The Effect of Generate Argument’ Instruction Model to Increase Reasoning Ability of Seventh Grade Students on Interactions of Living Thing with their Environment

Y Darmawanti¹, P Siahaan² and A Widodo³
¹ Department of Science Education, Universitas Pendidikan Indonesia, Jl. Dr.Setiabudi No. 229, Bandung 40154, Indonesia
² Department of Physics Education, Universitas Pendidikan Indonesia, Jl. Dr.Setiabudi No. 229, Bandung 40154, Indonesia
³ Department of Biology Education, Universitas Pendidikan Indonesia, Jl. Dr.Setiabudi No. 229, Bandung 40154, Indonesia
Email: darmawanti.yuan@gmail.com

Abstract. This study aim to examine the effect of generates an argument instruction model to increase students' thinking skills, especially reasoning ability in lesson material of interactions of living thing with their environment. The study use weak experimental method with and the design is One-group pretest-posttest design. Sample in this study consists of 34 junior high school students of Seventh Grade in one of the junior high school in Ciamis. The instrument used to collect data is the essay questions of reasoning ability test according to reasoning Marzano’s framework which consist of the eight indicators that are comparing, classifying, induction, deduction, constructing support, analyzing perspectives, analyzing errors, and abstraction. In generally, the results show there is an increase in the students' reasoning ability is significantly (Sig = 0.000). In addition, an increase in the ability of reasoning also viewed based on gender, and the result show there is not significantly (Sig = 0.168) the difference of reasoning ability between male student and female student. Increasing the ability of reasoning divided into two categories that is middle and low category.

1. Introduction
One of the thinking skills that need to be developed for students in studying science is reasoning abilities that also associated with the argument. Both of these abilities are related to one another, this is in line with that proposed by the Basel et al. in his research on the analysis of students' arguments on the concept of evolutionary theory which suggests that the analysis of the arguments gives us the opportunity to concentrate on the ability when the practice in terms of reasoning and arguing [4]. Beside it, a low complexity argument of students seem obvious but on the other hand, the use of various schemes of argument suggests that this argument comes from everyday experience. This shows that all students seem to have basic skills in argumentation derived from everyday life or other scientific contexts. Venville and Dawson argumentation skills play an important role in the formal reasoning [24]. In addition, any intervention based on the argument also positively impact on the quality of formal reasoning about a problem mainly related to sociosainstific.

Konstantinidou and Macagno explained that there are strategy and methods that can encourage the active participation of students in developing the ability of reasoning through argumentation, the results of research suggests that the latest research shows the increase in the application of the
arguments used as a strategy of education and teaching methods [7]. Based on these problems, we need a teaching strategies or teaching methods that can be used to develop reasoning skills. One of the way to do is through the implementation of Generate An Argument Instructional Model. This model is a learning model that encourages students to be active in the group argued. Sampson and Schleigh this learning model is designed to provide opportunities for small groups of students to develop the claim that answer research questions based on the amount of data available [17].

In the process of learning in the classroom, sometimes not all students are actively involved in their group, so the contribution of students in learning as well as a discussion group becomes uneven. Active participation of students during the learning process is influenced by gender. Lowrie and Diezmann has conducted research on gender differences in secondary school students in a test of problem solving related to the graph, the results showed gender differences favoring boys among 9 to 12 year old students' graphical languages in mathematics [10]. Other studies also showed (Lorenzo, Crouch & Mazur, 2006; Pollock, Finkelstein & Kost, 2007 in Nieminen, et. Al 2012) male student is better than female student in understanding the concepts of force, motion, electricity, and the concept of magnetism in materials physics.

Sampson and Schleigh argues that Generate An Argument Instructional Model was designed to provide opportunities for small groups of students to develop claims answered questions according the problem is based on the data available [17]. As part of this process, the group made a tentative argument then give their claims and evidence that supports the claim by using media that can be viewed by others. Each group then had the opportunity to share their ideas during the session argument. Application of this model shows that it should provide benefits that are useful for teachers because it can be used as a template or guide to design learning aimed at describing the content in the existing curriculum [16]. Here are the stages Generate An Argument Instructional Model that consists of four stages identification of problem, question, and task, generation of a tentative argument, the argumentation session and group sense-making [16], [13], [20].

Stiggins suggests that the reasoning is the application of knowledge in the context of problem solving [21]. Septiana argues that the reasoning of students is the result of the receipt and processing of information received during the learning process [18]. Kusumawati and Woro [8] argues that the reasoning requires one to describe the specific results obtained from the process of observation, facts and allegations. Reasoning ability is one aspect of cognitive intelligence possessed by each individual. Basically, the individual has the ability to create a reasoning are different from each other. Reasoning ability is required of students when faced with tests such as the completion of the problems and remedies during the learning process.

