



DEVELOPING LEARNING DEVICE BASED ON LOCAL FEATURE: WASTE AND RECYCLING OF WASTE

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ABSTRACT

Learning device is one of important thing in learning program. This study was aimed to develop local feature-based learning device of waste and recycling of waste subject matter and testing the effectiveness local feature-based learning device toward student achievement. The learning device was developed on the basis of needs analysis and particular literature reviews. Learning device was implemented on 33 students in SMA N 1 Wanasari grade 10th at 2014/2015 period. Validity of learning device was assessed by experts from university teachers of Unnes Semarang. Lesson plan, module and student worksheet were classified as "highly valid". N-gain test indicated that there was an increase in average score of student achievement with N-gain 0.55 (medium category). Student's who pass study (knowledge, skill and attitude aspects) for national minimum exhaustiveness criteria and school minimum exhaustiveness criteria were 90.9% and 81.8%, respectively.

Keywords: developing learning device, local feature, waste.

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INTRODUCTION

Regulation of Minister of Education and Culture No. 59th Year 2014 is a regulation made by government to regulate 2013 curriculum in Senior High School (Sekolah Menengah Atas; SMA) level. According to the regulation, syllabus of academic interest lesson such as biology develop by government. It use as guidance for teacher too developing learning device, especially in preparing lesson plan (Permendikbud No. 59th year 2014, 9th article).

Result of study on learning device document in SMA N 1 Wanasari district of Brebes shows module and student worksheet waste and recycling of waste subject matter not yet available in school, as well the lesson plan was inappropriate to the syllabus made by government. Lesson plan component which is not appropriate were learning activity and assessment. Incompatibility of these component impact on inaccessibility of learning goal assigned by government. Therefore development of learning device on waste and recycling of waste subject matter appropriate to the learning goal assigned on syllabus needed.

One of the principles on developing learning device, especially lesson plan is put environment as learning resource (Permendikbud No. 103th Year 2014). Local feature in environment around the school can be used as an effective student learning resource in learning process. Local feature can be a means in contextual learning (Ahmadi *et al.*, 2012; Mumpuni, 2013). Learning that used learning excellence could serve student an opportunity to get a meaningful learning that will facilitate student understanding and ultimately student learning outcomes may increase.

The aim of this research were develop local feature-based learning device of waste and recycling of waste subject matter and testing effectiveness of local feature-based learning device toward learning outcome on waste and recycling of waste subject matter.

METHODS

This study is research and development (R&D) based on Sugiyono's development procedure model consisting of 10 steps. Learning device developed

consisting RPP, modules, and worksheets. Subjects in this study were students of class X SMA N 1 Wanasari, Brebes the academic year 2014/2015. Small-scale subject using six students to know legibility modules and worksheets. Large-scale subject using the XMIA2 class consisting of 33 students to test the effectiveness of learning device. Testing the effectiveness of learning device use experiment method, one group pre-test-post-test design. Data collected in the study include: data learning device on the waste and recycling of waste subject matter in class X SMA N 1 Wanasari used as a needs analysis, the data validity of learning devices based local feature by experts, the data legibility of modules and worksheets, as well as learning outcomes data aspects knowledge, skills and attitudes.

Data collecting technique used was documentation, questionnaire and observation. Data analysis used including: descriptive and qualitative analysis of learning device in SMA N 1 Wanasari, descriptive percentage of validity and learning exhaustiveness on knowledge aspect, skill and attitude, descriptive and quantitative analysis on module legibility and student worksheet as well N-gain test to analyze learning outcomes enhancement. Indicator of the success

of local featured-based learning device effectiveness determined by two criteria namely 80% student pass the study and there is learning outcome enhancement stand in medium category.

RESULT AND DISCUSSION

Results from this research development is the learning device based on local feature consisting of lesson plan, modules and worksheets. Learning device developed by integrating the local feature as a source of learning, using learning model based on project, utilizing IT, implementing assessment learning outcome authentically and learning activities which is centered on students. The device is validated by experts before being implemented in learning.

Results of the validation of learning device based on the local feature shows that lesson plan, modules, and worksheets are obtaining the percentage of $\geq 85\%$ with very valid criteria so that the device is feasible to utilize (Figure 1). Legibility test results on a small scale also shows that the results of the development of modules and worksheets have high legibility criteria.

