



DEVELOPMENT OF CONTEXTUAL TEACHING AND LEARNING-BASED IPA STUDENT WORKSHEETS TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS

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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 method is development research. The sample of this study was a grade V student of Binjai Methodist Private Elementary School. The data analysis techniques in this study are 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 expert validation test conducted on 3 experts, namely Indonesian experts, material experts and learning media experts. obtained a score by an expert Indonesian of 35 with a percentage of 72.92% (quite valid), then a score was obtained by a material expert where the score was obtained 55 with a percentage of 85.94% (Valid). Then a score was obtained by a learning media expert of 64 with a percentage of 69.75% (quite valid). The results of the field trial in this study were obtained the number of scores obtained from 28 students, the average score obtained was 49.07 with a percentage of 87.63% (Valid) 2. For the effectiveness test, from the results of the calculation of the data obtained $t_{count} = 8.34$ From the distribution list t using the odds of $1-\alpha = 0.95$ with $dk n-1 (27-1) = 26$ obtained price $t_{table} = 4.25$. So that $t_{count} > t_{table}$ is obtained, thus the hypothesis states "There is an effectiveness of the Contextual Teaching and Learning (CTL) Based Science Student Worksheet on the Heat Transfer material in Class V of Binjai Methodist Private Elementary School".

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

A. Introduction

Education is very important for humans, because with education humans can gain knowledge and skills and can develop their abilities, attitudes and behaviors. Some of the challenges in the 21st century are climate change, global poverty, population growth, war in the 21st century (all out war), species extinction (losing species), creativity, trans humanism, and the separation between skills and wisdom (skill and wisdom gap) (Fatmawati & Yusrizal, 2021) . To face these challenges, the quality of science education in Indonesia not only needs to be improved on the cognitive dimension, but also on the skills dimension in science learning. One of the skills needed in the 21st century identified by the Assessment and Teaching of 21st Century Skills (ATC21S), namely the way of thinking (Griffin, McGaw, & Care, 2012). Ways of thinking include creativity, innovation, critical thinking, problem solving, and decision making (Hasibuan et al., 2021; Yusrizal & Pulungan, 2021b, 2021a).

According to Wagner (2010) and the Change Leadership Group of Harvard University, the competencies and skills required by students in dealing with life, the world of work, and citizenship in the 21st century are emphasized on the following seven skills: (1) critical thinking and problem-solving skills, (2) collaboration and leadership, (3) agility and adaptability, (4) initiative and entrepreneurial spirit, (5) being able to communicate effectively both orally and in writing, (6) being able to access and analyze information, and (7) having curiosity and imagination. Critical thinking skills have long been explicitly developed abilities in learning. Zubaidah (2016) suggests that students must be able to find various solutions from different points of view in solving complex problems. Critical thinking skills can also be improved through the CTL (Contextual Teaching and Learning) approach. This is in line with the research of Sudarmiani (2020), Silvia druru, et al (2018), and Hasruddin, et al (2015) which concluded that critical thinking skills can be developed through the CTL (Contextual Teaching and Learning) approach.

This opinion is in line with the results of research by I Wayan Sadia (2008: 219) that according to teachers, the learning model that is seen as making a significant contribution in developing students' critical thinking skills is contextual learning. CTL helps learners develop their intellectual potential by directly teaching the steps that can be used in critical and creative thinking and providing an opportunity to use these higher-level thinking skills in the real world (Johnson, 2009: p. 182).

Other alternatives to improve critical thinking skills by using learning models were carried out by Duran and Dökme (2016), Fuad, Zubaidah, Mahanal, and Suarsini (2017),

Ikayanti, Suratno, & Wahyuni (2017), Mahanal, Zubaidah, Bahri, and Syahadatud (2016), and Wannapiroon (2014). The results of these studies can improve critical thinking skills, but are highly dependent on student interaction with teachers during learning.

The CTL approach is an approach that can help students in relating the material learned to the real life of everyday students, both in the family, school, and community environment. Thus learning will be more meaningful. CTL can turn a regular program, a program that is not attractive to students, into a dynamic program, so that they can achieve a high standard sepriyanti, et al (2017, 233). The seven components in CTL learning are constructivism, finding (inquiry), questioning, learning community, modeling, reflection, and autententic assessment (authentic assessment) (Sanjaya: pp. 264-268).

Contextual learning is learning that allows a learning process where students use their understanding and academic abilities in various contexts inside and outside of school to solve simulative or real problems, either alone or together. Contextual learning provides a stimulus to the brain for processing materials meaningfully (Hasruddin, 2015: 11).

In addition to using various methods and strategies to achieve the expected learning objectives in the learning process in the classroom, teachers also use various tools as support in teaching such as package books, learning media, and Student Worksheets (LKPD). Usually LKPD is used for each subject as a tool for teachers in providing concise material along with questions that students can do. Interviews conducted with several class V science teachers in August 2020, showed that learning with the 2013 Curriculum has been carried out smoothly, but there are still obstacles in it related to the existence of LKPD based on the 2013 Curriculum.

