mathematics teachers within the research scope were asked about the learning area that they found the most difficult in distance learning due to Covid-19. Figure 1 presents the findings.

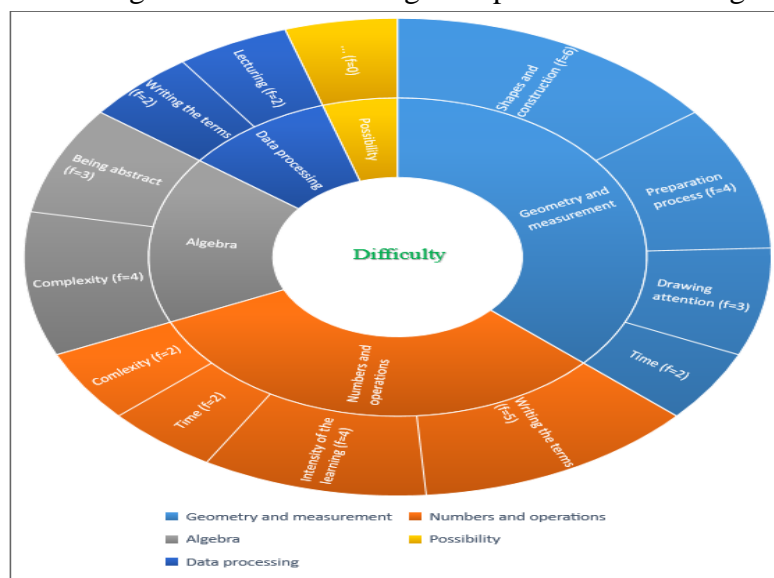


Fig. 1. The difficulty level in distance mathematics learning

According to Figure 1, teachers' main difficulty in distance mathematics education is shapes and construction in the geometry and measurement learning area. On this subject, the teacher coded as K₁₀ stated the following: “Geometry and measurement learning area. Because it is hard to draw geometrical shapes and follow how much the students understood through the screen. The students have difficulties drawing shapes when we ask them to; hence we experience more difficulties as teachers.” The challenges about the preparation process (f=4), drawing attention (f=3), and time (f=2) follow this situation. The teachers coded K₁ and K₁₇ stated the following: “Geometry and measurement learning area because the preparation process is difficult”, “Geometry and measurement learning area. Generally, we show drawings and then make the students draw the necessary shape, and it is problematic and time-consuming to make the students use a drafting compass, ruler, and set square. In addition, time can be considered as another problem in distance learning.” The mathematics teachers experienced difficulties such as writing the terms (f=4), the intensity of the learning outcomes (f=4), time (f=2), and complexity (f=2) in the numbers and operations learning area. The teachers, who were coded as K₉ and K₁₁, stated the following: “There are too many units and learning outcomes in the numbers and operations learning area, and therefore teaching becomes more difficult.”, “Since it is difficult to write exponential numbers, square roots, and rational numbers, I had difficulties in the numbers and operations learning area.” It can be said that the teachers experienced difficulties in complexity (f=4) and being abstract (f=3) areas in the algebra learning area. The teacher coded K₄ stated the following: “The most difficult learning area for me is algebra because it is more abstract and complex for the students.” The teachers had difficulties in lecturing (f=2) and writing the terms (f=2) in the data processing learning area. The teacher coded K₃₅ stated the following: “The data processing learning area, because the lecturing and writing datum one by one may be challenging.” The mathematics teachers also indicated that they did not experience any difficulties in the probability learning area. The mathematics teachers were asked about the learning area in which they did not have distance learning problems due to Covid-19. Figure 2 presents the findings.



