



THE DEVELOPMENT OF WORKBOOK DARTS-BASED TO INCREASE STUDENTS' CRITICAL THINKING SKILL ON THE CONTAMINATED ENVIRONMENT

Zakki Ichwan¹, S.M.E. Susilawati² dan S.H. Bintari³

¹ Madrasah Aliyah Negeri Putussibau, Kalimantan Barat

² Educational Science (IPA), Postgraduate, Semarang State University

E-mail: zeromind85@gmail.com

ABSTRACT

This research aims at developing DARTs-based LKPD to improve students' critical thinking in material of contaminated environment, describing the result of DARTs-based LKPD characteristics, testing it's feasibility, effectiveness students' achievement. This research is a research and development. The DARTs-based LKPD was tested in the class X-7 that had 30 students. Based on the result of this research, it showed that the feasibility of LKPD developed entirely was 4.5 categorized very valid. The students' responses toward the developed LKPD on small-scale was score 4.2 categorized very good. The result of average activities groups which have students who have critical thinking along learning of observation was 4.2 categorized very critical. The classical completeness of students learning outcome on the big-scale test was 90% that means it was over it classical minimum had been mad. According to the result of this research, it could be included that the DARTs-based LKPD developed based on the developed characteristics was very properly used, effective enough the students learning outcome of MA Negeri 1 Semarang.

Keywords: critical thinking, DARTs, students' workbook.

INTRODUCTION

In the learning process cannot be separated with activity of reading texts. Some students are bored if they get a text even which they do not comprehend what they read. To make reading can be meaningful for students, a teacher has to provide a text which can interact them to communicate with the text.

Majid (2005) states a text is one of important learning sources. Learning source is a recommended object and subject that is used to do activity in learning process. One of important learning source is a book which has main subjects and additional books also students' worksheet (LKPD).

According to the finding of *Programme for International Student Assessment* (PISA, 2012), students' interest in learning and science of Indonesia was two of the lowest with its score 375 and Peru was the lowest one with its score 368. Meanwhile, China was the highest with its score 613. The findings of PISA shows that the

weaknesses of students' interest in reading and science in Indonesia.

LKPD contains students' worksheet and exercises, it also includes summaries of subject. It is one of facilities to help and make them easy to do activity in learning process. It makes effective interactions between students and teacher, so it can increase the activity in learning process for them to enhance their achievement.

According to Robbin (2005) critical thinking skill is a skill that can be taught, so the skill can be learnt. One of ways to develop critical thinking is throw learning biology. According to Fachrurazi (2011) critical thinking skill can be a skill that is very needed in other to students are able to face changed conditions or challenges in learning process. LKPD DARTs-based can drill students to think higher or higher order thinking skill (HOTS), critical thinking is one of steps to be higher order thinking. Liliyasi (2009) states biology education can develop the skill of critical thinking of students if it

is printed out in a learning model that can be developed conceptual framework for students effectively.

The term of *DARTs* stands for *Directed Activities Related to Texts* which can be meant as directed activities with text or topic. *DARTs* can be applied into many kinds of situation that students do not always need to do experiment directly, students understanding toward context on LKPD *DARTs-based* and skill logic of students and argumentation that will built students critical thinking skill. The LKPD concept with *DARTs-based* in biology is expected that students are able to identify problems, comprehend facts, make decision around the nature and changed environments.

The contaminated environment in Biology learning was collaborated with a learning model *DARTs-based* or guided activities in reading texts. *DARTs* can be “*Reconstruction DARTs*” and “*Analysis DARTs*”. According to Wray & Lewis (Monks, et al. 2000) states that *DARTs* activities can make students to be critical thinkers and researchers. Texts as facilitation to learn Biology through *DARTs* can be student’s worksheet or LKPD which its components are adjusted with *DARTs* forms and it should increase the critical thinking of students. Conducting at Madrasah Aliyah Negeri 1 Semarang and interviewed the teachers that LKPD which spread out had many short texts, so it was not interesting for students. LKPD used did not increase critical thinking. The students had not drilled yet in improving critical order thinking. The use of developed LKPD through *DARTs-based* was expected helping teachers to increase reading activities, critical thinking, and creativity, develop process skill and collaboration. This aim of research is how the feasibility of LKPD which consists of language, developed presentation is and also how the effectiveness of LKPD through *DARTs-based* increase students’ critical thinking.

METHODS

This research was designed as *Research and Development*, development of LKPD *DARTs-based* to increase critical thinking skill. This research had been held on April to Mey 2015 at 10th class of Madrasah Aliyah Negeri 1 Semarang. It was undertaken to produce a particular product and test its effectiveness (Sugiyono, 2011). The developed instruments of research were syllabus, lesson plan, material, students worksheet (LKPD) in the material of contaminated environment. After doing the developed LKPD *DARTs-based*, there would be a research which aims to see properness, affectivity, and influence of LKPD *DARTs-based* that has been developed toward learning outcome of students.

