Profile of elementary student's argument ability on the energy topic

R P Pertiwi¹ and A R Sinensis²*

¹ Program Studi Pendidikan Guru Madrasah Ibtidaiyah, STKIP Nurul Huda OKU Timur, Jl. Kotabaru Sukaraja, Buay Madang, OKU Timur, Sumatera Selatan 32161, Indonesia
² Program Studi Pendidikan Fisika, STKIP Nurul Huda Oku Timur Jl. Kotabaru Sukaraja, Buay Madang, OKU Timur, Sumatera Selatan 32161, Indonesia

*arinirosa@stkipnurulhuda.ac.id

Abstract. The purpose of this research is to explore information about students' argumentation ability in elementary education level. This research uses descriptive quantitative method. The sample in this research is 34 students with 26 students in grade 3 and 18 students insixth grade. The technique of argumentation profile data compilation is using worksheet that provides image with energy topic then students give argument through writing. Techniques Data analysis using the Quality Assessment refers to Toulmin's Argument Pattern (TAP) such as: Data, Claim and Warrant which is the basic structure of an argumentation. The results show that 3 grade students' argument ability is better than 6 grade. In 6 grade argumentation in category D (27.8%), D-C (22.2%) and D-W-C (5.6%) while the rest cannot provide argumentation. In the grade 3 the argumentation ability on D (23.1%), D-C (26.9%) and D-W-C (23.1%) and the rest cannot argue. This problem is caused by anxiety factor of the sixth grade students because it will be a national exam affecting student achievement.

1. Introduction

Argumentation is an inseparable part of science. In the practice of science learning, argumentation is the main thing that underlies students in learning how to think, act and communicate like a scientist. Arguments as a form of introducing children to science, science education and common goals in the science curriculum has gained increasing attention over the last decade [1,2]. Referring to this objective, policy documents responsibility of science teachers, such as engaging students in dialogue and becoming guide in oral or written arguments of students [2]. Argumentation is also an important element of the investigation required to assist students with scientific literacy by engaging them in constructing and critiquing ideas [3].

At the elementary school level where writing learning is is introduced, a contextual approach fits into practice. At that level, the teacher should provide concrete examples that has been experienced or observed by students so students will be able to tell, distinguish or give opinions about something, students at this level will be able to produce writing with the appropriate pattern. Student argumentation profiles are extracted based on contextual approach and the process of providing pictures and then students argue through the text based on the topic on the given image media. Research [4] state that in writing, engaging students in a series of dialogical interactions and writing-for-learning experiences is one way to improve their argumentative practice. Students tentatively compose written arguments that make their understanding visible and publicly communicated. It is important in digging information to
find out how the students’ ability to argue, because in science learning needs to be equipped ability to explain phenomena both orally and in writing. In this research will analyze the argumentation of elementary school students with argumentation of writings based on contextual approach and figure media on topic energy. Assessment of the quality of argumentation refers to Toulmin’s Argument Pattern (TAP): Data, Claim and Warrant which is the basic structure of an argumentation. TAP as an analytical framework of: (a) how one is able to coordinate theory and evidence, and (b) identify the parallel nature between informal and scientific reasoning [5].

2. Method
The research method is used is descriptive quantitative. The research is conducted at elementary school of OKU Timur district of Madang Suku II of South Sumatra, Indonesia. This research choose the energy topic. The sample in this research is 34 students with 26 students in grade 3 and 18 students in sixth grade. The step research consists of 3 steps: preparation, implementation and evaluation. Here is an explanation of the research steps.
1. Preparation step
   a) Conducting standard study of curriculum content and syllabus that is about competency standard, basic competence and indicator on energy concept
   b) Create a student activity sheet with an argumentation note
   c) Creating rubric judgment with reference to the argumentative writing Assessment refers to Toulmin’s Argument Pattern (TAP)
2. Implementation step
   a) Provides learning about the concept of energy
   b) Provide students activity sheets to each student, and students are guided to provide an argumentation note related to problems that have been provided in LKS.
3. Evaluation step
   a) Analyze the result of the argumentation record
   b) Conclusion.

Argumentation skills in this research is the argumentation of writing. The task is given in the form of argumentative scientific writing on the topic of Energy is about saving energy both renewable and non renewable. The arguments to be analyzed are: Data, Claims, and Warrants [6].

