Jurnal Ilmiah Teunuleh
The International Journal of Social Sciences
Vol. 3, Issues. 1, Mar 2022 P-ISSN: 2807-193X | E-ISSN: 2746-4393

THE EFFECTIVENESS OF LKPD IPA BASED ON SCIENCE PROCESS SKILLS TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS ON SINGLE SUBSTANCE AND MIXED SUBSTANCES MATERIAL

Nora Deselia Saragih[1]
Medan State University
Email: 19961203n@gmail.com

Nurdin Bukit[2]
Lecturer at Medan State University

Sriadhi[3]
Lecturer at Medan State University

Abstract

The purpose of this study is to determine the feasibility and effectiveness of developing worksheets for science students based on contextual teaching and learning (CTL) to improve critical thinking skills. This research is based on development research, with a sample of grade V students of Binjai Methodist Private Elementary School. Data analysis techniques use descriptive studies and t-tests. The results of the research and conclusions in this study are: 1) For the feasibility test in this development research, namely the results of expert validation tests conducted on 3 experts, namely Indonesian experts, material experts and learning media experts. Obtained an expert score of Indonesian of 35 with a percentage of 72.92% (quite valid), then a score by a material expert obtained 55 with a percentage of 85.94% (Valid). Then the score by the learning media expert was 64 with a percentage of 69.75% (quite valid). The results of the field trial in this study obtained the number of scores from 28 students, the average score obtained was 49.07 with a percentage of 87.63% (Valid). For the effectiveness test, from the results of the calculation of the data obtained thitung = 8.34 from the distribution list t using the odds of 1-α = 0.95 with dk n-1 (27-1) = 26, obtained the price of ttabel = 4.25. So that a calculation of > ttable was obtained, with the hypothesis stated "There is an effectiveness of a Contextual Teaching and Learning (CTL) Based Science Student Worksheet on the material "single substance and mixed substance" in Class V of Binjai Methodist Private Elementary School"

Keywords: *Contextual Teaching and Learning, Critical Thinking Skills, Heat Transfer.*

A. Introduction

The way to train and develop learning in accordance with the advancement of science and technology is through science learning that emphasizes the approach of thinking skills. Science is the science of objects and phenomena obtained from the thoughts and research of scientists carried out with the skill of experimenting using the scientific method. Currently, Indonesia has participated in an international-scale assessment as an effort to educate Indonesia in competing with countries in the world, namely the Programme for International Student Assessment (PISA). Indonesia's ranking in PISA which assesses students' skills and abilities is still below average. The Organization for Economic Co-operation and Development (2019) explained the results of the assessment of science capabilities that had been carried out by the PISA team in 2018 that Indonesia was still ranked 71st out of 79 participating countries.

From year to year Indonesia's score in the field of science did not experience a significant increase. The low achievement of students in Indonesia in PISA is caused by several factors, one of which is the weak problem-solving ability of high-level questions. The questions used in the PISA study are questions consisting of contextual problems in everyday life to measure the ability to think at a high level. In dealing with these questions, students are required to think critically in answering PISA questions. So based on the results of the PISA study, it shows that the critical thinking skills of Indonesian students are still relatively low (Yusrizal & Pulungan, 2021b, 2021a). This is a special concern for the government and educators in Indonesia to be able to cultivate students' critical thinking skills in learning in schools.

In learning science, students should not only learn products, but should learn about aspects of processes, attitudes and technologies in order for students to truly understand science as a whole. But in fact, teaching is the transfer of knowledge from the teacher to the student. So it is not surprising why many teachers teach by means of lectures, because for them science is a set of knowledge that must be transferred to students (Firdaus & Wilujeng, 2018).

Nowadays, education requires human resources to have critical thinking skills. Critical thinking is part of a complex or high-level thinking pattern that is convergent. Critical thinking is a cognitive activity related to the use of reason. Learning to think critically means using mental processes, such as paying attention, categorizing, selection, and judging/deciding. Constructivism has influenced many studies of misconceptions and conceptions of alternatives in the field of science and today

science has shown a shift that emphasizes the teaching and learning process more and research methods that emphasize the concept that in learning a person contracts his knowledge. Dewey states that critical thinking is an active, persistent, and meticulous consideration of a belief or form of knowledge that is taken for granted from the point of view of the reasons that support it and the follow-up conclusions that are its tendency (Mahjatia et al., 2021).

Critical thinking skills are a student's ability to analyze arguments, make conclusions using reasoning, assess or evaluate, and make decisions or problem solving. Critical thinking is a process of making reasoned decisions based on the consideration of available evidence, analyzing and evaluating arguments from various points of view (Septiarini & Puspasari, 2020).

The rapid development of science today produces many concepts that students must learn through learning, while teachers are no longer able to teach many concepts to students. One of the alternative approaches developed in learning is learning with a process skills approach. The process skills approach is an insight into the development of intellectual, social, and physical skills derived from the fundamental abilities that have existed in principle in the student (Mulda, 2019).

