



Implementation of Jelajah Alam Sekitar-based Worksheets on Environmental Pollution Subject

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Abstract

Implementation of Jelajah Alam Sekitar-based worksheets (JAS) aims to improve student learning outcomes at SMP Negeri 38 Semarang. JAS-based worksheets were developed that uses environmental conditions of school. Treatment group using JAS-based worksheets that has been developed uses environmental condition of school. Control group using worksheets and learning with cooperative model in a discussion method. This research was conducted using Quasi experimental design with a Non-equivalent Control Group Design. Population of this research is all of 7th grade student at SMPN 38 Semarang. The samples that were used are 7th D and 7th A were taken by purposive sampling. The results showed that the learning outcomes treatment group are better than control group in terms of cognitive, psychomotor and affective aspects (discipline and cooperation attitude). The results of the cognitive and psychomotor aspects t-test results $t_{cal(0.05)} = 4.63$ and $t_{cal(0.05)} = 4.18$ with $t_{table} = 2.02$ ($t_{cal} > t_{table}$). The treatment group cognitive and psychomotor aspect was significantly different with control group. The average of treatment group affective aspect (discipline and cooperation) was classified in the very good category. But, environmental care attitude of treatment group wasnot significantly different with control group ($0,69 < 1,67$). Based on this result, it is concluded that implementation of JAS-based worksheets on environmental pollution subject was improved cognitive, psychomotor and affective (discipline and cooperation) learning outcomes.

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INTRODUCTION

The environmental condition at SMPN 38 Semarang were of concern. Industrial area causes a lot of garbage accumulation at environmental school. The density of the vehicle makes air pollution on environmental school. Learning process mostly be held at the classroom because environmental condition at SMPN 38 Semarang. The learning process at SMP 38 Semarang was teacher-centered. Teacher-centered learning makes one direction learning that causes students only listening. The learning process in SMP 38 Semarang makes slightly student motivation. Students was accepting and memorized all of material from the teacher. Afzal (2010) The study found positive and mutually causal relationship between student's motivation and student's academic performance. This relationship is reciprocal, meaning students who are more motivated perform better and student who perform better become more motivated. students who are intrinsically motivated perform much better academically than students who are extrinsically motivated. For this reason, student-centered learning and fun learning is needed to improve motivation and learning outcomes.

Exploration and investigation, costructivism, process skills with cooperative learning was found on JAS approach (Ngabekti *et al.* 2017). The components of the JAS approach are exploration, constructivism, science processes, learning communities, bioedutainment, and authentic assessments (Mulyani *et al.* 2008). Learning approaches with science process skills improve student learning outcomes in chemistry subject (Abungu *et al.* 2014). The component of JAS approach properly with a student-centered science process and fun learning. Exploration and science process, makes student building their own knowledge. Their own knowledge should be more meaningful and improved learning outcomes. Bioedutainment provides enjoyable learning process and optimized learning outcomes.

The research results showed that learning with JAS approach which resources of Biology Laboratory and Educational Garden of Unnes had a significant effect to the activities and results in Biodiversity concept to X graders of MA Al Asror Gunungpati. (Alvitasari *et al.* 2016). JAS approach opens students' insights to learning through real conditions. Learning outcomes from JAS was more efficient because learning process through the real conditions (Mulyani *et al.* 2008). Based on that research, JAS is one of approach that can increased knowledge. The application of JAS approach is expected to increased of environmental knowledge that affected increases of environmental awareness. Azhar *et al.* (2015) positive relationship was shown between environmental knowledge and ethics, to attitudes and environment behavioural.