Student reasoning ability develop naturally and continuously in line with increasing levels of education. Based on Inhelder & Piaget Basic reasoning ability have evolved since someone was 4 years old, but growing more rapidly again when it enters adolescence [5]. The development of reasoning ability differ at all ages, in adolescence reasoning ability can be developed through simple problem-solving strategies, through this strategy one can integrate knowledge and problem solving ability as part of the learning process [19].

Although everyone basically has the reasoning ability from an early age, but this ability should continue to be trained in order to develop properly. The development of reasoning ability are also a result of the teachings and practices of successive [15]. Students reasoning ability need to be developed in adolescence because reasoning ability was essential to learn the concepts of science [9]. In order to develop the ability of reasoning can be done through a series of instructional design that facilitates students use reasoning ability, for example by learning science and mathematics-based inquiry can help develop students' reasoning ability [3].

Reasoning leads to the complex thought [12]. Reasoning ability can be measured through a series of tests were prepared based on any particular framework. The conceptual framework offered by Marzano consist of cognitive and affective components [21]. The reasoning process consists of five dimensions, there are attitude and a good perception of learning acquiring and combining knowledge, extending and refining knowledge, using meaningful knowledge, and the habits of mind [11] [12].
Based on Dugari cognitive dimensions of reasoning Marzano can be applied as a learning strategy that can improve achievement in science [2]. In addition, according Salamat that through learning based on cognitive dimension Marzano can improve critical thinking skills in understanding the concepts of physics [2]. The results of another study (Baz 2001) stating that the chemistry learning through learning strategies adopted from the cognitive dimension Marzano shows the results that can improve student achievement in high-level thinking skills such as decision making, critical thinking, and creative thinking [2]. In this study, assessing student reasoning ability focus to the second cognitive dimension which consists of eight aspects of reasoning that is comparing, classifying, induction, deduction, error analysis, constructing support, abstraction, and analyze perspectives.

2. Research methodology
This research use Weak Experimental method with the research design is the One-group pretest-posttest design. The number of samples consists of 34 students of 7th grade at one junior high school in Ciamis. Reasoning skills of students are assessing through reasoning ability test which consists of 13 essay by 8 indicators reasoning abilities. The test is done twice: before give treatment (pretest) and after give treatment (posttest).

3. Results and discussion
Based on the results of data processing, it can be seen an increase in the average score of posttest when compared with the score pretest reasoning abilities of students. Results of significance tests through paired sample T test show the significance results with obtained Sig. (0.000 < 0.05) and shown in detail in Table 1 and 2.

Table 1. Recapitulation of reasoning ability test.

| N  | Ideal Score | Average of Pre test | Average of Post test | Average of Gain (G) | Average of N-Gain (<g>) | Sig. |
|----|-------------|---------------------|----------------------|---------------------|-------------------------|------|
| 34 | 100         | 55.28               | 64.93                | 9.65                | 0.222                   | 0.000|

Indicators of reasoning ability assessed in this study consisted of eight indicators include the ability to comparing, classifying, induction, deduction, constructing support, analyzing perspectives, analyzing errors, and abstraction. The score of each is shown in Table 2.

Table 2. Recapitulation indicators value of reasoning.

| Indicators of Reasoning | Average Pre test | Average Post test | N-Gain <g> | Category |
|-------------------------|------------------|-------------------|------------|----------|
| Comparing               | 54.41            | 60.78             | 0.140      | Low      |
| Classifying             | 36.27            | 46.08             | 0.154      | Low      |
| Induction               | 58.33            | 62.25             | 0.094      | Low      |
| Deduction               | 58.22            | 73.53             | 0.366      | Middle   |
| Constructing Support    | 52.45            | 63.73             | 0.237      | Low      |
| Analyzing Perspectives  | 64.71            | 73.53             | 0.250      | Low      |
| Analyzing Errors        | 64.71            | 78.43             | 0.389      | Middle   |
| Abstraction             | 49.51            | 62.75             | 0.262      | Low      |

In addition to seeing the reasoning ability of students, this research also viewed ability of students by gender, which distinguished group of male students and female students. Based on the results of data processing, increasing the average score of posttest compared with pretest is better in both of group that is male students and female students. The results show in Table 3.

Table 3. Recapitulation of reasoning ability evaluated by gender.

| Student Group | N  | Ideal Score | Average of Pretest | Average of Posttest | Average of Gain (G) | Average of N-Gain (<g>) |
|---------------|----|-------------|--------------------|--------------------|---------------------|-------------------------|
| Male          | 16 | 100         | 52.90              | 64.58              | 11.68               | 0.248                   |
| Female        | 18 | 100         | 56.84              | 65.24              | 8.40                | 0.208                   |
The stages that exist in the generate argument instructional model facilitate students develop reasoning relating to the third dimension according to Marzano’s framework of reasoning that extending and refining their knowledge. Through the first stage to the final stage students are required to actively develop the knowledge, the stimulus is given at the beginning of learning in the form of presentation of the problem. In addition, students are given the opportunity to select the knowledge through sessions arguments, which gives students the opportunity to express opinions not only on his native groups but also other groups who visit. So that students not only acquire knowledge through a learning process, but it can develop and select the knowledge gained.

