

The Development of Worksheets and Lesson Plan Based on the Scientific Approach for Craft Material in Junior High Schools

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ABSTRACT

There are some instructional tools that teachers must prepare before teaching such as students' worksheet and lesson plan. They are very necessary or the teaching and learning process. However, a scientific-based approach has not been implemented for grade 7th junior high school students in craft lesson. The purpose of this research is to develop valid, practical, and effective worksheet and lesson plan using the scientific-based approach in learning craft for grade 7th junior high school students to improve the learning process that is aligned with the 2013 curriculum. This research is a research and development that refers to 4-D model. The validity of students' worksheet and lesson plan are evaluated by experts judgment, their practicality is evaluated from the teachers' and students' respond, while their effectiveness is reviewed from the students' learning outcomes. Data collection techniques, as well as instruments used, are interview guidelines, observation sheet, validation sheets, questionnaires, and test. The results show that the developed students' worksheet and lesson plan are valid in terms of approach, content, form, language, graphic skills, components, formulation, and language used. They are also practical in terms of ease of use, usefulness, and time allocation. Then, they are effective because the students' learning outcome is increased to 87.18%. They pass the minimum passing grade. Thus, the developed students' worksheet and lesson plan have met valid, practical, and effective criteria.

Keywords: Worksheet, Lesson Plan, Scientific-Based Approach, Craft

1. INTRODUCTION

The teacher must provide good instructional tools to make the learning process works well. So that the of learning works well the teacher must prepare a good learning device too. There are many learning tools have to be prepared before teaching, yet one of the significant tools that influence on the learning process is students' worksheet. Rifdatur, et al (2014) defined a students' worksheet as a learning tool that contains guidelines for students to carry out learning activities that had been set before. On the other hand, students' worksheet should not only be given to evaluate student learning outcomes. This worksheet should also facilitate the students to learn independently, creatively, and actively. It must apply the concept of inquiry. Further, the researchers did preliminary observations to junior high schools Bukittinggi to see how students' worksheet used in the schools. It was found that the students' worksheet used for 2 craft subject contains a collection of materials and questions for exercises only.

This students' worksheet was made by the book publishers.

The students' worksheet used by junior high schools in Bukittinggi for learning craft is said to be a conventional one. This worksheet did not provide critical and creative learning activities. The students had not been familiar to solve problems in their own way and conduct inquiry learning. It had not been developed based on the 2013 curriculum which proposes the scientific-based approach, though these schools had implemented the 2013 curriculum. Moreover, there were craft teachers who did not use students' worksheet in their learning activities. Whereas, this work sheet was very important to explore the material learned by the students. The students' understanding became poor since some of them did not pass the minimum passing grade in each test.

Further, the use of worksheet in the learning process requires a lesson plan that will guide the teachers in learning activities. The lesson plan is procedures in organizing learning activities to achieve a basic

competency (Chodijah, et al, 2012). The finding from the observation also indicated that in general, the lesson plan used was not in line with the 2013 curriculum which claims a scientific-based approach as the main indicator of the curriculum. The lesson plan made by the teachers cannot maximize students' thinking abilities. This matter will badly affect learning objectives and students' learning outcomes.

One solution used to overcome the problems is by implementing the scientific-based approach as a mandate of 2013 curriculum in which the teachers must use a scientific approach for learning (Kemendikbud, 2013). It is intended to provide students' understanding in knowing various materials using the scientific perspective that information is coming from anywhere, at any time. It is not dependent on unidirectional information from educators (Diani, 2016). Furthermore Marjan, et al (2014) suggested that scientific learning approach let the students play a direct role both individually and in groups to explore concepts and principles during learning activities, while the teacher's task is to direct the learning process undertaken by the students and provide corrections to concepts and principles learned by the students. This approach is in line with the theory of constructivism learning that improves the science process skills such as observing, asking questions, gathering information, reasoning, and communicating (Hala, et al, 2015).

