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The Use of the Diorama in Science Learning about Highlands and Lowlands for Children with Autism Spectrum Disorders

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ABSTRACTS

The purpose of this study was to determine the use of dioramas in learning about the highlands and lowlands for children with autistic spectrum disorders. This learning is delivered using diorama media so that children can imagine the actual environmental conditions. The method used is a single-subject method with a pretest-posttest research design. The results of this study will be reviewed from changes in students' knowledge after being given learning using diorama. Data collection techniques will be carried out through pretest before learning and posttest after learning. The result of this research is an increase in knowledge about the highlands and lowlands. it can be seen from the results of the post-test students who experienced an increase in the average value of 45. This is because the diorama learning media is interesting and can stimulate the focus of children with autism spectrum disorders. The results of this study are expected to be a solution for teachers in teaching students about highland and lowland material, especially for children with autism spectrum disorders.

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1. INTRODUCTION

Children with autism spectrum disorders have differences each individual. This is what causes the mention of "spectrum" in the condition of children with autistic disorders. Rahayu (2019) said that autism is a developmental disorder as a whole that results in obstacles in socialization, communication, and behavior skills. These disorders can be distinguished from mild to severe levels. Handling children can be done with parents, therapists, or teachers according to their needs. One form of handling children with the autistic spectrum is with learning activities at school that will help stimulate children in developing their cognitive abilities.

Learning that is carried out in schools must of course be adjusted to the character of children with autism spectrum disorders, which is difficult to focus on. To be able to make children interested in learning carried out at school, in addition to using appropriate learning methods, it can also be done by developing more interesting learning media. One of the learning media that can be used is diorama media. Learning media using dioramas will help children to imagine the actual situation in their environment. In the process, diorama learning media helps children to form meaning based on what they see. This statement is reinforced by the theory of constructivism that learning is a process of assimilation and connecting the experiences learned and the experiences they have had (Hasnunidah, 2012).

Currently, many studies discuss learning using diorama media. Among them, namely, The Effect of Animal Diorama Media on Animal Recognition in Autistic Children at special elementary school Al-Ikhsan Bogor Kab. Nganjuk, Implementation of Diorama Media in Improving Talking Skills of Children 5-6 Years Old in Kindergarten Insan Madiri, Tanjong Glad District, Utilization of Diorama Media to Improve Students' Speaking Ability in Understanding Floor Plans Class IV Miftahul Huda Dukuhsari Sukorejo, Middle School Students' Critical Thinking Skills in Constructivism-Based Ecosystem Learning Using Diorama Media (Hasnunidah, 2012), The Effect of Diorama Media Use in Geography Learning on the Hydrosphere Theme on Learning Outcomes Class X students (Wulansari, 2017). However, until now there has been no research on the use of dioramas in learning about highlands and lowlands for children with autistic spectrum disorders.

The purpose of this study was to determine the increase in knowledge of children with autism spectrum at the junior high school level about the highlands and lowlands. The method used is the discovery learning method by giving assignments and questions and answers. The result of this study is an increase in the post-test score of students after learning using dioramas. Students actively respond during learning. This is because the learning media is interesting and helps students to focus on learning, so learning is easier to understand. The novelty of this study is (i) a diorama of the mountainous environment used in learning, (ii) autistic subjects for junior high school level, and (iii) highland and lowland material.

2. METHODS

This study was a literature review. Detailed information on how the process for the literature review is explained elsewhere.

2.1 Research Subject

The subject of this research is two children with autism spectrum disorder at the junior high school level at Special School, Indonesia. Special School in Indonesia is an extraordinary school that accepts students with intellectual disabilities, motor impairments, and children

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with the autistic spectrum. Children with different barriers can study in the same class but with different achievement targets.

2.2 Research Procedure

This study used a single-subject research design with a pretest-posttest type of research. Researchers delivered learning materials about the highlands and lowlands. This research focuses on efforts to increase the knowledge of children with autism spectrum about the surrounding environment. The flow of this research includes: (i) the preparation stage, (ii) the implementation stage, and (iii) the final stage (**Figure 1**). **Figure 1** describes the flow of research implementation. The research flow is divided into three major stages, namely the preparation stage, the implementation stage, and the final stage.

Figure 1. Research flow.

