Mathematics learning on geometry for children with autism

F E Widayati¹², B Usodo¹ and I Pamudya¹
¹Universitas Sebelas Maret, Jl. Ir. Sutami No. 36A Kentingan, Surakarta, Indonesia
²Sekolah Menengah Al Firdaus, Jl. Al Kautsar, Kartasura, Sukoharjo, Indonesia

E-mail: faridaesti27@gmail.com

Abstract. The purpose of this research is to describe: (1) the mathematics learning process in an inclusion class and (2) the obstacle during the process of mathematics learning in the inclusion class. This research is a descriptive qualitative research. The subjects were a mathematics teacher, children with autism, and a teacher assistant. Method of collecting data was observation and interview. Data validation technique is triangulation technique. The results of this research are : (1) There is a modification of lesson plan for children with autism. This modification such as the indicator of success, material, time, and assessment. Lesson plan for children with autism is arranged by mathematics teacher and teacher assistant. There is no special media for children with autism used by mathematics teacher. (2) The obstacle of children with autism is that they are difficult to understand mathematics concept. Besides, children with autism are easy to lose their focus.

1. Introduction
Education is a basic need of every human being in order to ensure its survival is more dignified so that education has an important role in community development. Without education, human will be difficult to develop and even going backward. A state has an obligation to provide high-quality education to every citizen. In Indonesia, the Law number 20 comment 2003 about the National Education System on Article 5 states that every citizen has the same right to obtain a high-quality education [1]. This implies that all children in all circumstances, including children with special needs, are entitled to an equal opportunity to obtain a proper education. Statement of the Individuals with Disabilities Education Act (IDEA) suggests that it is important to provide access to the crew in order to get the same curriculum as normal and expected students both get the same instruction on concepts that are important [2].

As a form of government concerns about the special education for children with special needs, the government shall provide an education program suitable for all conditions of children. The new paradigm for education for students with special needs is putting them together with the other children to access education for all without distinction as to the rich, poor, with or without special needs. This is consistent with the results of the Dakar Declaration in 2000 which resulted in political and strategic decisions on education for all. The contents of the declaration, among others, stated that ensuring human learning needs of all young and adults are met through equitable access to programs of learning and life skills as appropriate [3].

Inclusive education is a regular education in which there are children with special needs. Through inclusive education, the children with special needs are educated alongside the other children (without special needs) to foster their potential. However, not all schools can develop the skills, the knowledge, the programs, and the resources to ensure all students reach their full potential [3]. Inclusive education
prevents the discrimination against the children with special needs such that they can learn to live in the society. The society here means a society consisting of people with and without special needs live together, not separated, as a community. It starts with the school community. Similarly, this also applied to children with special needs of autism.

The Center for Disease Control and Prevention found that 1% of children aged 8 years in the United States meet the criteria for Autism Spectrum Disorder (ASD) in 2006. That is only for children aged 8 years there have been 40,000 individuals diagnosed with ASD. After 2000 there was a real increase in just 12 years, the number of children with autism has tripled compared with the previous decade. The remarkable number of suspected children with autism increases Indonesia. In 2015, it is estimated there are approximately 12,800 children with autism and 134,000 people with autism spectrum in Indonesia [4].

Autism is an organic developmental disorder that affects the ability of children to interact with people [5]. Children with autism experience the typical developmental disorder that includes perception, linguistic, cognitive, communication from mild to severe, and like living in his own world, characterized by the inability to communicate verbally and non-verbally with the external environment. Children with autism cannot relate to the others. It means that the ability to build relationships with other people disturbed by their inability to communicate and to understand the feelings of others.

Children with autism have very heterogeneous capabilities which can be leveled into high, average and below average [5]. The parents of children with autism generally have the assumption that children with autism have many advantages and they understand that children with autism have a chance to learn better than the other children with special needs. In the reality, most of the children with autism have constraints in terms of communication skills, social interaction, behavior, sensory, and learning styles which are very different from one child to another. Seeing this condition, it can be understood that children with autism have different characteristics from one another. The unique conditions of autistic children will greatly affect the education services, the program model, the learning strategies, and the resources needed for their learning activities, especially, as the focus of this article, in the mathematics learning.

Based on a description of the autistic child condition, obstacles probably occurs in the mathematics learning process when those abilities impaired. The teacher needs to concern with this condition by designing the mathematics learning to enable all children to learn according to their capacities. However, the actual learning services for children with autism tend to be generalized classical, no adoption of autism needs nor individual needs. One of the schools that organize inclusive education is SMP Al Firdaus. It is a junior high school in Sukoharjo, Central Java, Indonesia. The preliminary observation in SMP Al Firdaus gave data that there are three students with autism. Two students in the 7th grade and one student in the 8th-grade students. All the three students with autism are assisted by teacher assistant.

One of the subjects that must be taught to students with special needs is mathematics. Schools have to teach mathematics and students should learn mathematics. Indirectly, the statement explained that the inclusion school should also continue to teach mathematics, but the material presented to each student's special needs may be different between individuals from one another, depending on the condition of the student [6]. The success of student learning is not only influenced by the factors of students, but also of factors of teachers, especially in the inclusion classroom. According to the result of preliminary interview towards a mathematics teacher at SMP Al Firdaus, the difficulty in learning at children with autism happened because of the limitations of knowledge in understanding autism and how to handle a student with special needs. Identification of effective mathematics learning strategies for students with autism can facilitate success in both standardized testing and inclusion in a regular classroom setting. The success of mathematics learning in the classroom cannot be separated from the learning process and the interactions that occur in the classroom. To optimize the learning process, the readiness of the students and the teachers are required to establish the planning of the activities during the learning. The preparation of individual learning concerning to the needs of students with and without disabilities is more important than learning outcomes [7]. Based on the explanation, the purpose of this study was to determine (1) how the process of mathematics learning in the inclusive classroom, (2) the obstacles
experienced by teachers during the learning process in the inclusive classroom of SMP Al Firdaus Sukoharjo.

