Mathematics Learning for Students with Special Needs During the Covid-19 Pandemic

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Abstract. Students with special needs need special attention when learning during this pandemic because of the limitations they have, especially in learning mathematics. Therefore, the purpose of this study is to describe how mathematics learning for children with special needs during the Covid-19 pandemic is implemented. Therefore, the method in this research is the descriptive qualitative method. The data collection technique used in this research is the study of documentation and interviews with respect to their respective guidelines. Qualitative data were obtained through interviews with teachers accompanying inclusive students as key informants. Documentation is done to see an overview of the teaching materials used by the teacher. The subjects in this study were special guidance teachers for special needs students as many as 2 people from 2 different inclusive schools in the city of Bandung. The results of this study are that. At the beginning of the pandemic, Alam Bandung School implemented online learning, but the rules applied at the school became chaotic, students could not focus during video conferencing, and students' cognitive abilities decreased, especially in mathematics. Therefore, learning is carried out offline even though it is only 3 days filled with therapy, deepening material and assignments for home. At Mutiara Bunda School, at the beginning of the pandemic, online learning was carried out using Google Meetings and task collection through Google Classroom. Teachers design their own learning tools such as home learning guides for each special needs student so that learning objectives can still be achieved even though they are studying from home.

Keywords: Student, special needs, pandemic

1. Introduction

Education is one of the sectors that has been most affected by the Covid-19 pandemic. Since the enactment of School From Home (SFH), learning that is usually done in schools, must now be done at home to reduce the transmission rate of the Corona Virus. All levels of education, namely primary, secondary and tertiary education, apply SFH to teachers and students. Various challenges and obstacles that occurred during the implementation of this SFH, challenges and obstacles were not only experienced by teachers, but also experienced by students and parents. Homeschooling, which has been running for more than a year, is being conducted online and offline according to the conditions of each region.

One level of school that requires special attention is inclusive schools. Inclusive education is the latest development of the education model for children with special needs. Inclusive education is defined by including children with special needs in regular classes with other children. The concept of education...
that does not discriminate against the background of children's lives due to physical and mental limitations [1]. These children are divided into several categories, namely special education school section A for the blind, special education school section B for the deaf, special education school section C for the mentally retarded, special education school section D for the physically disabled, special education school section E for the visually impaired and special education school section G for multiple disabilities [2]. That way in teaching the teacher must pay attention to and facilitate students with different treatments for each student.

This is a challenge for teachers in inclusive schools in implementing online learning. In accordance with the 2019 Law on Teachers and Lecturers, a teacher is required to have 4 competencies, namely professional competence, pedagogic competence, social competence and personality competence. One of the most important competencies to have to answer the challenges of online learning for children with special needs during this pandemic is pedagogic competence. One of the teacher's pedagogic abilities includes the characteristics of students seen from various aspects such as moral, emotional, and intellectual. Teachers must be able to master learning theory and learning principles, because students have different characters, traits, and interest [3]. Pedagogic competence is needed, one of which is special needs students teachers [4]. The character of students with special needs is very diverse so that the services for each individual are different. Mathematics is one of the subjects that must be studied at every school level. This subject is also required for students with special needs in inclusive schools. A special strategy is needed in learning mathematics for students with special needs, especially during a pandemic like today, learning is mostly done at home. Teachers must facilitate students in learning mathematics. To support the success of the education of students with special needs, it is necessary to have basic and supporting facilities and infrastructure [5]. One of the service facilities that must be provided by teachers during SFH is teaching materials. Teaching materials that are arranged must be in accordance with the needs of students so that learning objectives can be achieved [6]. The steps of learning mathematics for special needs students are certainly different from ordinary students. The steps which are procedures in learning mathematics for special needs students are starting to describe the condition of special needs students abilities in mathematical substance, instilling key concepts, describing key concepts by manipulating concrete objects, transferring to symbols, communicating, and practice in everyday life [7].