The analyzed skills in this research were critical thinking which could be seen from twelve sub indicators of thinking: 1) focus on simple elaboration, 2) analyze argument, 3) question and answer the clarification and question challenge, 4) consider if the source is believable or not, 5) observe and consider observation, 6) deduce and consider deduction, 7) induce and consider induction, 8) make and examine the values of consideration, 9) identify terms and consider definitions, 10) identify assumption, 11) decide an action, and 12) interact with other people in which every indicators have sub indicators as the reference to decide the level of higher order thinking of students. Critical thinking skill could not be practiced in one or two meetings. Therefore, the researcher divided into every sub which were taught twice in 6 meetings in other to it fulfils the twelve indicators of critical order thinking and did it in group.

RESULT AND DISCUSSION

As the result analysis of research above, it got the result that LKPD *DARTs-based* can be one of choice as a media which helps learning especially in learning contaminated environment. LKPD *DARTs-based* has been developed in this research has been valid and proper to be used in learning. The developed LKPD *DARTs-based* was potential to increase students critical thinking skill and effective so, it increase students’ competence.

Results score by experts about LKPD *DARTs-based* with contaminated environment as the theme that had been developed in learning material showed the score 4,5 that categorized very good which means it was very proper to use (Table 1). This result is suitable with the assessment of developed LKPD *DARTs-based* showed it was very good which means it was very proper to use. LKPD *DARTs-based* on the small-scale of response test that aimed to test its clarity, it showed that LKPD *DARTs-based* was very good. As the suggestions given by the validators of material, it needed to have additional references, revision from error typing, unclear pictures, concept the biology material. LKPD *DARTs-based* also needs revision for right spelling (EYD). The assessment of developed LKPD *DARTs-based* showed its score 4.5 categorized very good, it means it was very proper o use (Table 2). The suggestion from the validator, LKPD had to use a formal, communicative, and was easily understood language for students to study the subjects especially its pictures which should be clearer and reduce the mistaken typing so that it could be proper to use as a learning media. The result of small-

scale toward LKPD *DARTs-based* to KIR group showed the developed LKPD categorized very well (Table 3). The result of assessment showed language aspect got lower score than other aspects, meanwhile the presentation aspect got maximal scores. The given suggestions were the questions had to be direct short questions, some unsuitable words in EYD, put additional attractive pictures and clear those pictures, and other comment that given toward LKPD was the problems which appear on daily life.

The big-scale test was conducted at X.7 class which consists of 30 students. The obtained data consisted of the result of students learning outcome, activities of critical thinking of students, learning outcome showed 90% which means it was complete (Table 4). A class could be complete (classical completeness) if 85% of students had achieved the classical completeness 80% from total of students with standard minimum score (KKM) ≥ 75 has been considered by MAN 1 Semarang with the highest score was 95 and the lowest was 60. There were 4 students could not KKM, it was caused they were passive in discussing and they also did not understand the questions well. It was also caused by kind of questions which need high skill in analyzing and evaluating them so, it requires the regular exercises in teaching and learning process (Suryanti, 2008).

The average data of activity each groups on the big-scale test during discussion about contaminated environment as the theme was 4.7 with categorized very critical that showed there were well interactions and responses between a group and other groups that have different arguments (Table 5). Such case was proven that the students were more spirit and enjoyable joining the learning process used LKPD *DARTs-based* about contaminated environment as the theme which has been developed than memorizing the material only that applied in previous learning biology. The developed LKPD *DARTs-based* was able to encourage students to think critically and develop their own concept to accomplish a problem and they were also able to combine with the nearby environment through the provided pictures and problems in the LKPD *DARTs-based*. The improvement of learning outcome and activity from critical thinking of students were good

because they were able to have logic and argument during learning process.

The result of carrying out the activities in critical thinking group in which students used LKPD *DARTs-based* on indicator of analyzing argument got the score 3,7 included the lowest category. It was caused every groups had been accustomed yet applying the learning process through the activities of critical thinking in which it demands analysis skill. Generally the students had activities of high order critical thinking. Indicator of interaction with other people got 4,7 categorized very critical and it was the highest score. It was caused every groups had been able to interact each other to process recycling some wasted products into worth things with their own deal and they were able to present it.

By applying LKPD *DARTs-based* students learnt how to understand a phenomena problem that was happening on their environment, identify the problem, understand the facts, and make a decision about the nature and changes of environment through reading text of *DARTs*. This is suitable with Cimer's opinion (2012) that if students did not enjoy with the way of knowledge that taught, they enable to show no interest and negative attitude toward the knowledge and teaching process. It means that their interest toward the developed LKPD *DARTs-based* could increase their learning outcome meanwhile uninteresting attitude toward the developed LKPD *DARTs-based* will decrease their learning outcome especially on the contaminated environment as the theme.