Students form their own knowledge actively through interaction with their environment, since conceptual development is the result of the interaction between existing concepts and new experiences. Therefore, a process approach can provide opportunities for students to participate in the discovery process or compile a concept as a process skill. Thus a learning process is not only a transfer of knowledge.

B. Method

This research was conducted at SD Negeri 158468 Lumut 5, Lumut sub-District, Tapanuli Tengah District, Provinsi North Sumatra. The subjek of this research is all students of the class of SD Negeri 158468 Lumut 5 for the 2021/2022 School Year. This research is a Development Research. The learning tool development model used in this study is Thiagarajan's 4-D model, namely Define, Design, Develop, and Disseminate. The defining stage (Define) includes the initial analysis stage (front-end analysis), learner analysis, task analysis ,concept analysis, and formulating learning objectives (specifying instructional objectives). The design stage (Design) is carried out by designing a model of Student Worksheets based on Science Process Skills. At this stage, the preparation of research instruments is also carried out. The development stage

(Develop) is carried out by implementing learning tools and instruments that have been validated. The dissemination stage (Disseminate) is the stage of disseminating the product from the development. This data collection uses a questionnaire sheet and an LKPD validation sheet.

C. Finding and Discussion

1. Finding

a. Data Analysis of Material Expert Validation Results

Table 1. The results of the Assessment by the Material Expert on the KPS-based LKPD IPA

No.	Indicators	Mean Score	Criterion
1.	Aspects of Content Eligibility	3,6	Very Valid
2.	Aspects of Language Eligibility	3,7	Very Valid
3.	Aspects of Presentation Feasibility	3,3	Valid
4.	PPP Assessment	3,8	Very Valid
Sum		**3,66**	**Very Valid**

Expert assessment of material in the LKPD IPA based on the PPP table above is based on four aspects, namely, aspects of content feasibility, aspects of language feasibility, aspects of presentation feasibility and PPP assessment The table shows an average value of 3.6 each in the aspect of content feasibility, 3.7 in the aspect of language feasibility, 3.3 in the aspect of presentation feasibility, and 3.8 in the PPP assessment. Overall, this aspect is in the "very valid" category, which means that the use of PPP-based science LKPD meets the needs of students. Thus, the PPP-based LKPD IPA is stated to be able to be tested in the field with revisions.

The results of the assessment of learning materials on the basic competencies of single substances and mixed substances show some comments and suggestions that are not conceptual errors and can be corrected through revision.

b. Data Analysis of Material Expert Validation Results

Table 2 Results of Assessment by Media Experts on PPP-based IPA LKPD

No.	Indicators	Mean Score	Criterion
1.	LKPD Size	4,0	Very Valid
2.	LKPD Cover Design	3,5	Valid

3.	LKPD Content Design	3,7	Very Valid

The results of the assessment of the learning media show some comments and suggestions that are not conceptual errors and can be corrected through revision. The PPP-based LKPD IPA by media experts was declared worthy of field trials with revisions to the less parts.

c. Analysis of the Effectiveness of Student Learning Outcomes in Trial II

The test results obtained by the researchers were analyzed to see the completeness of students in learning trial II. Criteria: 0% of birth control ≤ < 70% of students have not finished learning, 70% of kb ≤ ≤ 100% of students have completed learning. Based on the criteria for the completion of learning trial II which is compiled based on student abilities, it is classified in the complete criteria, including:

Table 3. Results of Pre-test and Post-test Trial II

Results of Pre-test Trial II		Test Post-test Results II	
Average	60	Average	75,44
PKK	34 %	PKK	88 %

Based on individual learning completion data according to the results of student abilities, it is known that there are 17 students who are "incomplete" and there are 8 students who are "complete". Meanwhile,based on data on individual learning provisions according to the results of student abilities, it is known that there are three students who are "not complete" and there are 22 students who are "complete".

Based on the classical learning completion data above, there are 88% of students who have achieved birth control ≥ 70%. Based on data on student learning outcomes in trial II, it can be classified in complete and incomplete levels. For that can be seen in the following table.

Table 4. Learning Outcomes Completeness Data

No.	Number Range	Frequency	Percentage	Criterion
1	70-100	22	88 %	Complete
2	0-69	3	12 %	Incomplete
Sum		25	100%	

Based on the results of data analysis in the table , 88% or 22 students were declared complete. Meanwhile, those who have not been completed are 12% or 3 people. After the completion of students in learning individually and classically in the analysis, the results of the pretest and posttest are calculated with a gain score to see

an increase in the value and effectiveness of LKPD developed between before and after using the gain score.