The chairperson of art teachers association said that the use of scientific-based students' worksheet and lesson plan in junior high schools Bukittinggi are rare. They never use such approach. Though, this approach has succeeded in improving learning outcomes (Marjan, et al, 2014; Hala, et al, 2015; Diani, et al, 2016; Wisdiarman, et al, 2018) Besides, some researches hypothesized that scientific-based learning approach can improve students' learning outcome in some courses like craft. However, some problems such as the availability of a students' worksheet provided by craft teachers associations, educational office, commercial products are very rare. Likewise, the prototype of the lesson plan for craft materials using scientific-based learning approach has never been created by craft teachers group. In the end, no guidance can be used by the teachers.

In conclusion, to implement 2013 curriculum that emphasizes the scientific-based learning approach is very crucial. It needs the scientific-based approach in using students worksheet and lesson plan. Hereafter, the researchers conduct this study to provide a valid, practical, and effective scientific-based approach of students worksheet and lesson plan in learning craft for grade 7th students in junior high school.

2. METHOD

1. Research Type

This research used research and development type focusing on developing and producing new products in learning that could be applied by the students as users. The new product to be developed was scientific-based students' worksheet for grade 7th junior high school. The

development model used was the 4-D model with some stages; defining, designing, developing, and disseminate stage (Thiagarajan, Sivasailam, in Trianto, 2009).

2. Data Collection Instrument

The instruments used in this study were interview guidelines, validation sheets, questionnaires and test.

a. Interview

Interview guidelines were used in the defining stage to obtain information about students' understanding and learning outcomes, models and methods used, learning resources, the use of students' worksheet and lesson plan, as well as the level of teacher needs for its implementation.

b. Validation Sheet

This validation sheet was used to collect the validity of the data. Some validation aspects were in terms of approach, content, form, language, graphic skills, components, formulation, and language used. The validation was carried out by experts who understand well about the study.

c. Questionnaire

The questionnaire was used to collect data on students' worksheet and lesson plan practicality. The students' worksheet practicality was in the form of user responses, both the teachers and students. This questionnaire was filled out by the teachers and students after taking a limited trial. The practicality aspects measured include the ease of use, readability, usefulness, and time allocation. Meanwhile, the lesson plan questionnaire was only filled by the teachers since they were the creator of the form. For this reason, the teachers needed to respond to the lesson plan.

d. Test

The test was used to measure the effectiveness of the students' worksheet. The passing grade percentage was determined from students competencies in learning craft using scientific-based students' worksheet and lesson plan. The competencies measured were cognitive and psychomotor.

3. Data Analysis Technique

The data of this research were explored descriptively. It was carried out to get valid, practical, and effective students' worksheet and lesson plan in learning craft. There were three types of data that analyzed; 1) the validation sheet data of students' worksheet and lesson plan to see validity level, 2) the students' and teachers' respond to see the level of product practicality, and 3) the test to see the level of product effectiveness.

3. RESULT AND DISCUSSION

Discussion

There were some points drawn as the result of this research and developmental study. It could be described below:

1. Defining stage result

a. The result of need analysis

The need analysis indicated that the teachers were not happy with the students' learning outcome in learning

craft since many of the students did not pass the minimum passing grade. Besides, the teacher often used instructional methods like lecturing, demonstrating, and giving assignments. In general, they had used lesson plans and instructional methods that were in line with 2013 curriculum, yet their implementation had not been optimized. On the one hand, the teachers had not stimulated the students to actively find and process their own knowledge in learning. They got the knowledge from teachers' explanation only and these ways made the students often forgot what they studied.

On the other hand, the learning resources available at school were so limited. They used resources from the teachers and national publishers' textbook only. They did not use students' worksheet, yet they used questioned provided in the textbook. This type did not expose the scientific-based lesson plan since they did not have one for learning craft. Thus, they needed the instructional tools in line with 2013 curriculum that proposed the scientific approach.

The need analysis was also obtained from the students. The results showed that; 1) the teacher taught conventionally, questions and answers method, and gave assignments, 2) they had difficulty in understanding craft materials, 3) they had never been given the opportunity to find and process their own knowledge, 4) learning resources were limited, 5) the teachers rarely discussed theoretical lesson and assignments given by them was limited on crafting practice, 6) the teachers did not use the students' worksheet because it was not available in schools, and 7) they said that it was useful to learn using students' worksheet.

b. Curriculum needs analysis

This analysis was used to formulate indicators of learning achievement as a guideline in the development based on a scientific approach. Further, the following step after this curriculum analysis was a concept analysis that identified essential materials that would be discussed in class. This analysis aimed to determine the content and subject matter needed in the development of the students' worksheet and lesson plan in order to achieve the competency goals. These materials were: 1) the nature of fiber craft, 2) types and characteristics of fiber crafts, 3) fiber materials processing, and 4) products and processes of fiber crafts.