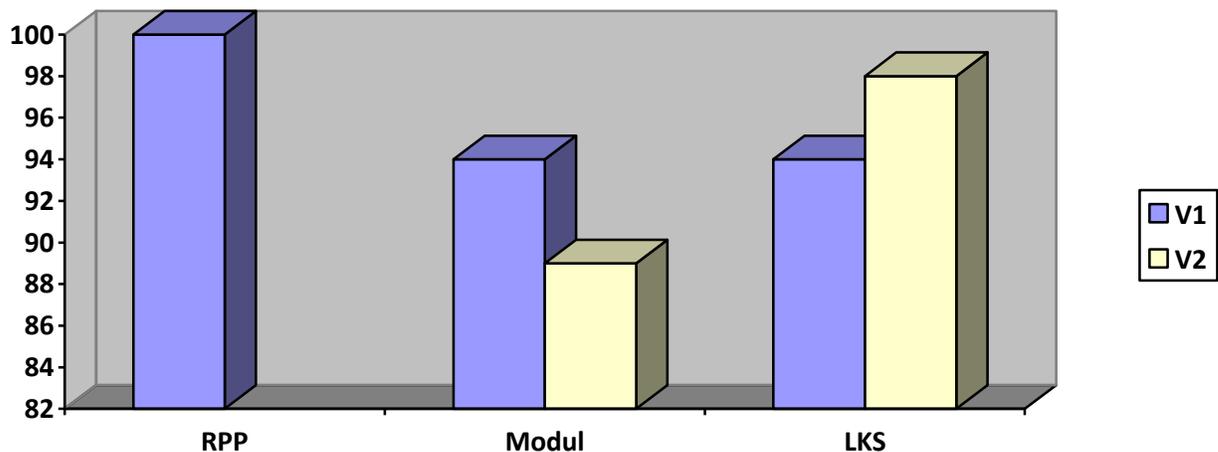


Figure 1. Recapitulation Validity of Learning Device Based on Local Feature

The results of the implementation of learning device based on local feature in large scale trials prove the effectiveness of the learning achievement outcomes in the aspect of knowledge, skills and attitudes. The effectiveness is evidenced by the number of students who

have passed the study more than 80% (Figure 2). N-gain test results also show there is a satisfy increase in learning outcomes with the medium category (Table 1).

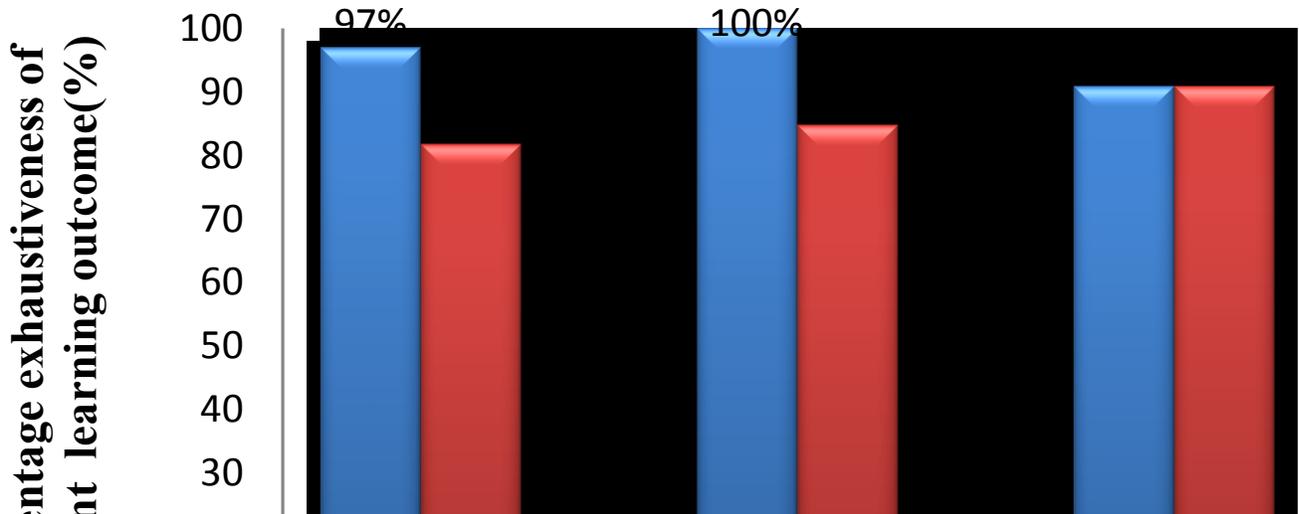


Figure 2. The Percentage Exhaustiveness of Student Learning Outcomes

Table 1. Value of N-gain the Knowledge Aspect of Learning Outcomes

	Mean	N-gain	Category
Pre-test	2.0218	0.55	Sedang
Post-test	3.1103		

The learning device based on local feature to the acquisition of learning outcomes because it is designed with learning activities which are centered on students (student centered learning). According to Bekele and Kassahun (2010) learning progress centered on student is the learning which invites students to learn by doing and put the teacher's role as a facilitator. Ahn & Mary (2011) stated that student centered to learn by doing would be increasing students' cognitive and metacognitive.

The learning device based on the local feature is also designed with learning activities that newfangled by Project-Based Learning (PJBL). The learning activities make students active and gain experience impacting directly so effected to the achievement of KKM on knowledge, attitudes, and skills aspects. These results are in accordance with the opinion of Sudjana (2010) that the active learning, students have intellectual engagement (cognitive), emotional (affective), and physical involvement (psychomotor).

The outcome of learning achievement in this study is also caused by the learning device which are

developed to provide a learning circumstances contextually and meaningful. Utilizing wasted union as a source of learning makes developed learning device can provide contextual learning atmosphere. Students in learning not only invited to study an abstract theory, but students are invited to connect a theory that they learned in their real life in term of creating a meaningful learning. Such this kind of learning can help students understand and remember the theory that have an ultimate impact on improving learning outcomes.