Based on the gain score, the result obtained is 0.38. The gain score in trial II is still relatively moderate. Overall, the results of the analysis of trial data II showed that the science process skills-based LKPD IPA (PPP) had met the effective criteria. Thus, it is known that the results of trial II are better than trial I. This is because the learning media used in trial II is a revised learning media from revision I learning media, it can be concluded that the KPS-based science LKPD to improve students' critical thinking skills developed has been effective.

2. Discussion

One of the objectives obtained from the development of learning tools in this study is to improve students' critical thinking skills. Zahroh & Yuliani (2021) in their research stated that LKPD can constructthe thinking and improve the ability of students to analyze and evaluate lesson concepts in solving problems. When students have mastered the ability to analyze and evaluate, they can be said to be able to think critically. This is also in line with the research of Sari et al (2019) in their research stated that student worksheets can be a supporting alternative to train critical thinking skills in students, so that students can easily understand a problem encountered in everyday life then analyze the problem by identifying the problem, looking for clear references, and accurately to answer the problem that occurs.

Based on the results of the analysis of improving students' critical thinking skills in trial I and trial II, it shows that children's critical thinking skills have improved as seen fromthe student's learning outcomes before using LKPD and after using LKPD. The increase in learning outcomes can be seen by the percentage of learning completion in trial I, which was 76% and 88% in trial II with excellent categories. The increase in learning outcomes can also be seen from the gain score in trial 1 only getting 0.38 medium categories with an average pretest of 48 and posttest 70, so it is necessary to carry out trial design II. In trial II, a gain score of 0.49 in the medium category was obtained with an achievement of pretest 60 and an average posttest of 75. So it was concluded that the thinking skills of the students improved with an afternoon gain of 0.49 in the moderate category.

Based on the exposure and analysis of data on critical thinking skills above, it is known that LKPD science learning based on science process skills encourages students

to be able to communicate things that have been understood to build new knowledge through the discovery of answers to a problem.

D. Conclusion

The conclusions in this study are based on the findings from the research data, the systematics of the presentation is carried out by taking into account the research objectives that have been formulated. The conclusions include:

1. Based on the validation results of material experts 3.66 (very valid) and media experts 3.66 (very valid), the LKPD IPA developed is included in the criteria very well and is declared valid and suitable for use.
2. Based on data on the completeness of students' critical thinking before using LKPD science obtained an average score of 60 while after using LKPD obtained data on the completeness of critical thinking of students on average 75 with a gain score of 0.49 falling into the moderate category. Based on these data, science process skills-based science LKPD is declared effective for use in learning.

Bibliography

Firdaus, M., & Wilujeng, I. (2018). Pengembangan LKPD inkuiri terbimbing untuk meningkatkan keterampilan berpikir kritis dan hasil belajar peserta didik. *Jurnal Inovasi Pendidikan IPA*, *4*(1), 26–40. 10.21831/jipi.v4i1.5574

Mahjatia, N., Susilowati, E., & Miriam, S. (2021). Pengembangan LKPD Berbasis STEM untuk Melatihkan Keterampilan Proses Sains Siswa Melalui Inkuiri Terbimbing. *Jurnal Ilmiah Pendidikan Fisika*, *4*(3), 139. 10.20527/jipf.v4i3.2055

Mulda, A. D. (2019). Pengembangan Lembar Kerja Peserta Didik Berbasis Keterampilan Proses Sains pada Pembelajaran Biologi SMP Kelas VIII. *Prossiding Seminar Asional Biologi VI*, 132–135.

Sari, K., Sujarwanta, A., & Santoso, H. (2019). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Pembelajaran Biologi Berbasis Keterampilan Berpikir Kritis pada Materi Ekosistem MTs Kelas VII. *Jurnal Lentera Pendidikan Pusat Penelitian LPPM UM METRO*, *4*(1), 63–72. https://ojs.ummetro.ac.id/index.php/lentera/.

Septiarini, A., & Puspasari, D. (2020). Pengembangan LKPD Berbasis HOTS dan Inkuiri Terbimbing Pada Mata Pelajaran Otomatisasi Tata Kelola Humas dan Keprotokolan Kelas XII OTKP Semester Gasal di SMKN 10 Surabaya. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *8*(1), 9–21. https://journal.unesa.ac.id/index.php/jpap

Yusrizal, Y., & Pulungan, S. A. (2021a). Pengaruh Model Project Based Learning dengan Metode Visit Home dan Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa di Era Covid-19. *ESJ (Elementary School Journal)*, *11*(3), 222–229.

Yusrizal, Y., & Pulungan, S. A. (2021b). The Effect of Project Based Learning Model on Student Mathematics Learning Outcomes in the Covid-19 Pandemic Era. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, *4*(4), 7810–7816.

Zahroh, D. A., & Yuliani. (2021). Pengembangan E-LKPD berbasis literasi sains untuk melatihkan keterampilan berpikir kritis peserta didik pada materi pertumbuhan dan perkembangan. *Jurnal Bio Edu*, *10*(3), 605–616.