2. Designing stage result

a. The worksheet design

There were five aspects in designing the worksheet; the aspects of approach, content, form language, and graphic.

1) Approach

This worksheet was designed using the scientific-based approach in which activities should follow the steps of the scientific approach such as observing, questioning, gathering information, associating, and communicating.

2) Content

Questions and exercises in the worksheet had been arranged to be in line with basic competencies and they

were set to achieve indicators of competency goals. Besides, the worksheet was also arranged to be in line with the cognitive development of the students, the need for the teaching materials, and the substance of the material, and logic based on craft knowledge.

3) Form

The students' worksheet had clear learning goals, complete structure (title, instructions, steps, competencies to be achieved, supporting information, assignments, and scoring), a systematic sequence, sequential learning procedures that fit the students' ability, and complete information.

4) Language

The students' worksheet used the standard language of Indonesian. It was clear, communicative, and appropriate to the level of ability of junior high school students.

5) Graphic

The students' worksheet used a good and interesting type of letters, size of letters, and layout. It had illustrations, pictures, and photos that were related to the concept. Besides, the cover was designed using an attractive appearance and represented the contents of the students' worksheet.

b. Lesson plan design

There were some aspects in designing the lesson plan; the component, formulation of each component, and language. The component was designed based on Permendikbud No. 65 of 2013 about Process Standards. These standards were lesson plan identity, main competencies, basic competencies, indicators of competency goals, learning goals, materials, approaches, models, learning methods, learning steps, learning resources, and scoring or assessment. Since this study referred to 2013 curriculum, the design of the learning process used a scientific approach. It could be seen the formulation of the learning activities steps, especially in the main activities, for example, observing, questioning, gathering information, associating/reasoning, and communicating.

3. Developing stage result

This stage was conducted to produce valid, feasible, practical, and effective students' worksheet and lesson plan based on a scientific approach for learning craft.

a. Validity test

The validity measurement of the students' worksheet and lesson plan were scored by experts who were expert in learning technology, content/material, language, and graphic. The results of the validity were described in the following table:

1) The worksheet validity result

The aspects observed in the students' worksheet were the approach, content/material, form, language, and graphic. The results of the validity test for all aspects could be seen in the table 1.

Table 1. The validity test result of the students' worksheet

No	Aspect	Score	Category
1	Approach	85.71%	Very Valid
2	Content	83.33%	Very Valid
3	Form	88%	Very Valid
4	Language	92%	Very Valid
5	Graphic	88%	Very Valid
	Average	87.41%	Very Valid

Average The average score of the students' worksheet validity was 87.41% that indicated to be a very valid category. It was also indicated that all aspects reached very valid category. Thus, it can be said that the designed students' worksheet using the scientific approach in this study was very valid in the aspects of its approach, content/material, form, language, and graphic.

2) Lesson plan validity result

The aspects observed in the lesson plan were its component, the formulation of each component, and language. The results of the validity test for all aspects could be seen in the following table:

Table 2. The validity test result of the lesson plan

No	Aspect	Score	Category
1	Component	91.11%	Very Valid
2	Component formulation	87.5%	Very Valid
3	Language	86.66%	Very Valid
	Average	88.42%	Very Valid

The average score of the lesson plan validity was 88.42% that indicated to be a very valid category. It was also indicated that all aspects reached very valid category. Thus, it can be said that the designed lesson plan using the scientific approach in this study was very valid in the aspects of its component, the formulation of each component, and language. In conclusion, the designed students' worksheet and lesson plan using the scientific approach in this study were very valid and feasible to be used in the process of learning craft for grade 7th junior high school.

b. Practicality test

The next step to do was conducting a practicality test of the scientific-based students' worksheet and lesson plan in the school to find out the use, ease of use, readability, and time efficiency. The trials were as small-scale trials in junior high school number 4 Bukittinggi. The sample taken in this trial were 2 art teachers and 14 students in class 7.2. This trials measured the teachers' responses on the students' worksheet and lesson plan and the students' responses on the students' worksheet. The results of these small-scale trials or responses of the teachers and students could be seen in the table 3.