Learning is delivered using the discovery learning method. In the process, this learning emphasizes the activeness of students in class. At the preparatory stage, the researcher will consult with the school regarding the time of the study and the research subject, then arrange learning tools, and make test instruments. At the implementation stage, the researcher conducted a pretest, learning using the discovery learning model, and a posttest. Furthermore, in the final stage, the researcher will carry out data processing and analysis of research data. **Figure 2** describes the research flow and research activities carried out. Each stage has its activities. In the preparation stage, the activities carried out by the researcher were selecting samples and loading learning tools and instruments. At the implementation stage, the researcher conducted a pretest, learning activities with diorama media, and a posttest. In the final stage, the researcher performs data processing and data analysis.

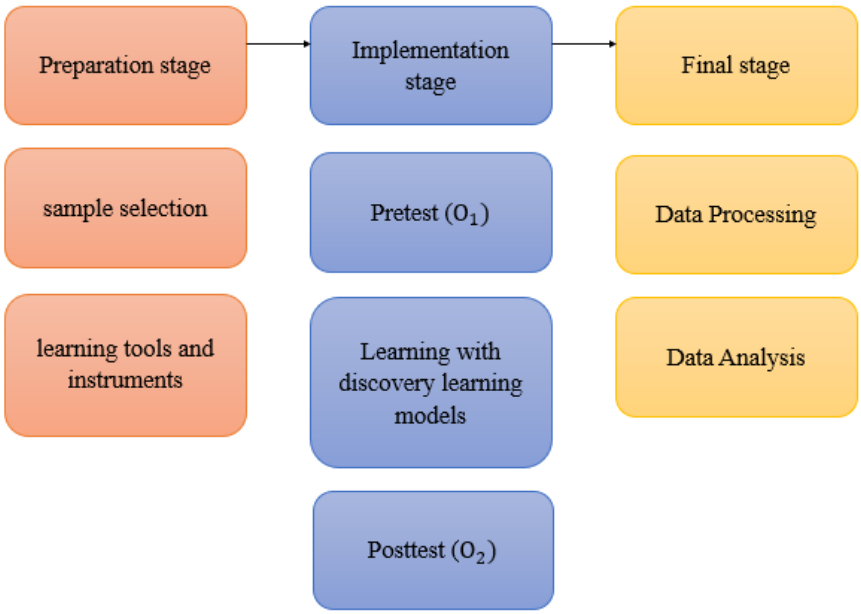

Figure 2. Research flow.

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Table 1 describes the pretest and post-test research design. That is a *pretest* (O_1), *treatment, dan posttest* (O_2). The pretest is a test that is carried out to measure the ability of students in the class before taking part in learning. Then, treatment is giving treatment to students to understand a lesson. Posttest is a test that is carried out after the treatment is carried out, to see changes in children's cognitive abilities after learning to use media.

Table 1. Research design pretest-posttest**.**

Pretest	Treatment	Posttest
O_1	X	O_2

2.3 Research Instrument

As for getting information about students' initial abilities, researchers conducted a posttest with the topic to be taught. The form of the test chosen was an observation test and an oral test with a total of 10 questions. This test aims to measure students' knowledge of the highlands and lowlands. The instrument is assessed using a rating scale of 0 to 2, a score of 0 (not able), a score of 1 (able with assistance), and a score of 2 (able). The maximum score obtained by students if they can answer all questions is 20 with a value of 100. The formula used is in Equation (1).

$$earned\ score\ x\ \frac{100}{\max score} = \text{value} \quad (1)$$

In addition to assessing knowledge about the highlands and lowlands, we also assessed aspects of reading, writing, arithmetic, and developmental aspects. The assessment uses a rating scale of 1-10. This is considered important as a basis for knowing the profile of students' initial abilities that are related to knowledge of the highlands and lowlands.

3. RESULT AND DISCUSSION

3.1 Student Demographics

The subjects of this study were students with an autism spectrum disorder. Rahayu (2014) revealed that the disorders experienced by children with the autistic spectrum are disturbances in interaction, communication (verbal-non-verbal), behavior, emotion, and sensory perception. The disorder possessed by the autistic child can make it difficult to adapt to a new environment so learning focuses on recognizing the environment that he might come to help the child to adapt to.