The achievement of learning outcome from three aspects (knowledge, skills, and attitude) in this study also influenced by modules and worksheets utilizing. Using modules and worksheets encourages student to be involved actively in learning process it selves.

On learning outcomes for skill aspect, there are two kinds of skills are assessed, the skills to make products and skills of communicating products. The analysis showed that the average value for the skills to communicate the results of the product is higher than the skills of making products (Table 2).

Table 2. Details of Skills Assessment

Skills aspect	Group						Total	Mean
	I	II	III	IV	V	VI		
Making product	3,52	2,68	3,00	3,00	3,20	4,00	19,40	3,23

Communicate the results of product	3,48	3,48	2,96	3,76	3,52	4,00	21,20	3,53
Total	7,00	6,16	5,96	6,76	6,72	8,00		
Skills scores	3,50	3,08	2,98	3,38	3,36	4,00		

Winkel (1996) states that the psychomotor skills are influenced by knowledge. Making skills require knowledge of products that are more complex than communicating skills. Skills communicate the results of the product only requires students to express what has been done, so students only requires factual knowledge while the skills to make products requiring procedural knowledge. According Munzenmaier & Nancy (2013), the dimensions of factual knowledge is low-level dimension while the procedural dimension is the dimension of high level before they reach the highest realm of metacognitive. The level of knowledge dimension of higher procedural difficulties caused students to achieve skills to make products that values

the skills to make the product is lower than the skill to communicate the results of the product.

Results of the average value of the skills to make an inferior product it may be caused by because these skills requires high creativity and the students have not been trained in making products designed. Results of study on attitudes aspect consists of six aspects of attitude. Implementation learning device based on local feature shows that only in the aspect of responsibility, perseverance, cooperation and caring environment achieved by students with a score ≥ 3 , while the brave and courteous attitude aspect in asking questions/arguments, critical thought and scientific are still many students who have not achieving ≥ 3 (Table 3).

Table 3. Details the Attitude Aspect Assessment

Attitudes aspect	Frequency of students who get score:				Total
	1	2	3	4	
Caring environment	-	7	14	12	33
Brave and courteous in asking questions/arguments	-	15	4	14	33
Critical thought and scientific	-	19	6	8	33
Perseverance	-	2	1	30	33
Responsibility	-	5	1	27	33
Cooperation	-	-	-	33	33

The formation of responsibility, diligence, and cooperation attitude on students installed because in learning activities the make a products in a group. Group learning activities that lead students to work together to achieve the same goal of completing the recycling of wasteof waste products. The achievement of brave and courteous attitude in asking the question/argument, critical thought and scientific attitude still not maximum because students are not accustomed to ask and argue critically and scientifically so that the attitude is not maximized.

CONCLUSION

Learning device developed by integrating the local feature as a source of learning, using learning model based on project, utilizing IT, implementing assessment learning outcome authentically and learning activities which is centered on students. Learning device based on local feature development results expressed very valid by education experts and proven to be

effective against the learning outcomes aspects of knowledge, skills and attitudes.

REFERENCES

Ahmadi, I. Amri, S & Elisah, T. 2012. *Mengembangkan Pendidikan Berbasis Keunggulan Lokal*. Jakarta: Hasil Pustaka.

Ahn, R & Mary, C. 2011. Student-Centered Pedagogy: Co-Construction of Knowledge through Student-Generated Midtem Exams. *International Journal of Teaching and Learning in Higher Education*. 23(2): 269-281.

Bekele, A. & Kassahun, M. 2010. Enactment of Student-Centered Approach in Teaching Mathematics and Natural Sciences: The Case of Selected General Secondary Schools in Jimma Zone. Ethiopia. *Ethiopia Journal of Education & Sciences*. 5(2): 29-49

- Munzenmaier, C. & Nancy, R. 2013. *Perspectives Bloom's Taxonomy: What's Old New Again*. Santa Rosa: The E-learning Guild
- Mumpuni. 2013. Potensi Pendidikan Keunggulan Lokal Berbasis Karakter dalam Pembelajaran Biologi di Indonesia. *Seminar Nasional X Biologi Sains Lingkungan dan Pembelajarannya*. 10(2): 1-7.
- [Permendikbud] Peraturan Menteri Pendidikan dan Kebudayaan No.59 Tahun 2014 tentang Kurikulum 2013 Sekolah Menengah Atas/ Madrasah Aliyah.
- [Permendikbud] Peraturan Menteri Pendidikan dan Kebudayaan No.103 Tahun 2014 tentang Pembelajaran pada Pendidikan Dasar dan Pendidikan Menengah.
- Sudjana, N. 2010. *Cara Belajar Siswa Aktif dalam Proses Belajar Mengajar*. Bandung: Sinar Baru Algensindo
- Winkel, W.S. 1996. *Psikologi Pengajaran*. Jakarta: Grasindo.