Learning community in JAS approach shown that learning outcomes are obtained from collaboration with others. Learning outcomes are sharing between friends, groups, those who knew and those who doesn't knew (Ngabekti *et al.* 2017). Student worksheet is one of the teaching materials that can be used in groups. Data on various schools in Turkey several types of Worksheets have been developed to improving academic ability. Worksheets have been developed was worksheets about knowledge, teaching concepts, practicum and skills. The majority of worksheet developed about knowledge. Skills worksheets is really need to developed (Kaymacki, 2012). The uses of worksheets in the learning process also can improved student learning outcomes on chemical equilibrium subject (Yildirim *et al.* 2011).

Implementation of JAS-based worksheet on environmental pollution subject, facilitated students to contextual and enjoyable science processes. This learning optimized the teacher's role as a facilitator, not the teacher who presented the materials. Students doesn't

memorizing the materials, learning can be more fun and learning outcomes improved. Improved the learning outcomes are also expected to improve students' environmental care attitudes.

RESEARCH METHOD

This research was used Quasi Experimental Design research design with Non-Equivalent Control Group Design. The population used seventh grade students of SMPN 38 Semarang at academic year 2016/2017. The research sample was taken by purposive sampling technique (Sugiyono 2013), 7th A and 7th D with reasoning of the mean and learning problem similarity. The procedures of this research: (1) Initial observational to identified problems with direct observation of the school to interviewed subject teachers and students; (2) Data collection from the odd semester biology report grade VII of SMP Negeri 38 Semarang; (3) Determining the treatment and control group with purposive sampling technique; (4) Design for learning activities and learning devices that will be applied; (5) Verifying of instruments; (6) Analyzing the results including validity, reliability, level of difficulty and appropriateness ; (7) Implemented that JAS-based worksheets on environmental pollution subject; (8) Analyzing student learning outcomes and student responses to learning (9) Constructing the results and discussion research.

RESULT AND DISCUSSION

The results of research were included student learning outcomes (cognitive, psychomotor, affective) and student responses. The results of the research are presented as follows.

Students cognitive learning outcomes

Cognitive learning outcomes of students using JAS-based worksheets are presented in table 1. The JAS-based worksheets used in this research were included water, air and soil pollution activities at environmental school. H_0 in this research is the between the pretest-posttest treatment and control group wasn't significantly different.

Table 1 The results of posttest cognitive aspects with t-test

Group	Mean	N	t_{cal}	$t_{table(0,05)}$	$t_{table(0,01)}$	Criteria description
Treatment	80	32	4,63	2,02	3,36	Treatment and control group was significantly different.
Control	70					

Table 1 with $n = 32$ ($t_{cal} > t_{table}$) so that H_0 be rejected and H_a be accepted. The result concluded that treatment and control group learning outcomes significantly different that uses JAS-based worksheets instead of control group that uses discussion method.

The learning outcomes average of treatment and control group was caused of implemented of JAS-based worksheets that increased students enthusiastic. Environmental observations make te real environmental problems. Students easier to understand the subject because the real environmental problems. Games and outdoor learning provided a new atmosphere that makes students more interested in learning activities. Theory that supported

this research were behavioristic and constructivism theory. Schunk (2012) Thorndike statement that responses of stimulus strengthened by satisfying affect. Constructivism argued that human was active students that own knowledge developed. The results of this research was conducted by Ngabekti *et al.* (2017) the meta-analysis result shows the effectiveness of JAS implementation proved in 97% of researches about JAS. Many types of research proved JAS approach succeeded in increasing the study result, can differentiate the resulting study between experiment class and control class where the experiment class has a higher average score.

The average of pretest and posttest cognitive learning outcomes students on environmental pollution subject was 60,94 and 70. The pretest and posttest control group showed an N-gain = 0.19 with a low category. The average cognitive learning outcomes of treatment group was 54.22 of pretest and 79.61 of posttest. The increase in the value of the experimental class pretest and posttest shows the value of N-gain 0.56 with the medium category. Implementation of JAS-worksheets making a participatory and interactive learning increased. JAS-based worksheets makes communicating of groups increased. Scientific work or practicum carried out that students are directly involved and the lasts longer informations. The principle of JAS-based worksheets paralleled with opinion of Marianti and Kartijono (2005) The JAS approach is a learning approach that utilized the natural environment lives of students both physical, social and cultural environments as learning objects of biology by studying the phenomenon through scientific work.