![Figure 1. Schematic component of TAP analyzed](image)

3. Result and Discussion
The result of the analysis of argumentation analysis of elementary school students of third grade and sixth grade with the same topic that is on energy topic is described in Figure 2. Based on the data explained above that the students at the base level of sixth grade and third grade has different levels of argumentation ability. In sixth grade argumentation in category D (27.8%), D-C (22.2%) and D-W-C (5.6%) while the rest cannot provide argumentation. In the third grade the argumentation ability on D (23.1%), D-C (26.9%) and D-W-C (23.1%) and the rest are not able to provide argumentation. In sixth grade students’ ability in analyzing high data but low in giving the opinion (claim) and provide warrant (warrant). To be able to write a warrant, the student should be able to explain the relationship of data and claims [7]. Different in grade 3 the ability of students in has the criterion is able to link data, claims and justification.
Figure 2. Argumentation elementary school student of third grade and sixth grade with the same topic that is on energy topic

The reason for the low level of argumentation ability in grade 6 can be caused by students' anxiety because they will face a national exam. This can be caused students stress and effect their emotional intelligence resulting in an impact on learning achievement [8]. In addition, stress can also effect students' cognitive (eg, attention, concentration) on success academic [9]. Found out two students of sixth grade has dysgraphia seen from the writing of argumentation students has difficulty in expressing their thinking through writing. Another factor is the method of teacher in teaching learning, in third grade the method is used by teacher is use thematic or integrated learning which is a teaching and learning approach that involves several subjects in a theme to provide experience for students. The experience that teacher provide is a direct experience in solving problems and students can relate them to other concepts they already understand. The approach is used is scientific that can be used to improve cognitive and argumentative abilities [10]. While in sixth grade the learning method is used is assignment, discussion and lecture, the method cannot support students in scientific explanation to improve the ability of argumentation.

4. Conclusion
Profile of students' grade argumentation ability the third class students' argumentation ability profile higher than sixth grade is due to anxiety factor of sixth grade students because it will face national examination beside that there are two students who suffer from disgrafia disorder. Learning methods and approaches used by teachers in science learning greatly affect students' argumentation skills. Therefore, some of the efforts that can be made to improve argumentation skills are model innovation, learning methods and strategies that focus on how the argument can be trained, as well as the use of problem / problem in learning and issues that are used as learning material problems that are factually encountered by the learner.

Acknowledgments
Thanks to the headmaster, the head of the Institute for Research and Community Service (LPPM) STKIP Nurul Huda Oku Timur who has provided ease in carrying out this research.

References
[1] Kim M and Roth W M 2014 Argumentation As/In/For Dialogical Relation: A Case Study From Elementary School Science Pedagogies: An International Journal, 9, pp 300-321
[2] Özdem Yılmaz Y Cakiroğlu J Ertepinar H & Erduran S 2017 The Pedagogy Of Argumentation in Science Education: Science Teachers’ Instructional Practices. International Journal of Science Education 39 pp1443-1464
[3] Chen YC Hand B and Park S 2016 Examining Elementary Students’ Development of Oral And Written Argumentation Practices Through Argument-Based Inquiry Science & Education, 25 pp 277-320
[4] Yore L D and Treagust DF 2006 Current Realities and Future Possibilities: Language And Science Literacy-Empowering Research and Informing Instruction. *International Journal Of Science Education* **28** pp 291–314

[5] Kuhn D 2010 Teaching and learning science as argument. *Science Education, 94* pp 810-824.

[6] Toulmin S E 2003 The Uses of Argument. United Kingdom: Cambridge University Press

[7] Driver R Newton P and Osborne J 2000 establishing the norms of scientific Argumentation in classrooms. *Science education* **84** pp 287-312.

[8] Noor F and Hanafi, Z 2017 The Role Of Emotional Intelligence In Mediating The Relationship Between Emerging Adulthood and Academic Achievement. *Malaysian Journal Learning and Instruction, 14* pp145-168

[9] Shankar N L and Park CL 2016 Effects of Stress On Students' Physical And Mental Health And Academic Success *International Journal of School & Educational Psychology* **4** pp 5-9

[10] Kaniawati I and Suhandi, A 2014 Penerapan Model Pembelajaran Pembangkit Argumen Menggunakan Metode Saintifik Untuk Meningkatkan Kemampuan Kognitif Dan Keterampilan Berargumentasi Siswa. *Jurnal Pendidikan Fisika Indonesia, 10* pp 104-116.