The students also could work together and help each other in their own group and communicate and share their arguments with other groups. This is suitable with an opinion by Khalil & Rukban (2010) that a discussion will facilitate students' skill in working together and causes they learn independent so, it increases their achievement. Purbaningsih (2013) states that the applying group discussion could increase the critical thinking skill. Based on the obtained data from the assessment of validator, learning outcome, student's activities, and students' responses had reached the decided indicators, so LKPD *DARTs-based* is very proper to use on the subject of contaminated environment on second semester at class X of MA Negeri I Semarang.

Table 1. The Result of Assessment Validation for the Subject

No.	Component Aspects	Score		Average
		Vdr I	Vdr II	
1	The properness of presentation	4,7	4,7	4,7

2	The properness of content	4,0	4,8	4,4
3	The properness of language	4,7	4,3	4,5
	Average			13,5
	Total of average Vdr			4,5
	Category	Very well		

Tabel 2. The Result of Assessment Validation of LKPD *DARTs-based* by Experts

No.	Component Aspects	Score		Average
		Vdr I	Vdr II	
1	The properness of presentation	4,3	4,7	4,5
2	The properness of content	4,3	5	4,7
3	The properness of language	4,4	4,0	4,2
	Average			13,4
	Total of average Vdr			4,5
	Category	Very well		

Table 3. The Result of Small-scale of Students' Response toward the Clarity of LKPD *DARTs-based*

No.	Assessment aspects	Average
1	The properness of presentation	4,3
2	The properness of language	4,1
3	The properness of content	4,2
	Average	4,2
	Category	Very well

Table 4. The Completeness of Students Learning

Class	Number of students	Complete	Incomplete	The average test score	The highest score	The lowest score	Completeness
Experiment class	30	27	3	79	95	60	90%

Table 5. The Accomplished Activity of Students' Critical Thinking by Using LKPD *DARTs*

No	Critical Thinking Skills	Total Indicator	Category
1	Focus on questions on basic explanation	3,8	Critical
2	Analyze arguments	3,7	Critical
3	Question and answer the clarified and challenge questions	4,0	Critical
4	Consider if the source can be trusted or not?	4,1	Critical
5	Observe and consider the result of observation	4,3	Very Critical
6	Deduce and consider the deduction	4,3	Very Critical
7	Induce and consider the result of induction	4,3	Very Critical
8	Make and examine the values of decision	4,3	Very Critical
9	Identify terms and consider definitions	4,4	Very Critical
10	Identify assumptions	4,5	Very Critical
11	Decide an action	4,5	Very Critical
12	Interact with other people	4,7	Very Critical
	Total score of Activity of Critical Thinking	50,71	
	Average of Activity of Critical Thinking	4,2	
	The Entire Categories		Very Critical

Based on the result of research can be concluded that the test for the propeness of content, language and presentation through LKPD *DARTs-based* is very proper to use. This is proven from the result of validation and small-scale responses are very proper. The implementation of the developed LKPD *DARTs-based* on the contaminated environment as the theme is effective to increase students' critical thinking skill.

Suryanti. 2008. *Model–Model Pembelajaran Inovatif*. Surabaya: Universitas Negeri Surabaya.

REFERENCES

- Cimer, A. 2012. What Makes Biology Learning Difficult and Effective: Students' views". *Educational Research and Reviews*, 7(3): 61-71.
- Fachrurazi. 2011. Penerapan Pembelajaran berbasis Masalah untuk Meningkatkan Kemampuan Berpikir kritis dan Komunikasi Matematis Peserta Didik Sekolah Dasar". *Jurnal UPI* (online). 1: 76-89. Tersedia: <http://jurnal.upi.edu/file/8-Fachrurazi.pdf>. (diunduh 8 Maret 2014).
- Liliasari. 2009. Berpikir Kritis dalam Pembelajaran Sains Kimia, Menuju Profesionalitas Guru. Dalam http://file.upi.edu./SPS/DirektoriSPS/PRODI.PENDIDIKAN_IPA/194909271678032LILIASARI/BERRPIKIR_KRITIS_Dlm_Pembel_09.pd. Diunduh tanggal 09 Juni 2014.
- Majid, A. 2005. *Perencanaan Pembelajaran*, Bandung: Rosda Karya.
- Monks, F.J. Konoeks, A.M.P., Haditono, S.R. 2000. *Psikologi Perkembangan dalam Berbagai Bagiannya*. Yogyakarta: Gadjah Mada University Press.
- PISA. 2012. Assessment Framework. (on line). Tersedia: <http://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf> (diunduh 9 Maret 2015).
- Purbaningsih. 2013. Penerapan Metode Diskusi Kelompok untuk Meningkatkan Kemampuan Berpikir Kritis Siswa dalam Pembelajaran IPS: *Jurnal online* 1(1): <http://pips.upi.edu/contents-journal-5.html> (diunduh pada 5 Agustus 2015).
- Robbin, S. 2005. The Path to Critical Thinking. On line at <http://hbswk.hbs.edu/archive/4828.html> (diunduh tanggal 5 Agustus 2015).
- Sugiyono. 2011. *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.