Figure 3 describes student abilities condition. SA students have not been able to read, have not been able to write, and have not been able to count. However, children can communicate in both directions and understand simple instructions, this can happen when the child is given stimulation. If the child is not stimulated, he will not initiate conversations with other people. Autistic children have problems in aspects of interaction and communication, usually they have limited ability barriers in starting communication (Mansur, 2018).

SE students can read simple sentences, understand simple sentences, can copy text, can recognize numbers 1-10, can communicate in two directions, and can understand instructions, for the same reason. This can happen when the child is given stimulation. If the child is not stimulated, he will not initiate conversations with other people. SE and SA have good fine motor and gross motor skills. Children with autism usually do not have obstacles in motor skills, it's just that there are obstacles in coordinating movements, such as eye and hand coordination, which causes autistic children to not be able to accurately catch a thrown ball (Harista, 2016).

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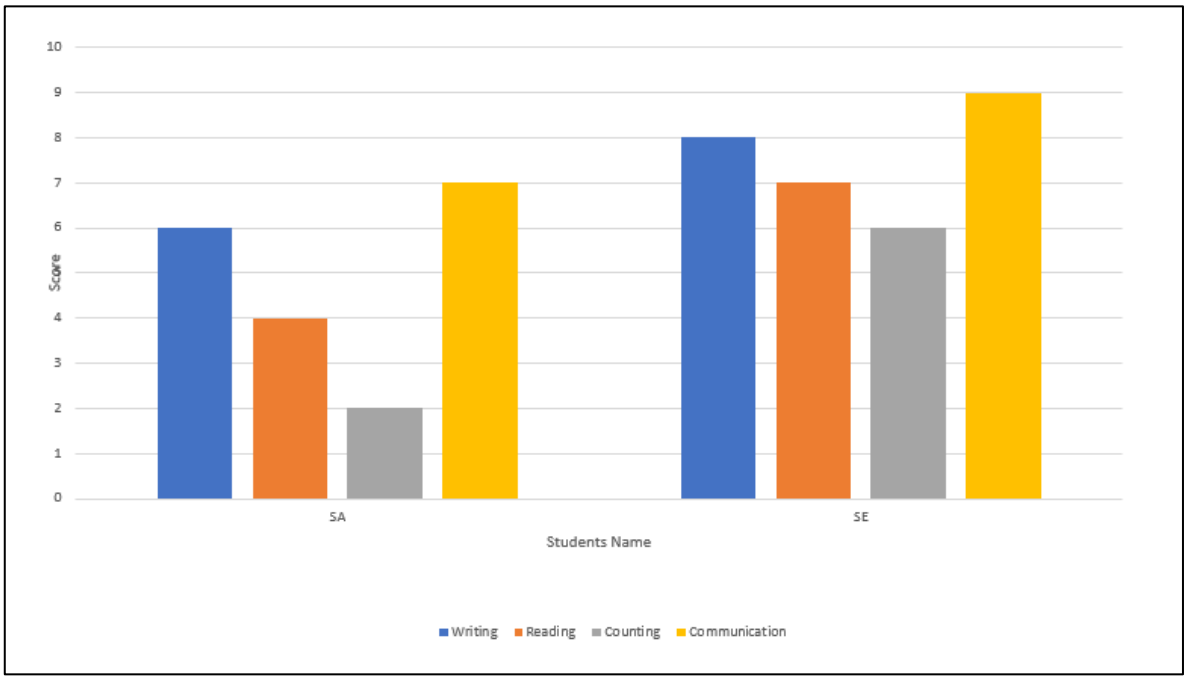

Figure 3. Student abilities condition.

3.2 Learning Process Activities

Aktifitas yang dilakukan sebelum proses pembelajaran, kami mempersiapkan media pembelajaran diorama. **Figure 4** shows an image of the highland and lowland diorama. The diorama depicts mountains, rivers, and rice fields. With this diorama, students are expected to be able to observe the difference between plains in the mountains and rivers. Then, students can understand that mountainous areas are highlands while river and rice fields are lowlands.

This diorama is based on a duplex, mountains are formed using newspaper pulp, and houses are made of plastic. In addition, there are rice fields and rivers which are made by painting using acrylic paint. The stages of making a diorama are;

(i) Preparing tools and materials,
(ii) Smoothing newspapers using a blender and water,
(iii) Filtering mashed newspapers,
(iv) Mixing newspapers with glue,
(v) Making mountain frames on duplex using cardboard,
(vi) Making mountain shapes using a mixture of newspaper and glue,
(vii) After the mountains are dry, coloring the mountains and drawing rivers, (viii) making rice fields using newspaper pulp which is colored brown, (ix) waiting for the paint to dry.

