

Effect of Scientific Approach toward Students' Critical Thinking Skills

Triyani¹⁾, Lovy Herayanti^{2*)}, Syifaul Gummah³⁾

^{1,2,3)} Program Studi Pendidikan Fisika, FPMIPA, IKIP Mataram

*Email: lovyherayanti@ikipmataram.ac.id

Article History

Received: April 2019

Reviewed: May 2019

Published: June 2019

Key Words

Scientific approach;
Critical thinking skill

Abstract

The role of education is to improve the quality of education, especially in producing high-quality students. High-quality students are those who are able to think critically, creatively, logically and take initiatives in responding to issues in society caused by the impact of the development of science and technology. This study aims to determine the effect of a scientific approach to students' critical thinking skills. This study is an experimental research with one group pretest-posttest design. The sample of this study consisted of one class (28 students), which was treated using a scientific approach. Critical thinking skills are measured using a test instrument and then analyzed statistically (t test). Hypothesis test results indicate that there is an effect of using a scientific approach toward students' critical thinking skills.

How to cite this article?

Triyani., Herayanti, L., & Gummah, S. (2019). Effect of Scientific Approach toward Students' Critical Thinking Skills. *Lensa: Jurnal Kependidikan Fisika*, 7(1), 15-18.

INTRODUCTION

The rapid development of science and technology demands an increase in the quality of education. This is in line with the continuing development of education curricula in Indonesia that are tailored to the needs and latest technological developments. The educational curriculum implemented must be able to equip students to follow changes and growth in society, namely the ability to think at a high level, one of which is to build critical thinking skills. This is in accordance with the implementation of the 2013 Curriculum in learning which includes competency attitudes, knowledge, and skills in learning (Hariadi, 2017).

Efforts to improve the quality of students need to improve the quality of education. In improving the quality of education, the government has made many efforts to choose the learning process through teacher training, curriculum improvement and so on. The efforts made by the government seem to have not shown optimal results to students, because the low critical thinking skills of students are caused by some deviations from the rules that have been set. One form of deviation in the implementation of learning is that core activities are not optimal and fulfill the process of exploration, elaboration, and confirmation (Sanjaya, 2012). Wirtha & Rapi (2008) revealed that there are still many students who only memorize concepts, record what the teacher is preaching, passively, and rarely use initial knowledge as a basis for learning planning.

Based on the results of preliminary observations about the way teachers teach in Physics there are several interesting factors. The teacher in delivering the material is still dominated by the lecture method, this condition is less optimal in improving students' thinking skills, especially critical thinking, the teacher provides a way of proving the formula but there is no implementation to students to find themselves, students are only required to complete examples of questions in accordance with existing formulas and students rarely associate the material presented with everyday life, causing the level of thinking ability and understanding of concepts to be low. This is considering the importance of students' critical thinking skills that can have an impact on the achievement of learning goals. Critical thinking is a directed and clear process used in mental activities such as solving problems, making decisions, persuading, analyzing

assumptions, and conducting scientific research (Yustyan et al., 2016). In line with this opinion, critical thinking is a mental process for analyzing or evaluating information. Thus, critical thinking can train students to formulate and evaluate their own beliefs and opinions as well as those of others through a series of systematic processes (Uswatun & Widiyanto, 2018). Lack of skills in critical thinking will have an impact on the low awareness of the perspective and understanding of an event. This is in line with the opinion of Uswatun and Widiyanto (2018), namely that critical thinking can help in understanding how to look at yourself, how to see the world, and how to relate to others. Critical thinking helps to analyze one's own thinking to ensure that they have determined and drawn conclusions well.

Critical thinking skills of students can be developed through an approach that can maximize the achievement of the goals of critical thinking itself, namely to achieve a deep understanding of something that is studied through a series of directed and clear processes, so that the truth about it can be justified that, a scientific approach can be the solution of that problem. One of the characteristics of the learning process called scientific is that learning encourages and inspires students to think critically, analytically, and correctly in identifying, understanding, solving problems, and applying the substance or learning material. The scientific approach can provide direct experience through the learning process, and can provide a deep understanding (Sukroyanti, 2018). This study aims to determine the effect of scientific approach toward students' critical thinking skills.

METHOD

This research is an experimental research (pre-experimental designs) with one group pretest-posttest design. The population of this study was all students of grade XI SMA Islam Al - Azhar NW Kayangan in academic year of 2018/2019. Sampling uses a purposive sampling technique with consideration and results of discussions from class teachers at school. The sample of this study consisted of one class (experimental class), which was treated using a scientific approach. Instruments in this study include treatment instruments (syllabus, lesson plans, and worksheets) and measurement instruments (observation sheets and tests of critical thinking skills). Critical thinking skills test instrument in the form of 8 items, with measured critical thinking is the ability to find similarities and differences, ability to give reasons, ability to make conclusions, and ability to use acceptable principles (Herayanti & Habibi, 2015). Before being used, the validity of the test has been conducted. The data analysis of lesson plan implementation was performed by descriptive analysis, while analysis of students' critical thinking skills data was done by quantitative statistical analysis with hypothesis testing (t test), with a significance level of 0.05.

RESULTS AND DISCUSSION

Based on the results of research conducted can be presented research results on students' critical thinking skills. Tailored to the needs of the analysis, namely the analysis of hypothesis testing (t-test) students' critical thinking skills are taught using a scientific approach to the experimental class. Data on increasing students' critical thinking skills is used to determine students' critical thinking skills after being given treatment. The average value of students' critical thinking skills can be presented in Table 1 as follows.