Fig. 2. Convenience level of learning areas in distance mathematics learning

According to Figure 2, the convenience in numbers and operations learning area in distance mathematics learning is the preparation process (f=7). The readiness of the students (f=4) follows this. The teacher coded K₁₀ stated the following: *“The numbers and operations learning area. This area is easier for us since the students have a general background in the subject. The preparation process is easy, also.”* The mathematics teachers stated that distance learning is easy in terms of shapes and construction (f=4), concreteness (f=3), and using dynamic geometry software (f=2) in the geometry and measurement learning area. The teacher coded K₄ stated the following: *“I have the least difficulty in the geometry and measurement learning area because it is not abstract and distance learning process can be conducted smoothly using the dynamic geometry software. And also, since there are shapes, there are no complex operations or problems.”* The teachers think distance learning about the data processing learning area is easy in terms of being comprehensible (f=5) and a positive approach (f=4). The teacher coded K₉ stated the following: *“I have the least difficulty in data processing because the students have a positive approach to the subject, and they do not have any difficulties.”* It can be said that mathematics teachers think that the probability learning area in distance learning is easy in terms of being comprehensible (f=5), and the subject's scope (f=4). The teacher coded K₂₇ stated the following: *“The easiest learning area is the probability subject because it has a few subheadings, and it has a narrow scope.”* On the other hand, the mathematics teachers did not state any opinions about the easiness in the algebra learning area. The mathematics teachers were asked about their opinions on the numbers and operations learning area's advantages and disadvantages. Figure 3 presents the findings.

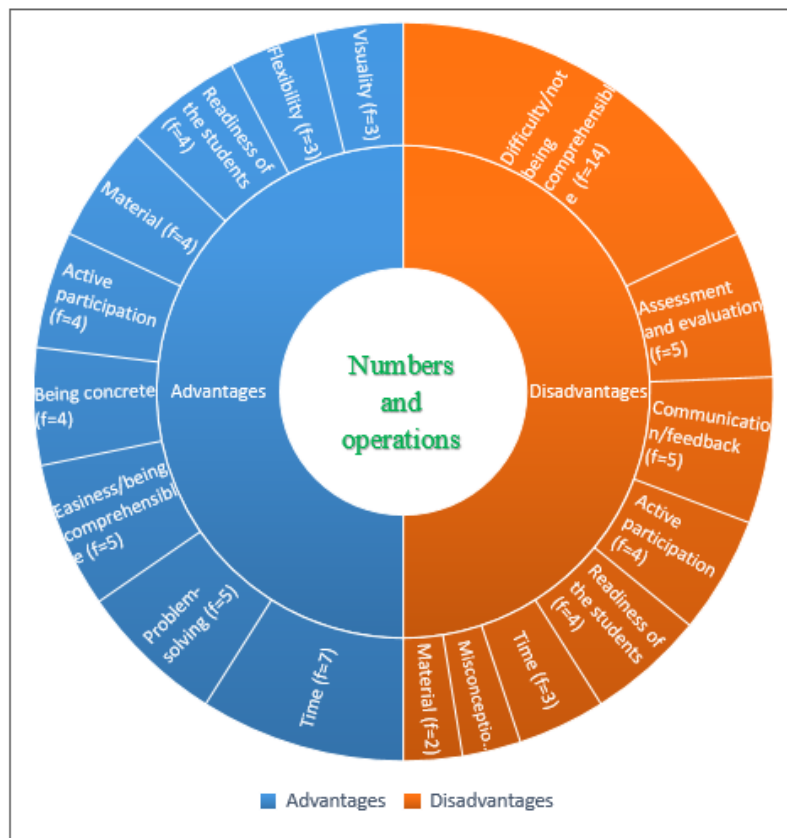


Fig. 3. Advantages and disadvantages of the numbers and operations learning area in distance learning