The basic principles that teachers need to pay attention to in learning mathematics for special needs students are the use of the spiral method, regular repetition, creating confidence in students in mathematical abilities, and being practiced in everyday life [7]. Mathematics learning during a pandemic conducted by special needs students must comply with these procedures and principles. Therefore, based on the above problems, the purpose of this study is to analyze how the implementation of mathematics learning during the COVID-19 pandemic for children with special needs in inclusive schools. By knowing the obstacles in the mathematics learning process during the Pandemic for special needs students, it is hoped that it can be the basis for compiling teaching materials in appropriate mathematics subjects and can overcome the obstacles / obstacles experienced by teachers.

2. Method
The purpose of this study is to describe the implementation of mathematics learning during the Covid-19 period for students with special needs in inclusive schools, therefore this research method is qualitative descriptive research with qualitative naturalistic approach, which refers to the conditions of the natural environment as it is without being manipulated and data collected, especially qualitative data [8]. The data collection techniques used in this study were observation, documentation studies and interviews with respect to their respective guidelines. Observations are in the form of special notes about what researchers observe in the field. Qualitative data were obtained through interviews with teachers accompanying inclusive students as key research informants and parents of students as additional informants. The results of the interviews with the informants were intended to obtain or obtain information about the implementation and obstacles to learning mathematics during the Covid-19 period for students with special needs in inclusive schools. Documentation studies were carried out to obtain a clearer picture of the implementation of mathematics learning for children with special needs during the Covid-19 pandemic by documenting learning tools that teachers had made for each special child with
special needs. The informants in this study were 2 special supervising teachers from 2 different schools in the city of Bandung Indonesia. The schools are Alam Bandung School and Mutiara Bunda School

3. Result and discussion

The implementation of this research was carried out in 2 inclusive schools in the city of Bandung where children with special needs in their learning were combined with other children. 2 informants in this study were special supervisor teachers at two different schools.

In learning mathematics for children with special needs in school 2, this inclusive school during the pandemic, the teacher designed his own teaching materials to be given to the special needs children. The curriculum used is the same as the rules from the central government. For mathematics learning materials provided are adjusted to the readiness to learn with special needs students themselves, the school does not force the target of mathematics material to be mastered. In inclusive schools, children with special needs are combined with children in general, only they are accompanied by a special supervising teacher (GPK). Each child with special needs has various abilities, therefore the task of the teacher is to facilitate the learning abilities of different children with special needs.

At the beginning of the pandemic situation at the Alam Bandung school, it stopped face-to-face learning and replaced it with school from home. With school from home, students with special needs should have a lot of time to study at home and develop their competencies. However, as time goes by, learning from home actually makes the cognitive and affective abilities of these special needs students decline (especially special needs students with intellectual limitations). The rules that have been made at school, become chaotic when learning from home. According to the accompanying teacher, this is because there is no control from the accompanying teacher during learning from home. While studying from home, these students with special needs are given teaching materials that have been designed according to the needs of each student. The platforms used when studying from home are WhatsApp Groups, Google Classroom, Google Meet and Zoom meetings. In the implementation of learning from home, the most frequent obstacle found by the accompanying teacher is during the video conference, students feel bored and do not focus on listening to the teacher's presentation so that students do not last long to sit in front of the device. Especially for students with intellectual disabilities, guardians of students need assistance during online learning. For uploading assignments through Google Classroom, it is necessary to be accompanied by a student guardian during the learning process.

At Mutiara Bunda Junior High School Bandung, the types of special needs students who are currently students at Mutiara Bunda Junior High School are students with Autism Spectrum Disorder, Slow Learners and Down Syndrome with different levels of needs. Because many of the special needs students in this school have intellectual limitations, in teaching mathematics the teacher follows the stage of development and ability of the child. There are 10% special needs students in 1 class which is usually filled by 25 students, so in 1 class there are 3-4 special needs students combined with other children. When the pandemic started, schools were conducted fully online with mixed online learning between face-to-face using the Zoom Platform and Google Meeting with Asyrcrounous such as Google Classroom and WA Group. The teaching materials used during online learning are specially designed by teachers for children with special needs according to their needs.