Table 1. Average score of critical thinking (Pretest-Posttest) and N-gain

Class	N	Variable	Average score
XI-IPA	28	Pretest	47,21
		Posttest	83
		N-gain	0,83

Before being tested, the research instrument was tested on classes that had already gotten subject material wave characteristics. The instrument in this study consisted of 8 items. After being tested, the instruments were analyzed to determine their validity and reliability. A valid instrument is then used to measure students' critical thinking skills. Furthermore, the analysis of the results of the hypothesis test can be presented in Table 2.

Table 2. The t-test results (paired sampel test)

Table 2. The t test results (paired sample test)								
Paired Differences						t	df	Sig.
Mean	SD	SEM	95% CI of diff.					
			Lower	Upper				
Pre - Post	-35.96	10.05	1.89	-39.86	-32.06	-18.92	27	.000

Based on the results of hypothesis testing (t-paired sample t test) with the testing criteria if the significance value > 0.05 then H_0 is accepted and H_a is rejected, whereas if significance < 0.05 then H_a is accepted and H_0 is rejected. The results of the hypothesis testing of students' critical thinking skills on the principal of language wave characteristics can be seen in Table 2.

Based on the results of the analysis of the hypothesis test with the t test showed that there are significant differences between the level of critical thinking skills of students between pretest and posttest using a scientific learning approach in the experimental class. The results showed that there was an increase in the results of students' critical thinking scores between pretest and posttest after the application of the scientific approach in learning. In general, the increase in critical thinking skills of each indicator has increased. Ealborasi of research results can be stated that there is a learning effect with a scientific approach to students' critical thinking skills. This finding is in line with Herayanti & Habibi's (2015) research that critical thinking skills can be improved if using scientific-based learning methods, such as problem-based learning or inquiry learning. Scientific-based learning does train students in developing various high-level skills such as critical thinking skills.

Increased students' critical thinking skills in this study seem to be the effect of students' activeness in finding solutions to the problems presented and students are able to solve problems through group work, they seek solutions together then present their findings. With scientific learning, students will have the freedom to convey knowledge and students can find new ideas and concepts based on the problems presented. Students actively participate in the learning presented because students are given the opportunity to discover for themselves the knowledge to be conveyed through active learning. The discussion process that takes place in the experimental class is more active than before because students are more enthusiastic about discussing the results of the material directly rather than just listening from the teacher. This is in accordance with Wilcox's opinion in Slavin (2005), where learning with a scientific approach, students are encouraged to learn mostly through their own active involvement with concepts and principles, and the teacher encourages students to have experience and conduct discussions that allow them find principles for themselves.

CONCLUSION

Based on the results of research and data analysis, it can be concluded that there is an effect of the scientific approach toward the improving of students' critical thinking skills at grade XI SMA Islam Al - Azhar NW Kayangan.

SUGGESTION

In the future researchers are expected to be better at applying scientific learning methods and on different subject matter

REFERENCES

- Hariadi, D. (2017). Pengembangan Modul Akuntansi Berbasis Kontekstual Sebagai Pendukung Implementasi Kurikulum 2013 Pada Materi Pengkodean Akun Dan pencatatan Transaksi. *Jurnal Pendidikan Akuntansi (JPAK)*, 5(1).
- Herayanti, L., & Habibi, H. (2017). Model Pembelajaran Berbasis Masalah Berbantuan Simulasi Komputer untuk Meningkatkan Keterampilan Berpikir Kritis Calon Guru Fisika. *Jurnal Pendidikan Fisika dan Teknologi*, 1(1), 61-66.
- Sanjaya, I. P. H. (2012). Pengaruh Model Pembelajaran Inkuiri Laboratorium terhadap Keterampilan Berpikir Kreatif dan Keterampilan Proses Sains Siswa Ditinjau dari Kemandirian Belajar Siswa. *Jurnal Pendidikan dan Pembelajaran IPA Indonesia*, 2(2).
- Slavin, R. E. 2005. *Cooperative Learning Teori, Riset dan Praktik diterjemahkan oleh Narilita Yusron*. Bandung: Nusa Media.
- Sukroyanti, A., B. (2018). *Pengaruh Pendekatan Saintifik Terhadap Peningkatan Keterampilan Berpikir Kritis Mahasiswa*.
- Sukroyanti, B. A. (2018). Pengembangan Media Animasi Dengan Aplikasi Makromedia Flash Untuk Meningkatkan Keterampilan Berpikir Kritis Mahasiswa. *Lensa: Jurnal Kependidikan Fisika*, 6(2), 59-65.
- Uswatun, D. A., & Widiyanto, R. (2018). Analisis aktivitas peserta didik dalam pembelajaran berbasis scientific approach di sekolah dasar sebagai implementasi 21st century skills. *JIPVA (Jurnal Pendidikan IPA Veteran)*, 2(2), 174-188.
- Wirtha, I. M., & Rapi, N. K. (2008). Pengaruh model pembelajaran dan penalaran formal terhadap penguasaan konsep fisika dan sikap ilmiah siswa SMA Negeri 4 Singaraja. *Jurnal Penelitian dan Pengembangan Pendidikan*, 1(2), 15-29.
- Yustyan, S., Widodo, N., & Pantiwati, Y. (2016). Peningkatan Kemampuan Berpikir Kritis Dengan Pembelajaran Berbasis Scientific Approach Siswa Kelas X SMA Panjura Malang. *Jurnal Pendidikan Biologi Indonesia*, 1(2).