The learning experience is very important in the achievement and student learning outcomes. Through various phenomena and problems presented during the learning process, students gain knowledge and experience that is more real because they are directly involved and experience it yourself. Learning through the generate an argument instruction model applied in this study pasted direct observation method to develop an argument while being prepared by the students. Generate an argument instruction model more emphasis on the study conducted outside the laboratory, so it is not required to obtain the data directly, but from a variety of literature and data from previous observations, Generate An Argument Instructional Model designed to develop arguments based on data obtained through the literature because of limitations in observation and data collection of objects, if done directly [16]. The ability of the student's thinking in this regard reasoning abilities of students are a significant improvement after the study is completed. Giving the problems in early learning, developing a tentative argument, and the argumentation sessions have helped develop the students to think systematically and logically and to be able to develop answers based on observation, combined with theory or concept based on the literature.

Although an increase in students' reasoning abilities significantly seen from the average value post test results, basically still occur obstacles when learning takes place. The low category of improvement based on the value of N-Gain is likely due to the obstacle when learning takes place. Responses were fairly well demonstrated by the students was also evident from the enthusiasm of the students increased from one learning process to the next learning process. Although the first learning process, most students are still confused about the learning patterns applied by teachers who are different from the usual pattern they use every day. Students' ability to communicate is still relatively low, it looks at the first learning process where the students still do not brave to ask questions, express or refute opinions. This is because the learning process is commonly used in everyday is not much or not familiar high-level thinking skills exercises.

If we look at the score of N-Gain, an average increase students' reasoning abilities of male and female student included in the low category. However, the value of N-Gain group of male students is higher than the score of N-Gain group of female students. Researchers initially suspected increase in student groups of male student will differ significantly from the group of female students. But the concept of gender itself is not an absolute, but rather is influenced also by other factors in the surroundings. The concept of gender is the inherent nature of men and women that is socially and culturally, but nature itself can be interchanged with one another, may change over time and differ from one place to another [6]. However, there is research that shows that there are differences in science achievement more positive on male students compared to female students [23].

No significant differences between the groups of male students and female students assumption group for learning model used is the Generate An Argument Instructional Model equally well for both groups of students, so the achievements of the two group students did not differ significantly. The same thing also expressed by the results of other studies of gender differences in the understanding of concepts and the ability of scientific reasoning in style concept which states that learning the concept of style does not show a significant difference between male students and female students, although the results of pretest and posttest male student better than female students, which indicates that the learning methods are used effectively for the two groups of students [14]. The different results show that the reasoning abilities of male students is lower than female students [22]. In addition the results
of other studies also demonstrate reasoning abilities of male students are generally lower than on girls, except in drawing conclusions logically indicators [8].

All stages of learning that exist in the Generate An Argument Instructional Model followed by a group of male students and group of female students, so that all students have an equal opportunity to develop thinking patterns. In addition, the materials studied are concepts that are close to the students' everyday life, namely the interaction of living thing with the environment. Therefore male students and female students are much different reasoning ability at the end of learning. It shows the characteristics of the subject matter also influence student performance achievements of men and women students, so that the characteristics of such academic subjects also affect the level of significance of gender differences.

Seeing the results of observation on student learning activity showed each stage generally follow well. But if you look at the enthusiasm to learn, male students look more enthusiastic when learning of group and observation activities. This is presumably because male student are more like a learning process with student-centered and relevant to problem solving, but female student are more like learning to write activity [1]. So, it can also influence is no difference between the reasoning ability of male students and female students due to screen test reasoning ability in writing. So, in this case, the gender factor is not the major determinant in the successful completion of a test-based reasoning because there are external factors that influence such differences in learning style preferred by male students and female students also indirectly affect the achievement of reasoning abilities.

4. Conclusion

Based on the analysis, it can be concluded that there are significant differences between the results of the pretest and posttest of students' reasoning abilities after learning to use the Generate An Argument Instructional Model with significant score of T test results of paired samples T test is 0.000 < \( \alpha \) (0.05). It also means the Generate An Argument Instructional Model sufficient to give effect to an increase in the ability of reasoning even though the score of N-Gain is still in the low category. Increase the ability of reasoning viewed based on gender in general there is no difference, this is indicated by the score of N-gain average are in the same category that is low.

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