

Designing Social Sciences Worksheets Based on Ethnoscience:

A natural stone artisans community

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Abstract—Learning resources that are contextual with the nature, social condition, and culture become very important in the learning of social sciences. The aim of this study is to identify the socioeconomic and cultural phenomena of the natural stone artisans which can be used as a worksheet for social sciences in school. This study is a research and development divided into three research stages. First, the researchers conducted a qualitative naturalistic study on the community of natural stone artisans. Second, the researchers formulated the results of the ethno science study which then will be used as a source of learning through an assessment of the social sciences curriculum. Last but not least, the researchers designed and developed the worksheets based on the results of the study. The results showed that the natural stone artisans have the knowledge, attitude, and value as well as skills in determining the factors of production, production processes, and distribution with the marketing system. It is also found that they are able to manage the existing natural resources. This phenomenon is then used as a learning source to understand the concept of production, distribution, and consumption as well as to build the value of environmentalism to the students in the context of social sciences.

Keywords—*ethnoscience; natural stone artisans; worksheets; social sciences learning*

I. INTRODUCTION

The regulation of the Ministry of Education and Culture number 65 of 2013 concerning process standards asserted that the learning process in educational units must be held in an interactive, inspirational, fun, challenging, and motivating manner to make students actively participate and able to provide sufficient space for initiatives, creativity, and independence in accordance with talent, interests, as well as the physical and psychological development of the students. In general, the above learning principles refer to a learning process that focuses on the students by developing all of their potentials. Social sciences teachers face challenges in teaching history, geography, economics, and political science to students with learning problems [1]. Contextually, students face the surrounding problems in their environment directly. Integrated learning of social sciences pushes the contextual study to be carried out in an interdisciplinary manner. Bringing out a number of problems in the social sciences learning can

challenge the students to think critically [2]. The raised issues are always tried to be directly related to daily life and/or the needs of the students. This is expected to arouse the interest and motivation of the students to convey their initial knowledge about the problem. In this situation, the teacher can involve and utilize the surrounding environment into a learning process to create different learning atmosphere [3].

The creativity of a teacher in finding and determining the right learning resources is indispensable. “Learning resources can be in the form of data, people, and everything that can be used by students in the learning process either individually or in the group; making it easier for students to achieve the learning objectives or certain competency [4]. The diversity of the existing learning resources does not guarantee the diversity of learning resources used. Some of the constraints found in the field of social sciences learning are the scope of the subjects that is not comparable to the available teaching hours and the nature of social sciences which the material is mostly a rote-learning. This raises a variety of problems such as Teachers cannot be profound because the time for one basic competency is too short even though the curriculum targets must still be achieved. Besides that, the quality of the learning process is reduced because the teacher does not use a variety of approaches or learning methods so as they only seem to complete the subject matter [5]. The teaching materials used are focused on finished textbooks (textbooks whose material does not apply local superiority or local wisdom) so that the learning process does not adopt the needs and interests of students to pay attention to the maintenance and utilization of the surrounding natural environment [6].

This learning condition, especially at the secondary level (Junior High School), indicates that there are some indications of neglecting local culture. This is reflected in the organization of learning material. The material tends to only focus on global insights that seem to erode humanist attitude and nationalism of the students. Therefore, the right and immediate solution must be sought so as the substance and essence of social sciences learning in schools can be realized correctly and in accordance with the expectation that is to have Indonesian people with good quality and ready to compete in the global era wrapped in Indonesian social and cultural noble values [7].

“Environment is one effective learning resource for students. Adopting the environment around students as learning resources will greatly help students to increase the activities in the classroom which will directly improve their learning outcomes” [2]. This is very logical that with this matter, students will have initial knowledge about the material to be studied. Thus, the environment is one of the most important learning resources that are highly valuable in the framework of the students’ learning process [8]. Basically, all types of environments around students can be utilized to optimize students’ educational activities as long as it is relevant to the basic competencies and learning outcomes [9]. This can be either in the form of a natural environment, physical environment, social environment, cultural or artificial environment, and historical environment.

Number one is the natural environment. By studying this, it is expected that students will have a better understanding of the natural phenomena that occur in their daily lives. Students also expected to be able to raise awareness from an early stage to love nature and participate to maintain and preserve the natural environment [9]. Secondly, the adaptation of social environment. Things that can be learned in relation to the use of social environment as learning resources are the customs and habits of the local community, the types of livelihoods in the surrounding area, the social organizations of the community, the religious life that is held by the residents around, the culture and arts, as well as the local government system [10].

Third, in addition to the natural and social environment, there is also a cultural or artificial environment. This is the environment that is intentionally created or built by the people for certain purposes that are beneficial to them. Artificial environments include irrigation, dams, parks, zoos, plantations, reforestation, and power plants. Students can learn about the artificial environment from various aspects such as the process, its use, its function, its maintenance, its carrying capacity, and other aspects that are pleasing to the development and interests of the people and society in general. To make this environment effective, it needs to be adjusted to the plans or existing programs. That way, this environment can enrich and clarify the teaching materials.

