

# Inclusive Education:

## How a Student with Special Needs Learns Science

Zulqifli Alqadri\*

Department of Science Education  
Universitas Pendidikan Indonesia  
Bandung, Indonesia

\*zulqifli.alqadri@student.upi.edu

Munawwarah Munawwarah

Department of Chemistry Education  
Universitas Negeri Makassar  
Makassar, Indonesia  
munawwarah@unm.ac.id

**Abstract**—This descriptive study aims to describe a student with special needs learning science in one of the inclusive junior high school of Bandung. The investigation was done since preparation stage, learning process, to evaluation stage. Observation was carried out during science learning on heat transfer topic to a grade VII special needs student as the subject (hereinafter referred to as X) who diagnosed with moderate-type of autism and ADHD (Attention-Deficit Hyperactivity Disorder). Interview was conducted with science teacher, helper and Orthopedagogic, while documentation was carried out through analysis of practice and final test questions. The results of the study revealed that on preparation stage which focused on the admission process, every applicant of inclusive school is selected by the school selection committee and internal psychologist by evaluating their results of therapy and psychology test. Learning objectives, material, process, and evaluation of science learning for inclusive students are adjusted based on student's needs, condition, and ability and always be accompanied by a helper during science learning. The evaluation process of science learning for inclusive students generally uses maximum 10 questions on cognitive level of C1 (remember) and must be equipped with pictures and colors.

**Keywords:** *inclusive education, special needs student, science*

### I. INTRODUCTION

Education For All (EFA) is a global commitment relating to ensuring access to (at least) basic education for all [1]. To embody this movement, the Salamanca World Conference on Special Needs Education was held and globally suggested to establish an inclusive education system [2]. Inclusive education is an education system that provides academic services to children with special needs within general education settings [3]. Basically, inclusive education accommodates all children regardless of their physical, intellectual, social, emotional, linguistic, gender, social status, ethnicity, race, religion or other conditions [2]. From a religious humanist perspective, inclusive education is considered as the fulfillment of basic human rights as God's creatures towards education without discrimination [4].

Indonesia is one of the countries that implement inclusive education as the embodiment of the concept of Education for All (EFA). This is based on the Indonesian Law and the Regulation of the Minister of National Education which

provides opportunities for children with special needs to obtain regular school starting from elementary school, junior high school and senior high school/vocational school [5]. Indonesia's inclusive education system adheres to several principles, including equity and quality improvement, diversity, meaningfulness, sustainability and principle of involvement [6]. In addition, the objectives of inclusive education for children with special needs according to Raschake and Bronson [7] are: a) they will feel part of the community in general; b) they will obtain various sources for learning and growth; c) increase children's self-esteem; and d) they get the opportunity to learn and make friends with friends of their age.

Bandung is one of the cities in Indonesia that has few inclusive school programs. Technically, student with special needs in inclusive class will receive the same subject matter as other students, including science learning. Science education is essentially an effort to understand, awareness and develop positive values about the nature of science [8]. Furthermore, science learning is expected to produce students who can face increasingly competitive challenges and can make decisions in matters related to science, including student with special needs. Thus, this paper aims to describe how an inclusive student learning science in one of the inclusive schools in Bandung.

### II. METHODS

This is a descriptive study that aims to describe a student with special needs in science class in one of the inclusive junior high school of Bandung which investigated from preparation stage, learning process, and evaluation stage. This study used observation, open interview, and documentation to gather information. Observation was carried out during the learning process on heat transfer topic. Interview was conducted with science teacher, helper and ortho-pedagogue. Documentation was carried out through analysis of final test questions of special need student.

Subject of the study was grade VII student (hereinafter referred to as X) who diagnosed with moderate-type autism and ADHD (Attention-Deficit Hyperactivity Disorder). Autism is a developmental disorder which characterized by social disorders, communication, and compulsive behavior [9]. Furthermore, children with autism have problems related to social interaction, disorders of communication (verbal and

nonverbal), disorder behavior, feelings/emotions, and disorders on sensory perceptions [10]. While ADHD is a group of symptoms representing a final common behavioral pathway for a gamut of emotional, psychological, and/or learning problems [11]. It also characterized by improper development of attention, hyperactivity, and/or impulsivity [12]. Children with ADHD have the potential to interfere in terms of development and impact on learning activities [13].