According to Figure 3, the mathematics teachers think that the numbers and operations learning area is advantageous in terms of time (f=7), problem-solving (f=5), easiness/being comprehensible (f=5), being concrete (f=4), active participation (f=4), material (f=4), readiness of the students (f=4), flexibility (f=4), and visuality (f=3). The teachers coded K₂₅ and K₃₄ stated the following: *“It is easy to find questions in the numbers and operations learning area in distance learning.”* *“This learning area is easier than other*

learning areas, so I think it is advantageous in distance learning.” Comparatively, the mathematics teachers think that the numbers and operations learning area is disadvantageous in terms of difficulty/not being comprehensible (f=14), assessment and evaluation (f=5), communication/feedback (f=5), active participation (f=4), readiness of the students (f=4), time (f=3), misconceptions (f=2), and material (f=2). The teachers coded K₉, K₁₃, and K₂₇ stated the following: “There are many disadvantages because face-to-face interaction is not possible with the students so we cannot check whether they understood or not. Another disadvantage is having limited time.”, “Distance learning is not an appropriate learning environment due to its conditions and tools. Practice and interaction are needed, but it is not possible.”, “There are significant differences between the students. The time allocated for lessons in distance learning is not enough, and the lesson allocation is complicated.” The mathematics teachers were asked about their opinions on the geometry and measurement learning area’s advantages and disadvantages. Figure 4 presents the findings.

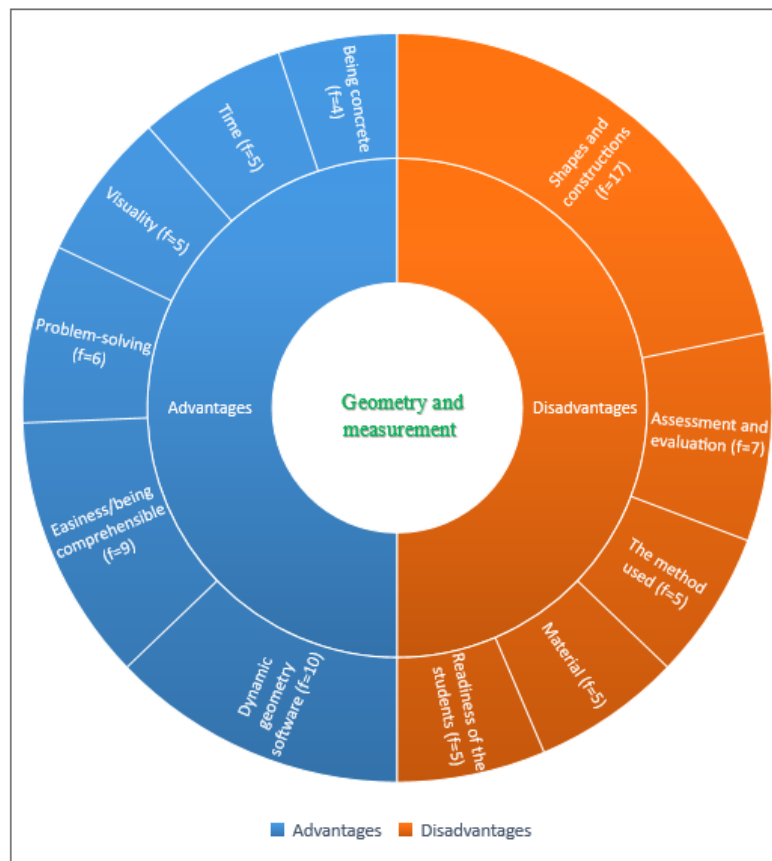


Fig. 4. Advantages and disadvantages of the geometry and measurement learning area in distance learning