LKPD is one of the teaching materials that is used as a tool to support learning objectives. Trianto (2009: p. 222) defines that LKPD is a student guide used to carry out investigation and problem-solving activities. LKPD can also be defined as printed teaching materials in the form of twin-sheets of paper containing material, summaries, and instructions for the implementation of tasks that must be done by students, which refers to the KD achieved (Prastowo, 2014: p. 204).

Each LKPD contains, among others: a brief description of the material, the purpose of the activity, the tools or materials needed in the activity, work steps, questions to be discussed, conclusions on the results of the discussion, and test exercises. So, LKPD can be interpreted as sheets used by students as guidelines in the learning process, and

contain tasks done by students both in the form of questions and activities that will be carried out by students. This is in accordance with the definition of LKPD according to Andi Prastowo (2013: 204) where student worksheets are defined as a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for the implementation of learning tasks that must be done by students with reference to basic competencies (KD) that must be achieved.

From some of the understandings above, the author concludes that LKPD is in the form of instructions or guides and steps to complete a task and also a guide for cognitive aspect development exercises as well as a guide for the development of all aspects of learning in the form of printed teaching materials / books containing summary materials, questions (questions) and is also a learning tool that can be used by teachers in increasing the involvement or activities of students in the learning process teaching which contains student activities that allow students to carry out real activities with the objects and problems studied.

The existence of innovative and creative LKPD will create a more enjoyable learning process. Therefore, it is a must that every educator or prospective educator be able to prepare and make innovative teaching materials. In preparing, teachers must be careful and have adequate knowledge and skills, because an LKPD must meet at least the criteria related to the achievement or not of a basic competency mastered by students. Given the importance of creating a good LKPD, before making the LKPD itself, it should be necessary to pay attention to several steps. According to Alan (2012: 23) the steps to make LKPD are: (1) The material must refer to the curriculum; (2) Pay attention to individual differences, because in the 2013 Curriculum emphasizes competence, the LKPD must be able to measure the abilities of students; (3) Activities support the understanding of concepts, activities in LKPD help understand the concepts studied; (4) Activities are associated with real and technological activities; (5) Have clear learning goals; (6) Make the subject matter and its details; (7) Use simple, clear and easy-to-understand sentences; (8) Have a sequence that is in accordance with the abilities of students; (9) Encourage learners to learn and work scientifically; (10) There is a congruence between the material and the time available; (11) Used to carry out activities or problem solving and drawing conclusions.

B. Methods

This research is a development research (Development Research). According to Sugiyono (2008: 407), research and development (research and development) is a research method used in order to produce certain products and test effectiveness. In this study, what was developed was teaching materials in the form of student worksheets based on the CTL approach. This research will be carried out at the Binjai Methodist Private Elementary School. The subjects in this study were students of Binjai Methodist Private Elementary School consisting of 6 (students) of class V for trials with the ability to learn science evenly as many as 28 people.

C. Finding and Discussion

1. Finding

- a. Results of the Feasibility Test of Student Worksheets (LKPD) of Contextual Teaching and Learning (CTL) Based Science

From the expert validation test conducted on 3 experts, namely Indonesian experts, material experts and learning media experts. obtained a score by Indonesian expert Mrs. Dr. Elly Prihastuti Wuriyanti, M.Pd of 35 with a percentage of 72.92% (quite valid), then a score was obtained by material expert Dr. Ridwan Abdul Sani, M.Pd where the score was obtained 55 with a percentage of 85.94% (Valid). Then a score was obtained by a learning media expert of 64 with a percentage of 69.75% (quite valid). Here's the table:

Table 1. LKPD expert test

No	Expert Name	Expert	Score	Maximum Score	P (%)	Category
1	Dr. Elly Prihasti Wuriyanti, M.Pd	Indonesian	35	48	72.92	Enough Valid
2	Dr. Ridwan Abdul Sani, M.Pd	Material	55	64	85.94	Valid
3	Dr. Samsidar Tanjung, M.Pd	Learning Media	64	92	69.57	Enough Valid

Based on the table, it is stated that the results of the feasibility test of the science student worksheet (LKPD) based on contextual teaching and learning (CTL) are declared suitable for use for elementary school students.

b. Results of the Effectiveness of Student Worksheets (LKPD) science based on Contextual Teaching and Learning (CTL)

The formulation of the second problem about the effectiveness test was carried out on 27 students, the following is the data of the effectiveness test in learning through LKPD:

Table 2. Effectiveness Test Data

	Pre Test Value (X1)	Post Test Value (X2)
Sum	1623.33	2128.33
Average	60.12	78.83
STDEV	9.65	8.51

From the results of the calculation of the data above obtained $t_{count} = 8.34$ From the list of t attribution using the odds of $1-\alpha = 0.95$ with $dk\ n-1\ (27-1) = 26$ obtained price $t_{table} = 4.25$. So that $t\ count > t\ table$ is obtained, thus the hypothesis states "There is an effectiveness of a Contextual Teaching and Learning (CTL) Based Science Student Worksheet (LKPD) on the "Heat Transfer" material in Class V of Binjai Methodist Private Elementary School".

