Pedagonal : Jurnal Ilmiah Pendidikan
Vol. 08, No. 02, October 2024, pp. 126~131
ISSN: 2550-0406, DOI: 10.55215/pedagonal.v8i2.12

Does the Creative Problem-Solving Model Improve Students' Argumentation Skills?

Ainu Zakiah Maulidiyah[a]*, Tri Wahyu Agustina[a,b], Tuti Kurniati[a]
[a] Faculty of Tarbiyah and Teacher Training, UIN Sunan Gunung Djati, Bandung, Indonesia
[b] Postgraduate Program, UIN Sunan Gunung Djati, Bandung, Indonesia
ainumaulidiyahhh@gmail.com*; triwahyuagustina@uinsgd.ac.id; tutikurniati1959@gmail.com
*Corresponding author

Article Info

Article history:

Received Sep 12, 2022
Revised Oct 5, 2024
Accepted Oct 17, 2024

Keywords:

Creative Problem Solving
Biodiversity
Argumentation Skills

ABSTRACT

Argumentation skills are one of the skills of the 21st century. The research aims to analyze students' achievement of argumentation skills using the Creative Problem Solving (CPS) model on biodiversity material. Qualitative research with descriptive methods. The research subjects were class X students in one of the Bandung City schools. The purposive sampling technique used 30 students. The argumentation skills question instrument is based on Toulmin's Argumentation Pattern which has level 1-5 criteria containing 12 essay questions. The research results showed that the students' strongest argumentation skills were at level 3 at 63.3 Percent with sufficient criteria and the weakest at level 1 and level 5 with very weak criteria. The criteria for level 1 are very weak, level 2 is weak, level 3 is sufficient, level 4 is strong, and level 5 is very strong. It is important for other education experts to acquire argumentation skills in the learning process.

Introduction

21st century learning is an implication of the development of society from time to time. Building the existence of an Indonesian nation with character is a challenge for the Indonesian people. This can be realized if every Indonesian citizen has a strong will and character in order to build the existence of the nation. Changes in this era are very significant in daily life by following the existing flow. One of the changes that occur is in the field of education. Education is used as a medium to develop abilities and shape the character and civilization of a dignified nation in order to educate the nation's life (Muthoifin and Jinan 2015). In accordance with the demands of the 21st century, one of the skills that students must have is argumentation skills, because it can improve understanding of biodiversity material (Hasnunidah 2014).

The learning gained is a form of student argumentation skills in thinking and acting scientifically to increase students' deep understanding of an idea. Argumentation skills have a relationship with biodiversity learning as a strategy to solve a problem that is supported by data and facts (Fatmawati *et al*, 2018; Tanfiziyah *et al*. 2021). Argumentation skills can serve as a bridge or a means to develop thinking skills and assist students in achieving predetermined learning objectives easily. Argumentation skills are a process of

strengthening a statement through critical thinking analysis based on evidence and logical reasoning. Evidence can consist of facts or objective conditions that can be accepted as truth (Ginanjar *et al*. 2015; Nisak and Suprapto 2022). The argumentation level criteria to assess the quality of a person consists of levels 1-5. The higher the level of one's argumentation, the more complex and extensive the argument will be. In the Toulmin Argumentation Pattern (TAP), the argumentation structure indicators consist of six, namely: 1) claim, 2) ground, 3) warrant, 4) backing, 5) qualifier, and 6) rebuttal (Erduran & Jimeneze-Aleixandre 2007).

Based on the results of interviews with biology teachers, information was obtained that during the biology learning process the Creative Problem Solving (CPS) learning model had never been applied at the school. There are still many students who are embarrassed to argue because of lack of interest in the learning that is done as a result students lack mastery of the material. Students are only able to provide answers to questions in the form of opinions (claims) or data (evidence) simply, but not accompanied by reasons that connect statements with evidence or facts so that students are lacking in argumentation. It is revealed that students' argumentation skills are still relatively low. The quality of learning is the learning process carried out by educators related to the learning model set. Therefore, the selection of the right learning model according to the characteristics of the subject is an aspect that must be considered (Festiyed 2014).