According to Figure 4, the mathematics teachers think that the geometry and measurement learning area is advantageous in terms of a dynamic geometry software (f=10), easiness/being comprehensible (f=9), problem-solving (f=6), visuality (f=5), time (f=5), and being concrete (f=4). The teachers coded K₄ and K₂₈ stated the following: “Geometry and measurement is a learning area that can be supported with concrete and dynamic geometry software. There are not intense learning outcomes, solving problems takes less time, and there are not many complex operations. In addition, a connection between daily life and the subject matter can be established.”, “The advantage of this learning area is that it has a lot of questions and sample solutions.” However, the mathematics teachers think that geometry and measurement learning is disadvantageous in distance learning in terms of shapes and constructions (f=17), assessment and evaluation (f=7), the method used (f=5), material (f=5), and readiness of the students (f=5). The teachers coded K₂, K₅ and K₂₉ stated the following: “In this learning area generally teachers show first and ask the students to do what is shown. Therefore, it is hard to teach the subjects to the students.”, “The biggest

disadvantage is not being able to draw the shapes as I want, like in the classroom.”, “We cannot check whether the students have learned enough about the subject, and cannot get feedback from them.” The mathematics teachers were asked about their opinions about the advantages and disadvantages of the algebra learning area in distance learning. Figure 5 presents the findings.

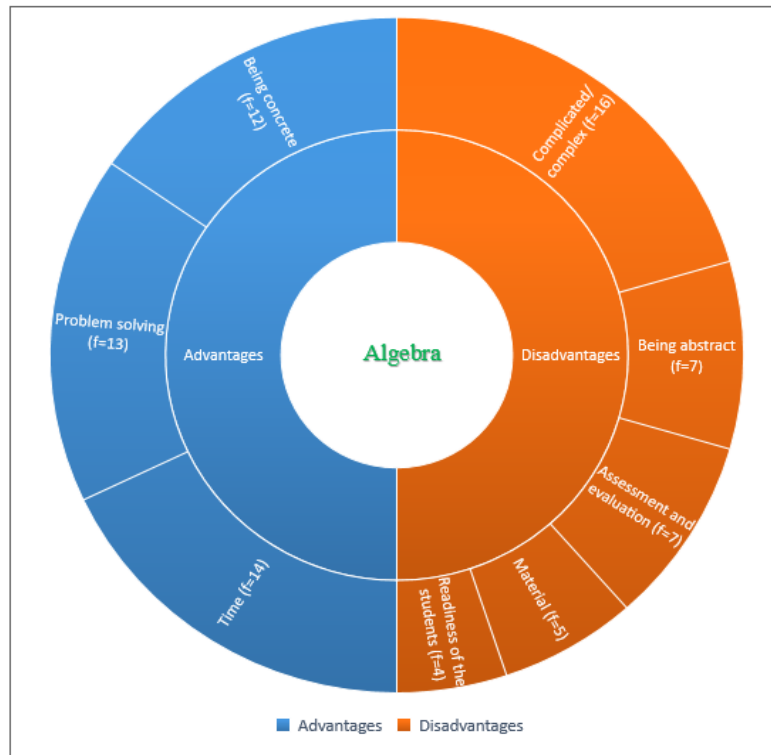


Fig. 5. Advantages and disadvantages of the algebra learning area in distance learning

According to Figure 5, the teachers think that the algebra learning area is advantageous in distance learning in terms of time (f=14), problem-solving (f=13), and being concrete (f=12). The teachers coded K₁₁ K₂₈ and K₃₄ stated the following: “As the teachers do not have to redraw, seeing algebra tiles visually used in the algebra learning area both in subject matter and questions saves time”, “It is advantageous because there are more questions and solutions as examples.”, “Being able to show algebraic expressions in the teaching process is an advantage for distance learning.” On the other hand, the mathematics teachers think that the algebra learning area in distance learning is disadvantageous in terms of being complicated/complex (f=16), being abstract (f=7) assessment and evaluation (f=7), material (f=5), and readiness of the students (f=4). The teachers coded K₄ and K₈ stated the following: “Algebra is an abstract concept and students find it complex. Readiness levels of the students must be excellent.”, “Face-to-face interaction is not possible with the students, so we cannot check whether the students understood.” The mathematics teachers were asked about their opinions about the data processing learning area’s advantages and disadvantages in distance learning. Figure 6 presents the findings.