The following is a detailed description of the learning difficulties experienced by special needs students during the pandemic period based on the results of interviews and observations from the two schools:

1) Learning for deaf children at alam bandung school

Deaf students are students who have hearing impairments, both permanent and non-permanent, and have speech impediments, so they are called blind. Students with special needs in the type of deafness do not have problems with their intellectual abilities, so that in learning mathematics the level of material taught is not much different from children in general, however, as a result of the deafness they have distinctive characteristics in terms of intelligence, language and speech, as well as emotional and social [9]. At this Alam Bandung school, the accompanying teacher in learning mathematics must explain directly in detail and take a long time. Because the understanding of using the teacher’s lip language should not be too fast in speaking. Especially in mathematics, for example,
in explaining the formula for volumetric figures, besides the teacher explaining the general formula of teaching materials that can also be observed by students, the teacher explains as much as possible by using additional teaching aids because the understanding of language is often reversed, the teacher must explain slowly and slowly details. Another difficulty is in understanding the story questions which are quite long, because languages are often confused, these students have to read several story questions with the help of the teacher, but when students understand the questions, they can do it well. This is in line with [10] through the eyes of deaf children understanding spoken language. In addition to seeing the movements and facial expressions of the interlocutor, the deaf child's eyes are also used to read the lips of the person speaking. So to understand the language, deaf children need a long time. However, the obstacles can be minimized because these students use hearing aids. Another obstacle is in number operations, students can work on problems with a maximum of two different number operations.

2) Learning for autism spectrum disorder (ASD) at alam bandung school

Autism Spectrum Disorder (ASD) is a developmental disorder, especially in behavior, which is generally caused by abnormalities in brain structure or brain function. ASD is seen before the child is three years old and can be detected from limited and repetitive social interaction and communication.[11]. Children who suffer from autism have a tendency to repeat things and obsessive attitudes. Usually he will clap his hands continuously or shake body parts. People with autism are obsessed with one activity and always repeat it every day, every autistic child has different abilities and obstacles. There are autistic children who are able to mingle with other 'normal' children in regular classes and spend little time in special classes, but there are also autistic children who are advised to always be in special classes that are structured for themselves or communication limitations. This can be seen from the behavior of those who tend not to see other people's faces when invited to interact, most of them lack interest in the surrounding environment. In learning mathematics, children with autism can basically acquire mathematical knowledge, although they need the help of concrete objects. The method that can be done is to repeat the work until a knowledge schema is formed in the memory structure[1].

Based on the results of interviews with GPK at the Bandung Natural School, autistic students have difficulty operating large numbers, this is in line with research [12] In recognizing numbers, these autistic children are still not able to add up to 10, but children already know the numbers 1 to 10. Learning in this Pandemic Period, students with ASD receive face-to-face learning on Monday-Wednesday for therapy and material strengthening. The implementation of online learning with video conferencing is not possible for students with ASD because it is difficult to stare at the screen for a long time, students sometimes do not focus. Therefore, when students and parents come to school, they are given assignments to do at home. School does not burden a lot of work to do at home. The following is a sample of mathematics subject assignments for 5th grade ASD children.
Figure 1. The assignment for ASD during covid-19 pandemic
In Figure 1, we can see that ASD is given a task regarding flat shapes, namely calculating the circumference of flat shapes. For this ASD child, when determining the circumference of a flat shape, it will be difficult to use the formula so the teacher must describe the counting process as shown in Figure 1. The length of the side of the square cannot be directly substituted in the formula \( K = 4S \), but must gradually add up \( K = 4 \times 48 = 48 + 48 + 48 + 48 \) is the addition of 48 4 times. Likewise, in calculating the circumference of mixed shapes, ASD prefers to calculate lengths one by one.

![Figure 1. The sample of ASD student’s homework](image)

Figure 2. The sample of ASD student’s homework

Based on the characteristics of students with intellectual limitations, counting does not involve large numbers. As in Figure 2. In the matter of adding time, the addition does not exceed the number 5 so that students do not find it difficult. The work on math tasks during the pandemic was carried out with parental guidance, but the accompanying teacher continued to communicate with students and parents to ask about difficulties in learning mathematics.