The Creative Problem Solving (CPS) model was chosen to be applied because it has advantages in training students to design a discovery by acting and thinking creatively so that realistic answers are obtained. The CPS model is applied because it is able to have a positive influence on students as a whole so that it becomes more relevant in life, by choosing the right and good learning plan the teaching and learning process can be achieved optimally (Yuliati & Lestari 2019). The syntax of the Creative Problem Solving Learning Model is: Objective finding, Fact finding, Problem finding, Idea finding, Solution finding, and Acceptance finding (Huda 2014).The advantages of the Creative Problem Solving model according to Shoimin (2017) are: 1) Train students in designing new inventions, 2) Train students to act and think creatively, 3) Solve problems faced realistically, 4) Identify and conduct investigations, 5) Interpret and evaluate the results of student observations. The CPS learning model trains students to find creative solutions based on their own thinking through an attitude of confidence and openness to all input and flexibility in solving a problem. Based on the explanation above, it can be concluded that the Creative Problem Solving (CPS) model is a series of learning activities that have the potential to train students in learning in the form of training a problem-solving skill that requires students to find their own solutions based on creative ideas or ideas generated from their thinking. The CPS model is a model that directs students to identify innovative problems to obtain solutions to problems and develop strategies by producing real solutions (Partayasa *et al*. 2020). In this study using the Creative Problem-Solving model where there is an Idea Finding stage which is focused on facilitating students' ability to argue, there are time constraints in conducting research. Based on the above explanation, the purpose of this study is to analyze the achievement of students' argumentation skills with the Creative Problem Solving (CPS) model on biodiversity material.

Method

Qualitative research with descriptive methods. The research was conducted in May 2024. The research location was carried out at one of the high schools in Bandung City, West Java. The research subject used in one of the X classes where the sample determination was

selected using purposive sampling technique from the entire population. The data collection procedure was carried out by giving questions in the form of essays totaling 12 questions with the provision of 50 minutes working time. The instrument used is in the form of questions to measure students' argumentation skills which refer to the indicators of argumentation skills. The written test score rubric for the quality of argumentation skills adapted from the Toulmin Argumentation Pattern level is presented (Erduran *et al*. 2007). The data obtained for each student is calculated as a percentage and then determined to be included in the appropriate level group (Karlina *et al*. 2021), so that the level can be determined with its qualifications.

Table 1. Argumentation Quality Level

Level	Criteria
1	An argumentative sentence is composed of a simple claim against a counterclaim or can be called a claim against a claim.
2	argumentation sentences are composed of claims with good data, warrant or backing, but do not contain elements of rebuttal
3	An argumentative sentence is composed of a series of claims with good data, warrant or backing with a weak rebuttal.
4	An argumentative sentence shows a claim with a rebuttal that can be clearly accepted. The argumentative sentence has several claims and backings, but none are required.
5	Argumentative sentences are composed of long statements, with more than one rebuttal.

Table 2. Assessment Interpretation Guidelines

Score Interpretation	Score Level	Qualification
$20\% \leq x \leq 35\%$	1	Very Weak
$36\% \leq x \leq 51\%$	2	Weak
$52\% \leq x \leq 67\%$	3	Simply
$68\% \leq x \leq 83\%$	4	Strong
$84\% \leq x \leq 100\%$	5	Very strong

Results and Discussion

Based on the results of the argumentation skills test to measure quality refers to the Toulmin Argumentation Pattern (TAP) which consists of levels 1-5. Argumentation skills are measured by students' ability to convey their claims, include data or facts to support ideas, explain the relationship between data and ideas appropriately, and provide theoretical justification so that ideas and data can be accepted, and be able to provide justification for ideas clearly. The results in the table are taken from quantitative calculations by calculating the presence of elements or indicators from the results of filling out 12 essay questions and given to 30 students as research subjects can be seen in Table 1. As follows:

Table 3. Quality of Student Argumentation with Creative Problem-Solving model

Argumentation Level	Frequency	Percentage	Qualification
Level 1	-		-
Level 2	4	10%	Very weak
Level 3	18	63.3%	Simply
Level 4	8	26.6%	Very weak
Level 5	-	-	-

