



Development of Envirokal Booklet Media Based Problem Solving Material Environment Pollution

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Abstract

The aim of the research is to know the worthiness and the effectiveness of Envirokal (Environment of Pekalongan) booklet with problem-solving method in the lesson of environmental pollution against student's learning outcome. The research is done at Senior High School 3 Pekalongan with a Research and Development (R&D) design, with 10 steps of research starting from the needs assessment, until obtaining the final product, i.e. booklet. The assessment done by the experts shows that the Envirokal Booklet obtained high scores as and it was concluded that the Envirokal Booklet was very effective to be used as learning material and could increase the individual score and classical completeness.

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INTRODUCTION

The results of the observation did in a few school in Pekalongan showed that the source of learning used in biology class by the students were books and assignment sheet. Course and exercise inside this source, according to Bloom's Cognitive Taxonomy, most of it are in C1 and C2 levels, which make it less adequate in case of engaging students to do critical thinking while facing the real life around them, especially in environmental problem. Furthermore, the obtained data shows that students who passes the minimum criteria in course of environmental pollution are 60%. According to the interview results with the students, it is known that the book they used is thick, lots of courses, and less visualization. Because of this, the students are less interested to study with the book.

Choosing and using the right media will improve student's interest and motivation towards learning so that it can improve the students learning outcome. One of the most effective media used to improve the learning outcome is booklet. Research done by Imtihana *et al.* (2014) about booklet media based on research, it is proven that this media could ease the students to understand the course. Another research done by Pralisaputri *et al.* (2016) showed that booklet development based on SETS is effective to enhance the cognitive, affective, and psychomotor learning outcome of the students. It is marked by the lots of question asked and critical opinion by the students.

The booklet presentation should not be like book which directly show the course. Directly showing the course tend to emphasize the students to recite the course. Mayer (2002) stated that recitation only make the student remember the information given. If they are given a problem, they can't use the information gained by reciting to diagnose the problem. This could create a difficulty for the students to look for alternative solution. Besides, curriculum of 2013 emphasize contextual learning for the students so that they could have a critical thinking ability to apply their gained knowledge to encounter problem in real life.

Regarding this matter, then it is necessary to create a learning booklet based on problem solving method which could improve the critical thinking ability from the students. According to Ennis (2011), critical thinking is thinking with reason and reflective emphasizing to take a decision about what to believe and to do. Problem-solving learning strategy is a learning strategy which is giving the students an experience to solve the problem with reasoning. Tan (2004) stated that, if the students are given a problem, they will feel more challenged to solve it. It will create an impact for the students to think deeper looking for solution.

One of the biology course in X grader is environmental pollution. All this time, environmental pollution course studied in the senior high school in Pekalongan by recitation and textual. According to Sutarno, executive officer of environmental office in Pekalongan, the rivers in Pekalongan are polluted because of solid waste disposal or batik wastewater discharge without proper treatment. Therefore, the environmental pollution study should be done contextually by direct observation in the polluted place. But, limited time in study lead to less effective study if the observation done in learning time.

Based on the problem above, the developed booklet must be contextual. Contextual learning encourage students to associate their knowledge with their own life. Therefore, the booklet title will be Envirokal Booklet. Envirokal means Environment of Pekalongan. Envirokal Booklet is designed to be the booklet which is filled by environmental pollution course and lift the real environmental problem in Pekalongan as a learning material. The problem given inside the booklet must be solved by the given solution from the students through discussion and practical training. So, the booklet advantages which is going to be developed is booklet will be filled by the real problem so that the students will learn contextually. This could enhance the critical thinking from the students and they can apply their knowlededge to solve the real problem in environment around them.

The research will be done at Senior High School 3 Pekalongan. The reason behind it that this school has not done any practical training because of some of their limited ability which can be solved by the booklet and the students character supported learning by discussion and friend tutor. School facilities support this activity. The teachers response to the developed media are supportive and they believe that the media are suitable for the students to study

The aim of the research is to know the Envirokal booklet qualification and effectivity based on problem solving method in the course of environmental pollution as learning material.

RESEARCH METHOD

The research is done at Senior High School 3 Pekalongan in odd semester in 2016-2017 period. The methods used in this study is *Research and Development (R&D)* consists of 10 steps (Sugiyono, 2015). Sampling methods used is *Purposive Sampling* method. Experimental design utilized is *Pre Experimental Design with One Group Pre-test Post-test Design*. The aim of the research is fulfilled when the classical students learning outcome shows that $\geq 80\%$ students get mark ≥ 77 .

RESULTS AND DISCUSSION

The results of the study shows that the Envirokal booklet is effective to improve the students learning outcome. Effectivity of this study is the students activity and improvements of the student's concept understanding. The data about students activity while in class can be see in Table 1.

Table 1 Total Percentages of Student's Discussion Activity Through Learning Process

No.	Criteria	1 st Meeting (%)	2 nd Meeting (%)
1.	Very Active	17,2	25,7
2.	Active	57,1	68,6
3.	Quite Active	25,7	5,7
4.	Not Active	0	0

Students in very active and active criteria has increased through the meeting with the percentage of 8,5 % dan 11,5 %.respectively. While the students in quite active criteria are decreased 20%. The results of the study shows that the developed Envirokal booklet is effective to improve the students learning outcome. It is supported by Farkhana *et al.* (2017) that using booklet in learning may enhances the students learning activities.