The average score of the scientific-based students' worksheet and lesson plan practicality were 89.19% that indicated to be a very practical category. Thus, it can be said that the designed scientific-based

students' worksheet and lesson plan in this study were very practical.

Table 3. The small-scale trials result

No	Aspect	Score		Average	Category
		The students' Average worksheet	Lesson plan		
1	Teachers' respond	85.33%	91.43%	88.38%	Very Practical
2	Students' respond	90%	-	90%	Very Practical
	Average			89.19	Very Practical

a. Effectiveness Test

The effectiveness test was conducted to see learning goals achievement using this scientific-based students' worksheet and lesson plan. This test was carried out using the test given to the students after 3 meetings to find out the level of students' understanding about the material discussed in the learning process. Furthermore, the test result in this study was taken from knowledge or content and psychomotor tests. The result of the test could be seen in the following table:

Table 4. The students' test result

Class	Pass		Failed		Total
	Total	%	Total	%	
VII.2	34	87.18	5	12.82	39

This table showed that 34 students who passed the test, while 5 students were not able to pass the test. Then, the percentage of the passing category was 87.18%, meanwhile, the rest, 12.82%, could be categorized as failed. On the other hand, the minimum requirement for passing grade was 75. When students' get this minimum score, the instructional could be classified as successful learning. Then, since the mastery percentage reached 87.8%, it could be said as successful learning. Thus, it could be concluded that scientific-based students' worksheet and lesson plan could improve the students' learning outcomes and they were said to be effective.

4. Disseminating stage result

The final step of the product development was disseminating it into a large scale. This dissemination stage included two actions; 1) applying the scientific-based students' worksheet and lesson plan in other schools, junior high school number 2 Bukittinggi, 2) publishing the result on international proceedings.

Discussion

1. The worksheet and lesson plan validity

a. The validity of the worksheet

As it was explained in the result part that the validity aspects of the scientific-based students' worksheet included; approach, content/material, form, language, and graphic. These aspects were a crucial part in developing a

product. Furthermore, the validity test result of the students' worksheet seen from the aspect of approach was categorized as a very valid product since it got 85.71%. This score showed that all activities in the students' worksheet had followed scientific steps in learning, for instance, observing, questioning, gathering information, associating, and communicating (Majid and Rochman, 2014).

Then, the result of content/material aspect validity test of the students' worksheet reached 83.33%. It was also classified as a very valid product since the questions and exercises in the students' worksheet were in line with basic competencies and they were also sufficient to achieve the indicators of competency goals. In addition, it was also arranged to be in line with the cognitive development of students, the need for teaching materials, the substance of the material. It was also presented systematically, logically, and correctly based on craft science nature.

Next, the form aspect could be meant how the worksheet was presented. The students' worksheet was also categorized as a very valid product seen from the form aspects since it had clear complete structure (title, instructions, steps, competencies to be achieved, supporting information, assignments, and scoring). They reached 88%. This result had been aligned with the students' worksheet components that were developed by the Ministry of National Education (2008) mentioned before such as, title, instructions, competencies to be achieved, supporting information, assignment, steps, and scoring (Rifdatur, et al, 2014). Moreover, the systematic arrangement of the lessons was aligned to the students' ability and the information provided was completely set.

Further, the validity result of the students' worksheet seen from language aspect was scored 92% and also categorized as very valid. This high percentage indicated that the designed students' worksheet used good and correct Indonesian standard. It used clear, simple, and communicative language that was understood by the junior high school students. In sum, a clear students' worksheet would be able to be well understood by the students and it assigned the students to do the tasks and answer the questions correctly.