### III. RESULTS AND DISCUSSION

#### A. Preparation Stage

One of the inclusive schools in Bandung as the observation target is an integrated Islamic private school that has inclusive program since it was established. Therefore, mostly special needs students from that school also continue their high school into the same school foundation. Preparation stage of this study focused on description of the admission process of special needs student into inclusive school.

Generally, the admission process of special needs children into inclusive school was selected by the school selection committee and internal psychologist. The selection begins with evaluating the results of therapy and psychology test of applicants. The therapy results of applicant aimed to diagnose the type of special needs of applicant. While the result of psychology test used to classify applicant whether he can attend into regular class program or given a special program. If the applicant has IQ above 70, so he can attend the regular class learning program. Meanwhile if the applicant has IQ under 70, so he will receive some special programs.

Special programs for inclusive student designed by psychologist, ortho pedagogic and helper which adic to evaluate the effectiveness of the implemented programs.

#### B. Learning Process

Every special need student in inclusive class always be accompanied by a helper during the learning process. The subject of this observation was a student (X) in one of the inclusive schools in Bandung. He is 14 years old and classified as moderate-type of autism and ADHD. He is one of the special needs children who participate in an inclusive class program. The observation carried out on science learning with the topic of heat transfer.

Based on the observation during science class, there are few activities of X that can be described. Learning activities are initiated by the apperception of the science teacher. The teacher demonstrated by showing 2 glasses of water, hot and cold water. Then ask one of the students to observe if both different water temperatures are mixed. However, the learning objectives have not been explicitly stated on this stage to students. Based on lesson plan, learning objectives are students can distinguish the kinds of heat transfer. Science content given to X was the same as other students. But the helper helped explaining back to X with simpler sentences or more simplified material content. If X cannot understand the

topic, the helper will modify the material. This is also applied by the inclusive schools in other cities in Indonesia [14].

Sometimes X took notice, sometimes also lacked of focus. X could write what the teacher wrote on the board and also quite cooperative when guided by the helper. In this case, there is no special media used for X. In addition, the book used by regular students was the same as the book used by X. This is because books, learning media, and special equipment that are appropriate to the conditions and needs of children are still rare in Indonesian inclusive schools [15–18]. Students with special needs need media learning science that is oriented towards inquiry-based activities [19]. To test X's understanding about the topic, the science teacher gave a special practice question to him but the question is quite simpler and keep assisted by the helper.

Communication between science teacher and helper is very important to X's learning process. The science teacher plays a role in conveying the learning material to all students then the helper plays a role in assisting and understanding X through the use of simpler language or material adaptation. Coordination also continues in terms of giving assignments or practice questions to inclusive student because only the helper knows the ability of inclusive student. The formulation of learning objectives for inclusive student, especially for science subject, in natural science subjects, is adjusted to the conditions and ability of the special needs students. Therefore, not all science learning objectives must be achieved by special needs students, depending on the material they might be able to absorb or by adapting the material.

During the science lesson, X seemed enthusiastic in paying attention to the explanation of the helper and teacher. In addition, he was also occasionally seen writing what his teacher wrote on the whiteboard and was enthusiastic about completing the questions given to regular students. However, X has a short concentration and his focus was easily distracted. In addition, under certain conditions the helper must maintain X's mood so that he will continue to take lessons.

In the science experiment, X was also included in one group with other students. Student with special need should immerse into a group setting with non-inclusive students [20,21]. But the role of X in group was limited to the light activities that he can do. Allowing students with special needs to carry out science activities aims to give them an understanding that science plays a big role in everyday life and is used in many different aspects and fields [22].

The obstacle felt by the teacher during teaching X was the lack of teacher's skills in dealing with students with special needs. This finding related to the problems faced by teacher in inclusive class settings of the previous studies [23–27]. In addition, the statistical results also show that the ratio of helper specifically dealing with children with autism and ADHD is still very lacking in Indonesia [28].