Student psychomotor learning outcomes

Students' psychomotor competencies were assessed based on nine aspects. Analyzing psychomotor learning uses environmental pollution management ideas. The result of the treatment and control group skills were presented in Table 2.

Table 2 The results of environmental pollution management ideas with t-test

Group	Mean	N	t_{cal}	$t_{table(0,05)}$	$t_{table(0,01)}$	Criteria description
Treatment	81	32	4,18	2,02	3,36	Treatment and control group was significantly different.
Control	73					

Based on table 2, the average of treatment group environmental pollution management ideas were 81 and control group were 73. The t-test with $n = 32$ $t_{cal} > t_{table}$, H_0 be rejected and H_a be accepted. The result concluded that treatment and control group psychomotor learning outcomes significantly different that uses JAS-based worksheets instead of control group that uses discussion method. This research showed that JAS-based worksheets improved psychomotoric student learning outcomes. The opened of practicum stages make explorative student of environmental condition. The exploration of environmental condition makes active students and psychomotoric aspect improved. Samitra (2016) JAS approach improves science process skills and learning outcomes. The exploration and observation based on environmental conditions involved intellectual interdisciplinary, physical, emotional and science process skills. Science process skill improved when implementation of JAS. Yildirim (2017) outdoor learning activities contribute to cognitive, linguistic, motor and social-emotional development of preschool children. It can be recommended that outdoor activities given in a framework of a programme should be

increased in preschool years. Teachers should be informed about outdoor education through pre- and in-service teacher training programmes and outdoor education should also be incorporated into teacher education curricula.

Students affective learning outcomes

Students affective learning outcomes were included environmental care, discipline and cooperative attitudes. The result of environmental care attitudes was presented in table 3.

Table 3 The result of pretest and posttest environmental care attitudes with t-test

Data	Group	Mean	S	t_{cal}	t_{table}	Criteria description
<i>Pretest</i>	Treatment	82,46	135,35	0,05	1,67	Treatment and control group wasn't significantly different.
	Control	82,59	67,99			
<i>Posttest</i>	Treatment	85,15	63,16	0,69		
	Control	83,63	79,57			

Based on table 3 t-test with $\alpha = 5\%$, $n = 32$ and $t_{table} = 1,67$ $t_{cal} < t_{table}$, H_0 was accepted and H_a was rejected. The results of pretest and posttest treatment and control group showed that there weren't significantly differences. The previous studied which states that JAS can improved students' environmental awareness (Fakhriyah 2017). But the level of environmental awareness of secondary school students in Balikesir Turkey is high level, but does not affected to participation of the environment and the environmental care attitude of students. However, it is understood that environmental disclosures made in schools are insufficient and the participation level of students to environmental activities is low. Students rather gain experiences in the field of environment from mass media (i.e. audio, printed and visual media). Science and technology-based curricula must be applied and supported by visual media so that students' environmental care attitudes and behaviors increased (Altin 2014). The uses of JAS-based worksheets has been science-based student learning based on environmental conditions with practicum. The uses of picture and video has been applied to the learning process. However, environmental care attitudes influences wiht other factors besides knowledge and environmental school.

Environmental care attitude were influenced by three factors, namely knowledge, individual internal awareness and individual environmental factors. Internal awareness and environmental conditions are two factors that interacted with environmental care attitudes. The social environment, information sources and availability of facilities significantly influences environmental attitudes (Rahman 2016). The environmental conditions of SMPN 38 Semarang were of concern. Industrial area causes a lot of garbage accumulation at environmental school. The density of the vehicle makes air pollution on environmental school. Public environmental awareness was of concern. Organic and anorganik waste doesn't been removed separately. The information and facilities to concern about public environmental awareness is low.