Fig. 6. Advantages and disadvantages of the data processing learning area in distance learning

According to Figure 6, the mathematics teachers think that the data processing learning area is advantageous in distance learning in terms of easiness/being comprehensible (f=16), visuality (f=8), problem-solving (f=6), technology support (f=5), and the link between the daily life (f=4). The teachers coded K₄, K₉, and K₁₁ stated the following: “The data processing learning area is associated with daily life. It is a simple, easy and concrete area.”, “We went through the units faster in this learning area.”, “Thanks to the technology, in the data processing learning area in distance learning, we saved the time we spent on drawing the graphics, and another advantage we experience is about the questions that require visuality.” On the other hand, the mathematics teachers think that the data processing learning area is disadvantageous in terms of graphics-drawings (f=20), evaluation (f=10), and time (f=9). The teachers coded K₁₀ and K₂₈ stated the following: “It is a disadvantage that we cannot get feedback from the students and cannot conduct evaluations.”, “It is a disadvantage that there are no graphic tablets or tablets with pens because it is hard to draw using the mouse.” The mathematics teachers were asked about their opinions about the probability learning area’s advantages and disadvantages in distance learning. Figure 7 presents the findings.

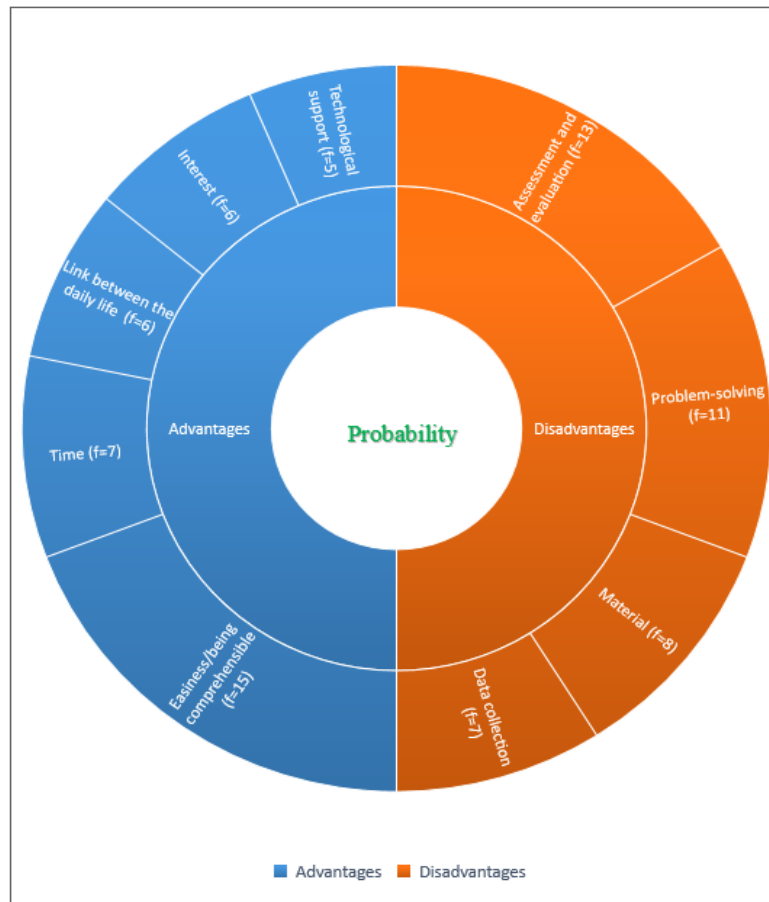


Fig. 7. Advantages and disadvantages of the probability learning area in distance learning