**C. Evaluation Stage**

Evaluation of learning outcomes for inclusive students is carried out while still considering the possibility of material that can be mastered by the subject. Technically, teachers, helper and ortho pedagogic coordinate each other to make a final test specifically for inclusive students. The questions that have been made then validated at the Indonesian Center for Special Education and then administered to inclusive students. For practice questions, only the teacher and helper collaborate in making specific questions. The examples of practice questions in the heat topic shown in Figure 1.

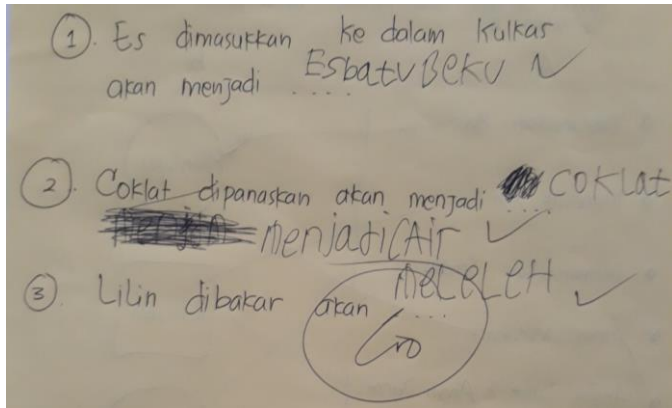


Fig. 1. Practice questions to inclusive students.

Generally, the questions tested for inclusive students are a maximum of ten numbers and must contain pictures and colors. The examples of final test questions shown in Figure 2.

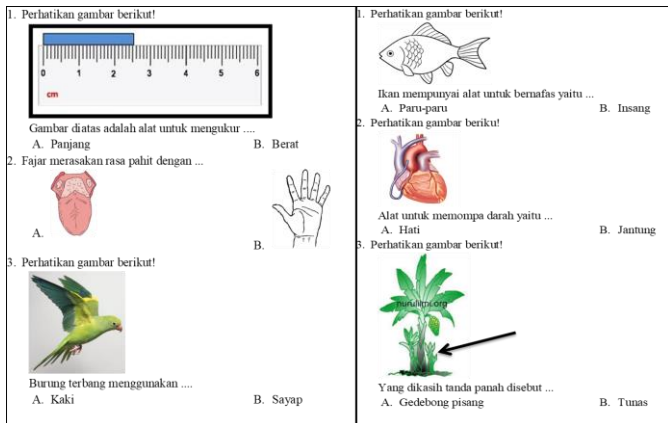


Fig. 2. Final test questions to inclusive students.

Based on Figure 2, it is revealed that the cognitive level of the questions is generally at the level of C1 (Remember). According to revised Bloom’s Taxonomy, level C1 (remember) is about accessing relevant knowledge from long-term memory which focuses on recognizing or recalling objects or concepts [29]. It is based on the ability and needs of students and is always linked to situations in their daily lives.

Based on the results of research, it clearly implies that students with special needs are not explicitly required to master

all scientific topics. Unlike non-inclusive students, students with special needs are oriented to understanding science related to their daily lives and environment. More than just understanding science topics, inclusive class brings some positive values to students. Those positive values [30] are:

- Students have caring among others and accept differences.
- Familiarize students with diversity, confidence, sympathy, empathy, acceptance etc.
- Improve students' social skills.
- Encourage interaction between students with special needs and other students.
- Growing students’ character.

**IV. CONCLUSION**

Based on the results, it can be concluded that the admission process of inclusive school in Bandung is selected by the school selection committee and internal psychologist by evaluating the results of therapy and psychology test of children with special needs. The learning objectives, material, process, and evaluation of science learning for inclusive students are adjusted based on student’s needs, condition, and ability and always be accompanied by a helper during science learning process. The evaluation process of science learning for inclusive students generally uses maximum 10 questions on cognitive level of C1 (remember) and must contain pictures and colors.

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