Based on Table 1. above, the quality of learning argumentation using the Creative Problem Solving (CPS) model is at level 3 with sufficient criteria. Students have the highest number at level 3, totaling 18 students with a percentage of 63.3%. Students have begun to be able to state arguments with claim, data, warrant, backing and weak rebuttal, however, the rebuttal written by students is not necessarily considered correct or appropriate. A weak rebuttal is a rebuttal made without using any evidence (Jewaru *et al*., 2021; Nurramadhani

et al, 2017). In line with Arianti's research (2024), students mostly use field facts and the results of observing an object as a foundation for compiling argumentation. Students' argumentation skills at this level show that the argumentation made can be said to be sufficient but still needs to be improved again Noviyanti *et al*., (2019). Samples of students' argumentation skills can be seen as follows: Students at level 2 obtained a percentage of 10% and level 4 obtained a percentage of 26.6% with very weak criteria. It happens that students are less able to provide answers accompanied by evidence that supports or convinces the answers proposed are really right. One's argumentation is not only theoretical but must be proven. Students generally only use assurance of the claims they choose. This can happen because students are still less able to provide rebuttals with reasons for their discrepancies and do not explain the reasons for rejecting the proposed arguments. In the discussion process, students have the opportunity to argue and provide rejection of opinions that they consider inappropriate (Suraya *et al*, 2019).

Students at level 1 and level 5 with a percentage of 0%. At level 1 students are only able to make claims / statements based on the initial knowledge they know (Devi et al., 2018). At this level students do not include evidence, backing, or rebuttal related to the claim, so at this level it is very weak or cannot be empowered (Noviyanti *et al*., 2019). The low level of not reaching level 5 shows that students still have difficulty providing detailed answers. In line with Fitriyati's research (2018) students at this level have not been able to refute a statement that they consider wrong and have not been able to provide reasons for the statement they refute. While at level 5 the argumentation that is owned is more complex and broader in nature containing more than one rebuttal and reinforcement (Qualifier), students do not yet have broad arguments and successive rebuttals (Suraya *et al*, 2019).

Based on the overall results obtained, students are at level 3 quality level, which is the sufficient category. The argumentation skills possessed by students can be caused by several factors, the factors that influence the argument are students' understanding of the material and the involvement of reasoning activities during the learning process. With research, students' understanding works well when they are able to answer questions with different types of questions. Each individual has their own understanding of what they know in shaping student argumentation (Fatmawati, 2018; Wahdan *et al*., 2017).

Conclusion

Based on the results of research in measuring the achievement of students' argumentation skills using the Creative Problem-Solving model on biodiversity material referring to the Toulmin Argumentation Pattern consisting of levels 1-5, it can be concluded that the quality obtained by students at level 3 with a total of 18 students with a percentage of 63.3% of sufficient criteria. Students have begun to be able to state arguments with weak claims, data, warrant, backing and rebuttal. While the weakest at level 1 and level 5 criteria are very weak. This low argumentation ability must be improved again considering the importance of this ability in supporting the achievement of 21st century skills. Learning that involves students actively and is considered capable of training argumentation skills is one of the Creative Problem-Solving learning models.

References

Arianti, P. E., Yuliana, I. F., & Fatayah, F. (2024). Analisis kemampuan argumentasi ilmiah pada materi reaksi redoks di ma al-balagh bulutigo. *UNESA Journal of Chemical Education*, *13*(1), 46–51.

Devi, N. D. C., VH, E. S., & Indriyanti, N. Y. (2019). Analysis of high school students' argumentation ability in the topic of buffer solution. *JKPK (Jurnal Kimia Dan Pendidikan Kimia)*, *3*(3), 141-151.

Erduran, S., & Jiménez-Aleixandre, M. P. (2007). *Argumentation in science education: Perspectives from classroom-based research*. Springer Science & Business Media.

Fatmawati, D. R., Harlita, H., & Ramli, M. (2018). Meningkatkan kemampuan argumentasi siswa melalui action research dengan fokus tindakan think pair share. In *Proceeding Biology Education Conference: Biology, Science, Enviromental, and Learning*. *15*(1), 253-259.