According to Figure 7, the mathematics teachers think that the probability learning area in distance learning is advantages in terms of easiness/being comprehensible (f=15), time (f=7), link between the daily life (f=6), interest (f=6), and technological support (f=5). The teachers coded K₄, K₁₀, and K₁₉ stated the following: “The probability is a concrete and easily comprehensible learning area. The link between daily life can be established.”, “It is an advantage for the students to be interested in the lesson and provide feedback.”, “We went through the units faster in this learning area.” Nonetheless, the mathematics teachers think that the probability learning area in distance learning is disadvantageous in terms of assessment and evaluation (f=13), problem-solving (f=11), material (f=8), and data collection (f=7). The teachers coded K₁ and K₃₀ stated the following: “It is hard to convey information during the problem-solving process in this area. Also, we could not implement data collection.”, “We cannot communicate with each student since we cannot establish sufficient eye contact; therefore the feedback and assessment processes get more difficult.” The mathematics teachers were asked about their recommendations to improve the mathematics lessons in distance learning. Figure 8 presents the findings.

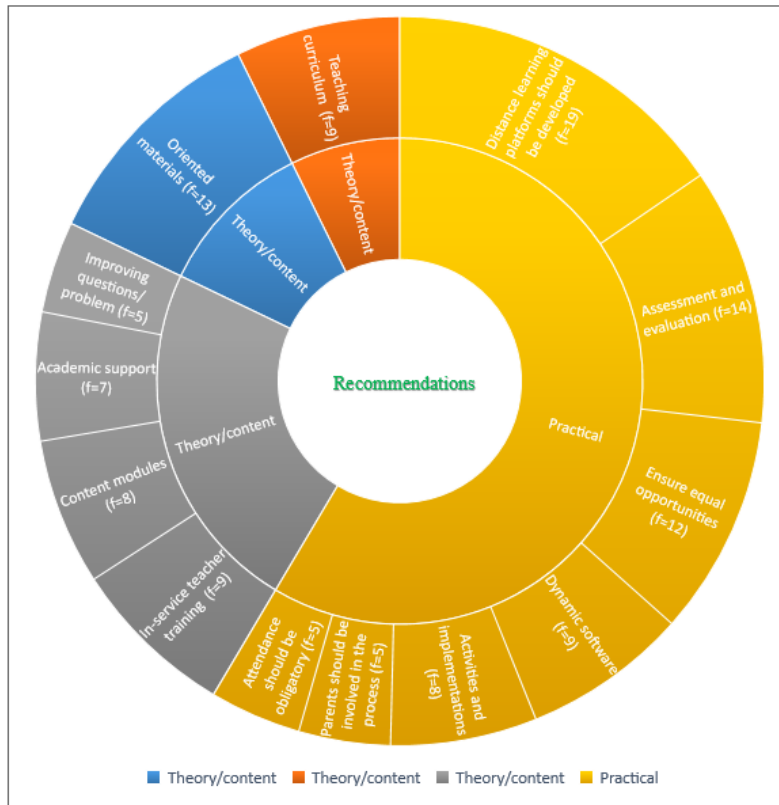


Fig. 8. Teachers’ recommendations about mathematics lessons in distance learning

Figure 8 shows the mathematics teachers’ recommendations on distance learning in terms of improving the theory/content oriented materials (f=13), providing in-service teacher training (f=9), improving teaching curriculum (f=9), developing content modules (f=8), ensuring academic support (f=7), and improving questions/problem statements (f=5). The teachers coded K₄, K₈, and K₃₄ stated the following: “Teachers can be supported through in-service teacher training on these subjects. Ready-made content modules can be made widespread.”, “Teaching curriculum should be updated to be suitable for distance learning.” “Common platforms can be established for academicians and teachers to share documents.” Nevertheless, the mathematics teachers also recommended that practical distance learning platforms should be developed (f=19), assessment and evaluation processes should be improved (f=14), studies to ensure equal opportunities should be carried out (f=12), dynamic software should be developed and used (f=9), activities and implementations should be improved (f=8), attendance should be obligatory (f=5), and parents should be involved in the process (f=5). Teachers coded K₁, K₃, K₄, and K₃₈ stated the following: “Attendance must be obligatory. Experts can strengthen distance learning platforms.”, “Students should be supported to ensure equal opportunities.”, “Dynamic geometry software could be integrated into the process.”, “Assessment and evaluation process should be improved.”