3) Learning Activities for ASD Students in Mutiara Bunda School

Down syndrome (DS) or down syndrome is a chromosomal abnormality, namely the formation of chromosome 21 (trisomy 21) due to the failure of a pair of chromosomes to separate from each other during division. Children with Down syndrome suffer from various learning and developmental deficits. They tend to be uncoordinated and lack sufficient muscle tension making it difficult for them to perform physical tasks and engage in play activities like other children [13]. They can carry out work and self-care tasks with supervision, but have difficulty performing academic tasks. This is because brain development and nerve function are not perfect [14]. At the Alam Bandung School, DS students learn to follow their cognitive development abilities, to recognize numbers, number cards and the use of puzzles are needed. The use of formulas is not recommended for DS students because it will be difficult to apply them. DS students in learning mathematics are enough to learn to have life skills such as counting that can be used in everyday life. Therefore, the learning must be contextual, such as the use of currency to learn buying and selling. At Mutiara Bunda Middle School, online learning is carried out for all children, including special needs students with the DS type. Mathematics learning in this school is done in synchronous and asynchronous ways, when Asyncronous the teacher provides Home Learning Guidance and tasks that must be done at a certain time. During the synchronous process, the material is deepened and discussed with the special needs students material that is difficult to learn. Asyncronous is also done to upload assignments via Google Classroom.
Synchronous learning using google meetings is carried out independently by students as shown in Figure 3. Virtual face-to-face learning needs to be done for down-syndromic children in learning from home. The form of direct attention from the accompanying teacher gives enthusiasm and motivation to learn for children with Down syndrome. Students can follow the lessons well presented by the accompanying teacher. Children with Down syndrome experience obstacles in achieving developmental tasks from cognitive, affective, and psychomotor aspects. However, they can still develop non-academic potentials such as taking care of themselves, practicing friends and respecting the property rights of others. Children who grow up with conditions having disorders such as Down syndrome have the same rights in obtaining adequate educational services [14]. Therefore, in synchronous learning the teacher provides the best service according to the development of individual children. After virtual face-to-face learning, students are given the opportunity to upload assignments on Google Classroom. The following is an example of an assignment that has been uploaded by students on Google Classroom as shown in Figure 4.

The questions given in Figure 4 are assignments given to DS children at the 7th grade level of junior high school. If we observe the level of the question is usually given to grade 2 elementary school students. This is because the mental age of children with DS is different from their chronological age [15]. In studying shapes, for example, DS students do not study until formulas find volume. But only get to know shapes because they cannot think abstractly. The tasks designed for DS children vary according to the level of students' thinking abilities, this school facilitates every child's needs so that the teaching materials and test instruments given to each DS student are not the same. The accompanying teacher at Mutiara Bunda Junior High School designs learning for at home which is
commonly called home learning guided (HLG). The steps for learning at home are well organized in the HLG for each meeting so that special needs students, especially DS students, can study effectively with their parents at home.

Figure 5. Home learning guided designed by the teacher

Home guided learning as in Figure 5 contains instructions in what is done at home, a combined form of assessment of skills, attitudes and assessments of student worksheet work. In addition to the HLG, the teacher designs a final assessment test question grid for each special needs students. The following is an example of a grid of test questions that the teacher has designed for one of the DS students.

Table 1. Grid of test questions for students with down syndrome class VII

| SUBJECT            | BASIC COMPETENCES                                                                 | INDICATORS OF ITEMS                                                                 |
|--------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Number             | Understanding the properties of arithmetic operations and their use in problem solving | Determining the arithmetic addition operation                                      |
|                    |                                                                                  | Defining subtraction operation                                                    |
|                    |                                                                                  | Defining multiplication count operations                                           |
|                    |                                                                                  | Determining the comparison of story questions                                     |
|                    |                                                                                  | Determining comparisons using pictures                                             |
| Relation           | Distinguishing comparisons of worth and inverse values using tables, data, graphs, and equations | Determining the comparison of story questions                                     |
|                    |                                                                                  | Determining comparisons using pictures                                             |
| Arithmetic         | Understanding various situations related to social arithmetic (sales, purchases, etc.) | Determining the purchase price based on the story questions                       |
|                    |                                                                                  | Determining the selling price                                                      |
|                    |                                                                                  | Determining the profit price                                                       |
|                    |                                                                                  | Determining the price of lossWriting down the price of the item according to the picture |
| Two-Dimensional    | Understanding flat shapes (square, rectangle, rhombus, parallelogram, trapezoid, and kite) and triangles | Defining two-dimentional Figure                                                      |
| Figure             |                                                                                  | Determining the type of two-dimentional Figure                                      |
|                    |                                                                                  | Determining the shape of a flat shape with objects in the house                   |