Festiyed, F. (2009). Pengembangan Generic Life Skill Siswa Sekolah Menengah Pertama pada Pembelajaran Fisika.

Fitriyanti, F. (2017). *Profil Kemampuan Menulis Argumentasi Siswa SMP Melalui TAP (Toulmin's Argumentation Pattern) Pada Konsep Pemanasan Global* [Thesis]. Universitas Muhammadiyah Sukabumi.

Ginanjar, W. S., Utari, S., & Muslim, M. (2015). Penerapan model argument-driven inquiry dalam pembelajaran IPA untuk meningkatkan kemampuan argumentasi ilmiah siswa SMP. *Jurnal Pengajaran Matematika Dan Ilmu Pengetahuan Alam*, *20*(1), 32-37.

Hasnunidah, N., & Susilo, H. (2014). Profil perspektif sosiokultural mahasiswa dalam berargumentasi pada mata kuliah biologi dasar.

Huda, M. (2013). *Model-model pengajaran dan pembelajaran*. Pustaka Pelajar.

Jewaru, A. a. L., Parno, P., & Nasikhudin, N. (2021). Identifikasi kualitas argumentasi ilmiah siswa sma pada termodinamika. *Jurnal Pendidikan Teori Penelitian Dan Pengembangan*, *6*(9), 1436-1466.

Karlina, G., & Alberida, H. (2021). Kemampuan argumentasi pada pembelajaran biologi. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, *5*(1), 1–7.

Muthoifin, M., & Jinan, M. (2015). Pendidikan karakter ki hadjar dewantara: studi kritis pemikiran karakter dan budi pekerti dalam tinjauan islam. *Profetika: Jurnal Studi Islam*, *16*(2), 167-180.

Nisak, F. N. F., & Suprapto, N. (2022). Analisis kemampuan argumentasi ilmiah siswa dengan penggunaan media photovoice pada materi pembiasan cahaya. *IPF: Inovasi Pendidikan Fisika*, *11*(1), 35-45.

Noviyanti, N. I., Mukti, W. R., Yuliskurniawati, I. D., Mahanal, S., & Zubaidah, S. (2019, June). Students' scientific argumentation skills based on differences in academic ability. In *Journal of Physics: Conference Series*. *1241*(1), 012034. IOP Publishing.

Nurramadhani, A., Ms, H., & Rahman, T. (2017). Argument-Driven Inquiry (ADI): The way to develop junior high school student's argumentation skills in science learning. *In International Conference on Mathematics and Science Education*, 128-132.

Partayasa, W., Suharta, I. G. P., & Suparta, I. N. (2020). Pengaruh model Creative Problem Solving (CPS) berbantuan video pembelajaran terhadap kemampuan pemecahan masalah ditinjau dari minat. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *4*(1), 168-179.

Shoimin, A. (2017). *68 model pembelajaran inovatif dalam kurikulum 2013*. Ar-Ruzz Media.

Suraya, S., Setiadi, A. E., & Muldayanti, N. D. (2019). Argumentasi ilmiah dan keterampilan berpikir kritis melalui metode debat. *Edusains*, *11*(2), 233-241.

Tanfiziyah, R., Khasanah, M., Riandi, R., & Supriatno, B. (2021). Inovasi pembelajaran berbasis teknologi informasi: model learning cycle 5e menggunakan gather town pada materi protista:(information technology-based learning innovation: 5E learning cycle model using gather town on protista material. *Biodik*, *7*(3), 1-10.

Wahdan, W. Z., Sulistina, O., & Sukarianingsih, D. (2017). Analisis kemampuan berargumentasi ilmiah materi ikatan kimia peserta didik sma, man, dan perguruan tinggi tingkat I. *J-PEK (Jurnal Pembelajaran Kimia)*, *2*(2), 30–40.

Yuliati, Y., & Lestari, I. (2019). Penerapan model Creative Problem Solving untuk meningkatkan hasil belajar siswa pada pembelajaran ilmu pengetahuan alam di sekolah dasar. *Jurnal Cakrawala Pendas*, *5*(1), 32-39.