4. Results and Discussion

The study researched the most challenging learning areas and prominent difficulties of distance learning due to Covid-19, according to mathematics teachers. The shapes and construction subject in the geometry and measurement learning area was determined to be the most challenging area for mathematics teachers in distance learning. The second problematic area was the lesson's preparation process, drawing students’ attention and difficulties about the time allocated. In the area of learning numbers and operations, mathematics teachers had problems in writing terms, the intensity of the acquisitions, duration, and complexity. It was determined that the mathematics teachers had difficulties in the subject being complicated and abstract in the algebra learning area. The mathematics teachers were challenged in

lecturing and writing the terms in the data processing learning area. On the other hand, the mathematics teachers indicated that they did not struggle with the probability learning area in distance learning. When the learning areas are evaluated, it can be said that the difficulties experienced differed according to the terms of the area and the implementation process. Another reason for these difficulties could be the mathematics teachers' experiences with technology. Flack et al. (2020) stated that schools could not be successful in the transition to distance learning because of several teachers' lack of self-esteem about using technology.

Another research topic of the study was the learning area in which the mathematics teachers experienced the least difficulty during distance learning amid the Covid-19 pandemic. It is understood that the mathematics teachers considered the numbers and operations learning area as the most comfortable item of the curriculum during the distance learning amid the Covid-19 pandemic and the preparation for this subject matter as the most effortless step and the readiness of the students follows it. The mathematics teachers found the geometry and measurement learning area convenient for distance learning as the subject is concrete and using dynamic geometry software in shapes and constructions is possible. The mathematics teachers stated that distance learning was beneficial for the data processing learning area to be comprehensible and establish positive approaches. In the probability learning area, mathematics teachers found distance learning understandable and straightforward in terms of the subject scope. Nevertheless, mathematics teachers did not state any convenience regarding the algebra learning area. The advantages of technology, area education received by the teachers, and their attitude towards the process might have affected their opinions on distance learning convenience. The study of Hall and Knox (2009) identified that distance learning is advantageous in offering good opportunities.

The study researched mathematics teachers' opinions on the advantages and disadvantages of numbers and operations learning area in distance learning. The mathematics teachers believed that the numbers and operations learning area is advantageous in terms of time management, problem-solving, being comprehensible and easy, concretization, active participation, using materials, the readiness of the students, flexible teaching, and visualization. This is because distance education increases the quality of education and provides individuals with better opportunities (Engelbrecht, 2005; Hall & Knox, 2009; Shih et al., 2006). However, the mathematics teachers thought that the numbers and operations learning area was disadvantageous in distance learning in terms of the difficulty or incoherence of the content, assessment and evaluation process, communication and feedback, active participation, the readiness of the students, time management, misconceptions, and material preparation. The reason for all these results could be the sudden onset of the pandemic and adaptation problems within the transition to distance learning from face-to-face education. Another reason for these results could be that the teachers lack digital literacy skills and not using web 2.0 technologies. Chiemeké and Imafidor (2020) stated that teachers feel unprepared for the transition to online learning and implementation. Almanthari et al. (2020) stated in their study that the students lacking information about online learning environments are an important obstacle.

The research also evaluated the mathematics teachers' opinions about the geometry and measurement learning area's advantages and disadvantages in distance learning. The mathematics teachers thought that the geometry and measurement learning area in distance learning is advantageous in using dynamic geometry software, the subject being manageable and comprehensible, problem-solving, visuality, time management, and concretization. On the other hand, the mathematics teachers believed that the geometry and measurement learning area in distance learning is disadvantageous in drawing shapes and constructions, assessment and evaluation, methods used, material design or use, and students' readiness. The students' and educators' readiness levels in terms of the novelties introduced because of distance learning, or the methodological or the technical novelties brought by the technology could be the reasons for these results. Rachmadtullah et al. (2020) stated that the changes in the strategies and techniques regarding the teaching processes and the technological readiness levels about the online distance learning affected the teachers during the pandemic.