2. Discussion

From the expert validation test conducted on 3 experts, namely Indonesian experts, material experts and learning media experts. obtained a score by Indonesian expert Mrs. Dr. Elly Prihastuti Wuriyanti, M.Pd of 35 with a percentage of 72.92% (quite valid), then a score was obtained by material expert Dr. Ridwan Abdul Sani, M.Pd where the score was obtained 55 with a percentage of 85.94% (Valid). Then a score was obtained by a learning media expert of 64 with a percentage of 69.75% (quite valid). The results of the field trial in this study were obtained the number of scores obtained from 28 students, the average score obtained was 49.07 with a percentage of 87.63% (Valid).

Based on previous research journals on the development of LKPD, namely Nurul Hidayati's research (2014) So far, the process of developing science teachings in elementary schools has not provided optimal opportunities for students to improve the skills of the science process. Science kits have not been used optimally because teachers have not developed LKPD based on science kits. This research is an R&D study with LKPD results based on IPA Kits. The development steps carried out are: (1) Analisis product, (2) Initial product development, (3) validation and revision, (4) Small-scale field trials and revisions. The results of the quality feasibility study by material experts got the category

"san gat baik ", by media experts got the category "good", by linguists got the category "good". The results of small-scale trials show that there is an improvement in basic science process skills in every aspect. This is in line with Rahayu (2021) who explained that the development of LKPD is very necessary.

For related research that tests effectiveness is a study by Pradika (2022) This research aims to (1) describe the design and development of interactive E-LKPD, (2) know the feasibility of interactive E-LKPD, and (3) know the effectiveness of interactive E-LKPD. The development model used is ADDIE. Data collection methods used methods of interviews, observations, questionnaires and tests. The data analysis used is quantitative descriptive analysis, qualitative, descriptive statistics and inferential statistics. This interactive E-LKPD is worth using, this is evidenced by the results of the learning content expert test 98.7%, learning media expert 98.6%, learning design expert 100%, individual test by teacher 97.5%, student 93.3%, small group test 96.1%, field test 95% qualified very well. The results of the effectiveness test showed that interactive E-LKPD based on local wisdom was effective in increasing the competence of Balinese language knowledge as evidenced by the results of the t-test obtained $t_{count} = 6.1665$, $t_{table} = 2.086$. This means $t_{count} > t_{table}$ so that H_0 is rejected and H_1 is accepted. Thus, interactive E-LKPD based on local wisdom on Balinese script material is effectively applied to grade V students of SD Negeri 8 Banjar Anyar.

Purwaningrum (2022) This development research aims to test the feasibility of products in the form of digital-based student worksheets as an online learning innovation with Natural Science subjects. The feasibility test results from peers received a good response with an average of 90.4% followed by one-on-one (individual) tests with an average result of 90%, in small group tests obtained an average of 87%, and in large group tests obtained 88%. Based on validation from experts and trials that have been carried out, digital-based student worksheets as an online learning innovation are worthy of use in the learning process. From the results of this effectiveness test, it can be concluded that LKPD has a significant influence on students' critical thinking ability.

D. Conclusion

Based on the results of the study, it was concluded that the feasibility test in this development research was an expert validation test conducted on 3 experts, namely Indonesian experts, material experts and learning media experts. obtained a score by Indonesian expert Mrs. Dr. Elly Prihastuti Wuriyanti, M.Pd of 35 with a percentage of

72.92% (quite valid), then a score was obtained by material expert Dr. Ridwan Abdul Sani, M.Pd where the score was obtained 55 with a percentage of 85.94% (Valid). Then a score was obtained by a learning media expert of 64 with a percentage of 69.75% (quite valid). The results of the field trial in this study were obtained the number of scores obtained from 28 students, the average score obtained was 49.07 with a percentage of 87.63% (Valid). And for the effectiveness test, from the results of the calculation of the data obtained $t_{\text{count}} = 8.34$ From the list of distributions t using the odds of $1-\alpha = 0.95$ with dk $n-1$ $(27-1) = 26$ obtained price $t_{\text{table}} = 4.25$. So that $t_{\text{count}} > t_{\text{table}}$ is obtained, thus the hypothesis states "There is an effectiveness of a Contextual Teaching and Learning (CTL) Based Science Student Worksheet (LKPD) on the "Heat Transfer" material in Class V of Binjai Methodist Private Elementary School".

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