Learning activities begin with reading prayers and apperception. Students are told what they will learn, namely about the highlands and lowlands. In addition, students are also informed about the learning objectives.

At the core activity stage, the researcher will ask questions on the pretest sheet orally and then the students will answer orally. Researchers assessed the pretest to know the children's knowledge about the highlands and lowlands. After the pretest activity was completed, the researcher showed the diorama media as a learning medium. Students are asked to observe the learning media and then mention what they see.

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Figure 4. Highland and lowland diorama.

After observing activities, students one by one mention what they see in the learning media. Students are also stimulated to mention their experiences when they have seen natural phenomena that exist in a diorama in their daily lives. The researcher asked students to name objects that are commonly used in highland and lowland areas.

At the end of the activity, the researcher and the students concluded the results of the learning that had been done. Students work on written questions in the form of circling pictures of the highlands and lowlands, what objects are used in highland areas, objects used in lowland areas, and the characteristics of highlands and lowlands.

3.3 Analysis Result Data

Table 2 is a table of pretest and posttest results regarding the ability to recognize highlands and lowlands. Children have not been able to answer questions about the highlands and lowlands. This is because children are not familiar with the term's highlands and lowlands. When SA is asked about objects commonly used in mountainous areas, the child answers with additional stimulation. The child answered "jacket" after being stimulated by the question that mountainous areas had low temperatures. Based on this, the child gets a score of 1 or can one question with help.

Table 3 describes the students' scores in answering the pretest. The table describes the children's lack of knowledge about the highlands and lowlands. The assessment in this table is based on the results of tests conducted before the learning treatment using dioramas. Student scores are still relatively small, ranging from 1-2 with a value of 5-10.

Table 4 describes the acquisition of student scores in answering the posttest questions. Posttest questions are given after the treatment using diorama learning media and discovery learning methods. These results illustrate the increasing knowledge of students about the highlands and lowlands. In addition, the characteristics of the lowlands and highlands were tested. Student scores increased to a range between 8-10 with a value of 40-50.

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Table 2. SA pretest results.

Basic competencies	Aspect	Indicators of Competence accomplishment	Instrument	Value			
				SA		SE	
				O_1	O_2	O_1	O_2
3.1 Observing the highlands and lowlands	Highlands and lowlands	3.1.1 Observing the shape of the highlands	1. which one is the highlands?	0	2	2	2
		3.1.2 recognized the highland atmosphere	2. what scenery is there in the highlands?	0	0	0	
		3.1.3 observing the shape of lowlands	3. What is the atmosphere in the highland?	0	1	0	2
		3.1.4 recognized the shape of lowlands	4. Which one are lowlands?				
			5. What the scenery is there in that lowland?	0	2	0	2
			6. How is the atmosphere in the lowlands?	0	0	0	2
				0	1		0
4.1 Mention objects that are commonly used in the highlands	Objects commonly used in the highlands and lowlands	4.1.1 Mention objects that can be used in the highlands	1. What can we use in the highlands?	0	0	0	1
		4.1.2 Mention objects that can be used in the lowlands	2. Why do we wear jackets when we are in the mountains?	0	0	0	1
			3. What do we wear on the coast?	1	2	0	0
			4. Why do we wear glasses in river areas?				
				0	0	0	0
Scores				**1**	**8**	**2**	**10**

Table 3. List of student scores (O_1).

Numb	Student Name	Score	Maximal Score	Value (1-100)
1.	SA	1	20	5
2.	SE	2	20	10

Table 4. List of student grades (O_2).

Numb	Student Name	Score	Maximal score	Value (1-100)
1.	SA	8	20	40
2.	SE	10	20	50

4. CONCLUSION

Learning for children with autism spectrum disorders must be designed in such a way as to be more interesting because media help children focus more. This will make it easier for children to focus on understanding the content of the learning itself. This study can see changes in students' understanding of the surrounding environment, especially the highlands and lowlands. The method used is a single-subject method with a pretest-posttest research design. The result of this research is that children's knowledge increases. An increase in the pretest score of children with the initials SA from 5 to 40, and children with the initials SE from 10 to 50.

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5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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