The study also evaluated the teachers' opinions about the advantages and disadvantages of the algebra learning area in distance learning. The mathematics teachers stated that the algebra learning area in distance learning is advantageous in time management, problem-solving, and concretization. However, the mathematics teachers indicated that the algebra learning area in distance learning was disadvantageous in terms of the subject being difficult, complex, and abstract, assessment and evaluation processes, material use, and students' readiness levels. These results can be the students experiencing difficulties, and this situation affects the learning, and the changes in the method and application of teaching due to distance learning. The teachers being inexperienced or unprepared in assessment and evaluation can be another reason for the results. According to Talidong and Toquero (2020), the concerns increased during the distance learning period due to teachers' inexperience about distance learning, the students' adaptation problems to the new system, and the teachers not knowing how to evaluate the students.

Another subject of the research was the opinions of mathematics teachers about the advantages and disadvantages of the data processing learning area in distance learning. The mathematics teachers believed that the data processing learning area in distance learning was advantageous in terms of the subject being manageable and comprehensible, visualization, problem-solving, technology support, and establishing a link between daily lives. On the other hand, mathematics teachers indicated that the data processing learning area in distance learning was disadvantageous in graphics and construction, assessment procedures, and time management. The reason for these results could be the difficulties arising as a result of the nature of the data processing requiring technological support. The teachers could have experienced problems with time while preparing for this subject or teaching it. Livari et al. (2020) stated in their study that some teachers indicated that lesson planning requires more time in distance learning than face-to-face education.

The study also researched mathematics teachers' opinions about the advantages and disadvantages of the probability learning area. Mathematics teachers stated that the probability learning area in distance learning is advantageous in terms of the subject being manageable and comprehensible, time management, establishing a link with daily life, being attentive, and technological support. Mathematics teachers thought that the probability learning area in distance learning was disadvantageous in terms of assessment and evaluation, problem-solving, material design and use, and data collection. Although the probability learning area is seen as an area where technology is used, the practices in the process of data collection and evaluation and the situations that occur during teaching can be seen as the reasons for the results of the research. Since teachers and students find this area manageable and understandable, interest in this topic may have increased. Gudmundsdottir and Hathaway (2020) stated that most teachers did not have prior online teaching experience before Covid-19 and are willing to use and successfully use online teaching platforms.

5. Study Limitations and Recommendations

The research was limited to the mathematics teachers, for accessibility reasons, due to the sudden onset and rapid developments of Covid-19, other subject teachers were not included in the study. In addition, the study was also limited to the eight open-ended questions prepared by the researchers since the process was aimed to be evaluated within the scope of learning areas. Other variables, such as learning outcomes and teaching hours were not included in the study to not deviate from the research focus. The following recommendations can be made based on the mathematics teachers' responses within the scope of the research: The content modules and lecture notes and materials about theory and content can be modernized according to distance learning. The teachers can receive in-service teacher training about distance learning, digital literacy, and web 2.0 technologies. The teaching materials should be developed and updated according to distance learning. Online idea exchange meetings can be conducted for teachers and academicians to establish the academic support for mathematics teaching. Developing questions or problem statements for distance learning may facilitate the process. Studies for practicality and implementations can be conducted to improve the distance learning platforms. Implementing process assessment and evaluation

along with result assessment and evaluation may be beneficial for advancing the assessment and evaluation processes. Developing and operating dynamic software can be helpful for learning areas. The activities and implementations suitable for mathematics in distance learning should be created either by academicians or teachers. Making attendance mandatory may be beneficial for the active participation within the process. In addition, routine meetings between parents, and school units such as teachers, school counsellors, and the school board can be conducted to increase productivity during distance learning.

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