The last, the validity result of the students' worksheet seen from the graphic aspect scored 88% and it was categorized as a very valid product because it was designed using appropriate type and size of letters. Besides, the layout was good and interesting too. The students' worksheet was also added with good illustrations/pictures/photos that were related to the concept. Likewise, the cover was designed with an attractive design and represented the contents of students' worksheet. This display made the students become motivated and interested in doing the tasks and exercises given in students' worksheet. Putri and Mitarlis (2015) also stated that the students' worksheet could attract and develop students' motivation if it used appropriate writing, colors, and images. It could help the students in understanding the material and they would be interested in studying it.

b. The validity of the lesson plan

As it was explained in the result part that the validity aspects of the scientific-based lesson plan included; components, component formulation, and language. All these aspects were explained in the following explanation.

First, the validation results of the lesson plan seen from the component aspect scored 91.11% and it was classified as a very valid category since the component was in line with the 2013 curriculum. The components were the identity of the lesson plans, main competencies, basic competencies, indicators, learning materials, approaches/ models/ methods, learning steps, learning resources, and scoring assessment. The designed lesson plan had both complete component and a good sequence and formulation.

Second, the validation results of the lesson plan seen from the component formulation aspect reached 87.5% and it was categorized as a very valid product. The component of learning steps like main activities in learning indicated that the lesson plan was designed according to scientific-based approach (Wisdiarman, et al, 2018). Furthermore, the formulation of main activities in the lesson plan had followed the steps of the scientific approach such as observing, questioning, gathering information, associating, and communicating. Thus it could be concluded that the design lesson plan was based on the scientific approach seen from the aspects of the component formulation.

Third, the validation result of the lesson plan seen from the language aspects was scored 86.66% and this percentage was categorized as a very valid category since the designed lesson plan used appropriate and correct Indonesian standard. Additionally, the lesson plan also used clear, communicative, and simple language. In summary, the component formulation of the lesson plan could be understood by the teachers well and they were able to carry out learning well.

2. The worksheet and lesson plan practicality

The practicality test results showed that the developed students' worksheet and lesson plan for learning craft based on scientific approaches were in a very good category. It made easier for the teachers to carry out learning, help the students to be more actively discuss the materials in depth, direct the students to do assignments, set sufficient time to do the task, and attract the students to actively engage in learning. The look of the students' worksheet was attractive too and the instructions were written were not too long. Besides, the students' worksheet was designed using simple language that did not cause misinterpretation. It made easier for the students to learn the worksheet without teachers' guidance. On the same hand, the lesson plan was said to be practical since it was very useful for the teacher in achieving learning goals, especially for teachers who did not have art backgrounds. Finally, the designed lesson plan was easy to carry out because the steps in doing some activities had been clearly

formulated and sufficient with the time allocation provided.

3. The worksheet and lesson plan effectiveness

The effectiveness test result of the designed worksheet and lesson plan indicated that these tools could improve students' learning outcome. It was very effective in achieving learning goals for junior high school students grade 7th in learning craft. These instructional tools followed the procedural stages of scientific-based approach that were included observing, questioning, reasoning, associating and communicating (Bintari, et al, 2014). These stages let the students discover and process the knowledge through teachers' guidance.

Furthermore, this approach gave the students opportunities to express their ideas in learning activities, as well as learning to work together and respect each other, both in one group and with other groups. Importantly, it was able to help the students to learn independently. Prastowo (2011) stated that students' worksheet aimed to train the independence of the students in learning processes and present tasks that enhance them in exploring knowledge.

Besides, this approach stimulated the students to be more active in conducting experiments and observations to collect data/information and discuss the results of their observations to draw conclusions. In this manner, there was knowledge processing within students themselves (Hala, et al, 2015). To sum up, the key of scientific-based approach was giving the students a challenge to learn and solve problems. These challenges created greater learning effort and positive impact on the students' learning outcome.

4. CONCLUSION

Based on the results of the study and discussion, it can be concluded that the worksheet and lesson plan based on the scientific approach developed has been valid, practical and effective so that in can be used in learning craft material for junior high school students grade 7th.

Suggestions

Some suggestions can be drawn based on the conclusion of this study;

- 1) The craft teachers and students to be able to use worksheet and lesson plan based on the scientific approach to craft material in grade 7 junior high school.
- 2) The craft teachers are expected to develop a learning based on scientific approach to other materials, because in can improve the students' learning outcomes.

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