The students activity is increased because the teacher give more explanation that stimulate students to ask and give an opinion. Moreover, reward or positive stimulus accepted by the students from the first meeting triggered students to be more active in the next meeting. It is implied by Rohmah (2011) that through learning process, the teacher activities which stimulates the students to be more active are giving questions that stimulate for more question and opinions, checking through the discussion between students and giving reward for those who is active through learning process.

Based on observation, students are more easily to discuss with their friends rather than ask a question to the teacher. The students are not hesitate to ask their questions, share their opinions and solutions from their team mate. It is fit with Saumi *et al.* (2014) that learning with their friend tutor are giving the calm yet serious atmosphere. It makes the student is not hesitate to ask and share their opinions with their friend.

The students activity is increased in discussion and practical training. It is because of the booklet persuade the students to explore the problem happened in environment and how they can

solve it. It is fit with Sari (2015) that exploration activity in learning improve the ability of problem solving students which it is marked by lots of difference answers among students.

Course in booklet presented clear and brief. Therefore, students become more active to look for knowledges from different resource. It is suitable with Septiani *et al.* (2013) that learning material which is effective to improve this activity is media which is not detail.

Ability to share their opinions and ask are increased because students presented their group discussion results in front of another group. Presentation become a greater forum with other groups. Presentation encourage students to share their opinions with another group discussions and the teacher as mediator to make sure that there will be no any misconceptions among students. Istikomah *et al.* (2010) state that presentation provoke the students to be more open minded against another opinion. Moreover, students are challenged looking for the best answer in presentation because in this activity, another student will disagree with the opinion if it is not the truth.

Critical thinking ability of the students is increased. It is marked by more students who shares their arguments and questions according with the topic. It is stated by Ristiasari *et al.* (2012), that problem solving proved to create an effective atmosphere and improved critical thinking ability from the students.

Based on observation, there is an indicator which can't be fulfill. It is that the students didn't write down the discussion result. They don't write it because they are throwing responsibilities among the others. According to Dewi dan Indrawati (2014), it is true that writing is important for learning because writing make knowledge is stay longer in the brain.

Another indicator is that discussion in order because they discuss another thing outside the topic and group that can not make it time. Voice among students makes hard to concentrate in learning process.

The next data about the booklet effectivity is data about students learning outcome which is increasing of the understanding of the concepts. Increasing of understanding concepts is analyzed with N-gain and completeness classical analysis. Data N-gain shown on the Table 2.

Table 2 Recapitulation Results of N-gain Test

No.	Result	Sum
1.	Pretest mark averages	56,3
2.	Posttest mark averages	82,2
3.	Maximum point	100
4.	N-gain averages	0,59
5.	N-Gain criteria	Sedang

Using envirokal booklet, it is gain N-gain 0,591 which is showed that it is getting middle. It is according to Mahendrani dan Sudarmin (2015) which stated that the development of Ethno Sciences Photography .which is applied in learning is effective which is proved by increased learning outcome from cognitive aspect with N-Gain 0,5.

There are 5 students which the pretest marks are not suffice. According to the observation, the students tend to be passive among discussion. The students who don't past the minimum criteria confuse to choose the answers because it is long and almost similar. They confuse and eventually choose the wrong answer. According to Adiputra (2012) the good deception created in tests must be collected from group which their concepts is weak so that they could get better questions.

Envirokal booklet applied in Senior High Schiil 3 Pekalongan is known to improve the studentes knowledge. It is because the activities done are discussion and practical learning. The students are forming group consists of 2 students to discuss problem and their problem solving. It is fit with Adnyana (2009) who find the facts that problem solving model able to create an interaction

between students in dynamics so that it could motivate the students to learn more. Discussion through learning help the students to keep the concept he has given longer (Rohmawati *et al.* 2017). The next data is about classical minimum criteria for students to pass. It could be seen at Table 3.

Tabel 3 Final Recapitulation Test

No.	Test Results	Sum
1.	Average final mark	84,5
2.	Highest final mark	92
3.	Lowest final mark	78
4.	Those who cannot pass	0
5.	Those who pass	35
6.	Classical completeness	100%

Table 3 shows that data with envirokal booklet giving positive impact. It is marked by 100% completeness and minimum criteria to pass is 77. The indicator is done and success with classical completeness $\geq 80\%$. It is supported by Imtihana *et al.* (2014) that booklet based on research is effective as learning material. Minimum passing criteria at Senior High School 3 Pekalongan is 75, but it is raised become 77. It is to prove that booklet developed is effective to improve their classical completeness.

Learning with Envirokal booklet effective to open their mind about environmental problem around them. Students are more motivated to study because they are not learn everything at once. They are given course step by step so they could get understand easier. It is according to Loibl dan Rummel (2014) that problem solving learning it is not done by giving everything at once. It is being emphasized that students need to understand the concepts step by step until they know the whole knowledge.

CONCLUSION

The conclusions is that the developed Envirokal booklet based on problem solving course of environmental pollution is effective to improve the students learning outcome.

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