2. Method
This study is a qualitative research which aims to understand the phenomenon of what is experienced by the subject of the study such as behavior, perception, motivation, action, and others, in a holistic manner, and by way of description in the form of words and language, in a specific context naturally and by utilizing a variety of natural methods [8]. The research was conducted at SMP Al Firdaus Sukoharjo.

The data in this study are the information about the mathematics learning process including the readiness of teachers before the learning process, the implementation and the evaluation, the student's activity during the learning, and the information about the difficulties experienced by the children of autism during the mathematics learning process in the inclusive classroom. The information obtained through observations in the mathematics learning as well as interviews with the mathematics teacher, the children with autism, and the teacher assistant. There are three sources of data in this study, namely: the key informants, places, and events, as well as documents. We were supported by instruments of observation towards the mathematics learning process and the guidelines for the interview.

3. Result and discussion

3.1. Mathematics Learning in Inclusive Classroom
The readiness of the teacher and the students with and without autism are very necessary before starting the mathematics learning. In the SMP Al Firdaus, mathematics teacher prepares the learning resources and media necessary for the learning process in the classroom inclusion before the learning begins. There are no special media prepared for students with autism. In order to help the concentration of students with autism, the teacher place students with autism to sit in the front row. In addition, there is a communication advance especially between mathematics teacher and teacher assistant regarding the material to be taught and to be adjusted to the student's ability.

There are three students with autism at SMP Al Firdaus. Two of them are in the 7th grade and one of them is in the 8th grade. Each student with autism in SMP Al Firdaus has different abilities. This makes the mathematics learning delivered differently. A student with autism in the 7th grade joined regular mathematics learning with partial modification. It means that the student still follows the regular teaching in classrooms, but with a modified curriculum that covers most of the materials and the assessments. The other one student with autism in 7th grade obtain mathematics learning with full modifications. It means that the student does not join the mathematics learning in a regular classroom but in a separate room and taught by a teacher assistant. Specifically, the material obtained was also different and not equal to the 7th grade but was equal to the 3rd grade.

A student with autism in the 8th grade gets mathematics learning by joining the regular classroom, using the regular curriculum, and do not get a modification of the curriculum. During the process of mathematics learning in the inclusive classroom, teacher assistant is ready in the classroom to help mathematics teachers in guiding students with autism when experiencing difficulties during the learning so that students with autism can still follow the material given by the teacher of mathematics well.

There is a modification of lesson plan for children with autism. This modification such as the indicator of success, material, time, and assessment. A lesson plan for children with autism is arranged by mathematics teacher and teacher assistant. The lesson plan was arranged using contextual approach. Thus, the students were introduced by the geometry material related to everyday life. This is in line with a research states that the ultimate goal of educating children with autism is to prepare students to achieve independence in the functioning of life and become a successful member of society [9]. This is because students with autism are difficult to gain knowledge of mathematical concepts. Thus, it is important that teacher use the most effective methods to teach students mathematics skills.
At the beginning of the learning activity, mathematics teacher give the students a motivation to focus more on teaching and conduct apperception by repeating the material and give the material-related questions without distinguishing students with and without autism. Questions for students with autism sometimes have to be repeated more than once to help students concentrate and focus.

Mathematics teacher connects the material and the context in daily life so that students with autism are easier to understand, for example, on the material of solid geometry, to help students understand the cube teachers carry teaching aid such as toy section, and to facilitate understanding of the beams, teachers using wrap toothpaste. The assessment stage performed almost as they both monitor the progress of students during the learning takes place, differing only in providing feedback on the success of students, especially students with autism, since they have different capabilities. Assessment instruments for each student with autism are also different, tailored to the abilities of each student, and has been agreed by the mathematics teacher and teacher assistant special. Assessment tools for students with autism with the regular curriculum prepared by the teachers of mathematics, whereas for autistic students with curriculum modifications either partially or fully drawn up by a teacher assistant with guidance and approval of mathematics teacher.

3.2. Experienced teacher in the classroom during the process of inclusion

At times during the learning process of mathematics, there are factors that experienced by mathematics teacher at SMP Al Firdaus Sukoharjo. Teachers have difficulty in providing materials to students with autism considering students with autism have difficulty in planting concept. The biggest obstacle for teachers in the mathematics learning process in the inclusive classroom is that the concentration of student with autism was less focused on learning as well as the lack of learning media or teaching aid to support the students with autism in learning mathematics.

4. Conclusion

Based on the results and discussion, it can be concluded that: (1) The process of mathematics learning in the inclusive classroom of SMP Al Firdaus Sukoharjo has a good preparation both the teacher and the students; (2) At the beginning of the learning activities, the mathematics teacher conducts apperception stage by repeating the previous material and provide related question; (3) At its core activities, mathematics teacher connects the material and daily context; (4) In the assessment phase, it is conducted by monitoring the progress of students during the learning takes place, differing only in the provision of feedback on student success; (5) Obstacles experienced by teacher in the learning process is on how to maintain the concentration of students with autism in learning mathematics.

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