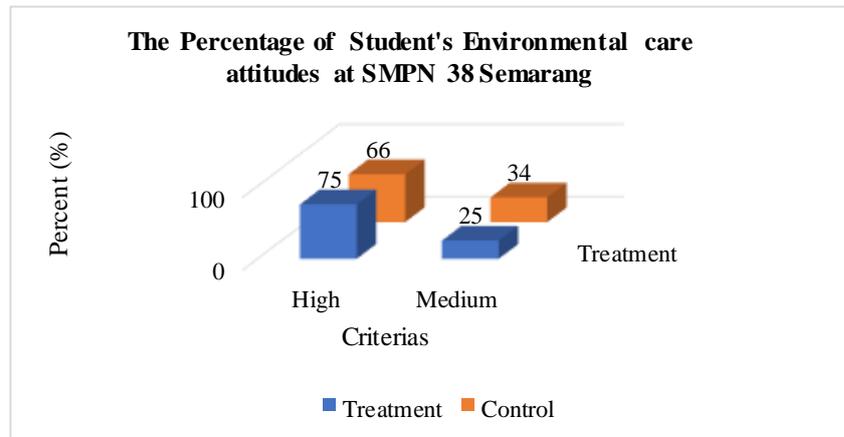


Diagram 1 the percentage of student's environmental care attitudes at SMPN 38 Semarang

Based on table 4, treatment group of environmental care attitudes was 75% in high criterias and 25% in medium criterias. The control group of environmental care attitude was 65.6% in high criterias and 34.4% in medium criterias. Treatment and control group doesn't low criterias. The differences percentage of environmental care attitude at the high criterias between treatment and control group was 9.4%.

The cognitive development by Piaget depended in four factors: biological growth, experience with physical environment, and equilibration. The equilibration was biological motivation to created an equilibrium condition. The equilibration was behavior coordinated from three factors and makes the mental's structure and environmental external reality was consistent for the others. Social cognitive theory was human behavior is not only to adapted with the tendency of other people. Human behavior was motivated and regulated with internal standard of people (Schunk 2012). Self-awareness and environmental conditions were found in student's behavior was related to environmental awareness.

The environmental care awareness measured using questionnaires, literature studies, and documentation studies. The result showed that school environment had affected on the environmental care attitude of students in SMA Negeri Kabupaten Cianjur (Tamara 2016). In this study, the assessment to measured environmental care attitudes once during research with questionnaires about environmental awareness. Measurements of environmental care attitudes should be continuously and uses the specifically questionnaires related to the JAS approach. Researchers should be observe students 'daily activities' to get the maximum changes in students' environmental care attitudes. The results of discipline and cooperative attitudes shown that significantly differences between treatment and control group. These attitudes have increased after the implementation of JAS-bades worksheets on environmental pollution subject.

Discipline and cooperative attitudes were assessed based on six aspects. Discipline and cooperative attitudes analyzed descriptively. Descriptive analyzing aims to knew the criterias of six aspects. The result of treatment and control group discipline and cooperative attitudes is presented in Table 5.