Table 1 is a grid of test questions for the final assessment of DS students in mathematics learning during this pandemic. Special teachers design learning tools for each special needs students. The questions given are adjusted to the students’ abilities and train special needs students to have life skills. In the material for flat shapes, DS students are more focused on being able to determine the
types of flat shapes and at least know the types of flat shapes found at home. In the comparison material, students are asked to get to know comparisons by using pictures.

Figure 6. DS student showing comparison using pictures

Figure 6. This is a math assignment uploaded to Google Classroom by DS students. They, at grade VIII, are asked to show comparisons using pictures because in explaining comparisons using abstract number symbols, DS students will have difficulty. Learning during a pandemic has a tremendous impact on children with special needs. There are many challenges and obstacles that must be overcome when studying from home. Autistic children who have difficulty interacting and socializing with their environment during the pandemic are increasingly difficult to mingle considering that during the pandemic they cannot socialize with other friends in class, however, learning from home must still be done, one of which is learning mathematics, by learning mathematics can train brain work so that they can think logically and can develop children's creativity. Children who can develop their creativity will be well received by society [1]. Likewise for deaf children, the characteristics in terms of intelligence, potentially deaf children are no different from the intelligence of normal children in general, there are smart, moderate and some have low abilities. However, functionally their intelligence is below normal children, this is due to the difficulty of deaf children in understanding language. Characteristics in terms of language and speech, deaf children in terms of speech and language experience barriers, this is due to the close relationship between language and speech and hearing acuity, considering that language and speech are the result of an imitation process so that the deaf in terms of language have distinctive characteristics. which is very limited in vocabulary selection, difficult to interpret figurative meanings and abstract words [9], so teachers must facilitate the needs of these deaf students in learning during a pandemic. In a situation like this, the teacher's pedagogic competence plays a role, teachers are required to be able to design flexible learning during this pandemic. Do not give too heavy a task to students with special needs and arrange teaching materials according to the needs of students [16]. The learning presented must be fun so that students do not feel bored and motivated [17] although learning from home, the teacher must still maintain the emotional stability and intelligence of these students with special needs, so that learning objectives can be achieved. The learning strategies created can facilitate the needs of children in the implementation of their education, especially for children with special needs. In developing the potential possessed by special needs students, it is necessary for educators or adults to assist them in developing their potential. Not only assistance from educators, but also assistance from parents to motivate their children [18].

4. Conclusion
Based on the results and discussion, the conclusion of this study is that learning mathematics during the pandemic for children with special needs is carried out online and offline. In Alam Bandung School, offline schooling is only done for 3 days, while at Mutiara Bunda Junior High School, it is fully online. At the Alam Bandung School, of the 3 days provided for therapy and deepening of mathematical material and taking assignments for home special needs students with the deaf category there were no obstacles when learning mathematics during a pandemic because there were no intellectual disturbances,
only for homework students were given questions in detail and not too long for description questions, then for special needs students with ADS category the tasks during the pandemic are not too difficult, addition with repeated schemes to form a scheme while learning barriers when school from home for special needs students at Alam Bandung School is that students are not focused in learning mathematics. At Mutiara Bunda Junior High School, all mathematics learning for special needs students is done online. Learning begins asynchronously with the provision of teaching materials, then synchronously using Google Meeting for virtual face-to-face. Teachers specifically design teaching materials that are tailored to the limitations of individual children with special needs so that learning with special needs students can be facilitated.

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