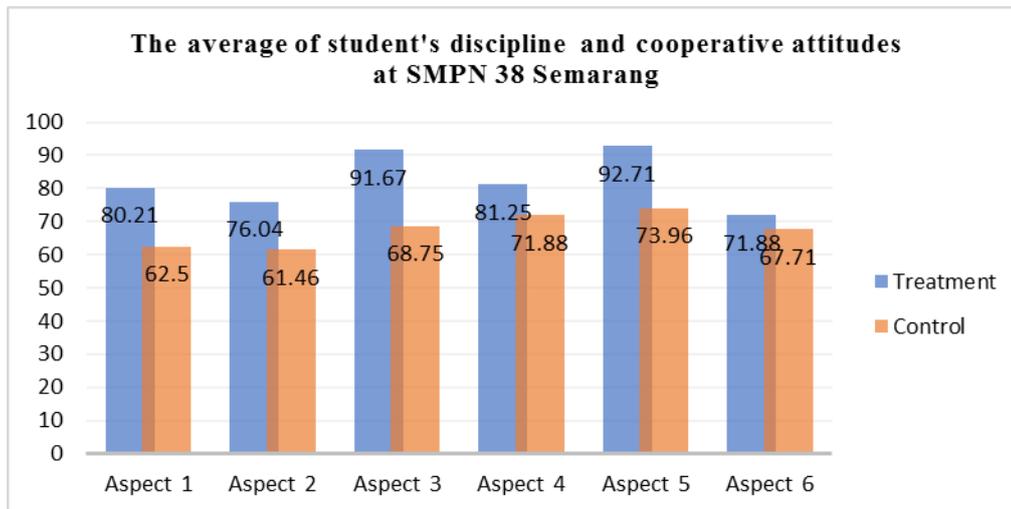


Diagram 2. the average of student's discipline and cooperative attitudes at SMPN 38 Semarang

Table 5 about discipline and cooperation attitudes was showed that implementation of JAS-based worksheets on environmental pollution subject based on six aspects. The average treatment group was 82.29 in the good criterias and control group was 67.71 in the medium criterias. The implementation of JAS in the learning process can developed students' softskills, and makes students discipline and cooperative was improved.

JAS-based worksheets use the environmental conditions of SMPN 38 Semarang (ecological approaches to classroom management). The ecological approaches to classroom management involved that students-direct participating and cooperative attitudes was improved. The ecological approaches to classroom management makes better discipline of students that learning can be held. The results of this study are in line with the article from (Osher, 2010) This article surveys three approaches to improving school discipline practices and student behavior: ecological approaches to classroom management; schoolwide positive behavioral supports; and social and emotional learning. This article identified the transactional nature of discipline, the multiple factors that affect discipline, and the importance of the schoolwide context. It examined three approaches to creating a disciplined school environment and suggested how they could be integrated or aligned.

The collaborative student worksheet allows student to do a research and conduct an experiment on a topic of their interest and ability under supervision of a teacher also to encourage students to participate in class in order to improve their affective scientific collaborative, i.e. focus on tasks and participation, positive interdependence and shared responsibility, were actively involved in the discussion, sharing information while performing experiments, and work together in teams and social skills e.g. interaction with friend and teacher can also increase student' interest and attention to a lesson. Using the collaboration student worksheets in learning, student will be able to evaluate their own learning outcomes, develop their ability of creative skills, do experimental in laboratory and helps students to understand the material by themselves (Astutik et.al 2017). Friends in the same group help each other and clarify things for each other and because of the positive collaboration that takes place in the group students finish their tasks in a relatively short time were the basic positive attitudes of Kurdish students towards group work in the classroom (Othman 2015).

Based on the two studies, improvement group collaboration has impacted on student discipline attitudes.

The implementations of JAS-based worksheets on environmental pollution subjects was well-responded by grade 7th D. The average of student's response questionnaire was 86% in very good criterias. The implementation of JAS-based worksheets has positive effect in cognitive, psychomotoric and affective (discipline and cooperative attitudes) learning outcomes. The result of student responses showed that JAS-based worksheets: (1) help students to understand the environmental pollutions, (2) interesting and fun learning makes enthusiastic of learning environmental pollutions was improved, (3) the environmental conditions of SMPN 38 Semarang makes that direct-learning experience, (4) the environmental conditions of SMPN 38 Semarang was giving real problems about environment, (5) students environmental knowledge was improved, (6) improving curiosity about environment and biology.

CONCLUSION

The results of research can be concluded that implementation of JAS-based worksheets on environmental pollutin subject had significantly affected on cognitive, psychomotor and affective (discipline and cooperative) students learning outcomes of SMP 38 Semarang.

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