Fourth, the historical environment or historical heritage. What is meant by the historical environment is historical places and/or historical relics that are arranged like a museum. From this environment, values and knowledge can be obtained so that students will gain new values for themselves. To introduce this historical environment, study tour activities are usually held (learning and traveling). The activities can be in the form of visiting temples, museums, palaces, and others. Indirectly, this kind of education can increase the religious value of students [11].

Utilizing the environment as a source of learning does not need to go far with expensive costs [2]. The surrounding area that is close to the school and house of the students is assumed to be enough by optimizing it into a source of learning that is very valuable for the students’ learning interests. The environment can increase the activeness, motivation, preparation, and collaboration between students in the learning

process [12]. Learning that brings students to observe the environment can make students feel interested because they interact directly with the environment.

Referring to that opinion, it is necessary to seek an alternative solution to resolve the issue. One alternative is to raise the phenomenon of the economic environment to be used as a source of learning in an effort to improve the quality of learning and provide understanding to students about social sciences. The field of study that is related to the economic environment is the material of economic activities covering the fields of production, distribution, and consumption. One of the phenomena that appear today is the business of natural stone. Many companies start to reach natural stone business in which they even do the substitution. Therefore, to be able to survive and compete in a healthy manner, an innovation is needed. Keeping up with the trends, the company is required to always comply with the desires of the consumers by launching new products to meet the ever-changing needs of the consumers [13]. On this basis, researchers will compile teaching materials based on the economic environment because they are considered appropriate to be used in social sciences learning especially in the material of economic activities related to production, distribution, and consumption activities.

II. RESEARCH METHOD

This is a research and development carried out with a qualitative method. The objects to be developed in this study are teaching materials in the form of worksheets. The stages of research used in this study are preliminary studies, learning assessment or formulation, designing teaching materials, and revising the design of teaching materials until ready for the trial. It is important to note that the trial was not conducted in this study [14]. Preliminary studies were carried out by conducting literature studies, the study of needs for students, and study of ethnoscience as the basic material for the design of teaching materials. This preliminary study took place as the material in analyzing the students’ need to make the initial design. After the design is ready, it will be validated by experts and field practitioners to produce a hypothetical design.

The ethnoscience study was done at the natural stone artisans community in Lengkong Wetan Village, Majalengka Regency. The research subject used in this study was snowball sampling with triangulation techniques. At this stage, there was a combination of observation, interview, and documentation for the same data sources simultaneously [15].

The study was analyzed with Miles and Huberman model. In this qualitative research, the data analysis was carried out at the time of data collection and after the data collection was completed in a certain period. In the field, the researchers conducted an observation during the process of economic activity and record the interviews. The data validation was performed by using triangulation techniques and review informant in proving the validity of the data that has been collected. Triangulation data validation is the most commonly used method in guaranteeing the validity of data in qualitative research. Review informant is a development of data validation where researchers conduct a re-examination of the data that has been arranged in report units.

The results of this ethnoscience study data were then inventoried and assessed as the main material in the design of social sciences learning worksheets. The design of this worksheet is based on the basic competence, social sciences curriculum, and learning objectives. It is assumed that the most important event in the instructional design process is identifying the instructional goals [14]. After that, the teaching materials that have been designed were validated by two experts. Various inputs from the experts then became a consideration to revise the teaching materials that had been designed. Therefore, there will be a development of teaching materials from previous design at the end of the study.

III. RESULTS AND DISCUSSIONS

The ethnoscience study on the natural stone artisan’s community in Lengkong Wetan Village, Majalengka Regency have various competencies in accordance with the objectives of social sciences learning that covers the material of economic activities including production, distribution, and consumption. By that, this ethnoscience study focuses on the economic activities carried out by the stone artisans as well as the factors in the process. The economic activities studied are how the production, distribution, and consumption processes are carried out in the community of natural stone artisans.

The production carried out by the stone artisans is divided into three production stages, namely pre-production, production, and finishing. The pre-production stage includes the selection of raw materials consisting of andesite stones, candid stones, and marble stones. The provision of the necessary equipment includes splitters (shovel, hammer, scrapper, and crowbar), machinery (cutters, saw, polishes, grinders, welding flames), and supporting equipment (strapping machines, cardboard straps, transport trolleys, LPG gas, and oxygen). This equipment serves to accelerate the performance of the artisans.

In the production, each of the stages requires skills in mastering the tools, perseverance, tenacity, and creativity. The production stage is divided into three processes. First, the stone will be cut in large blocks. This cutting is not done arbitrarily but using a cutting pattern that produces the same size. Secondly, the stone blocks that have been cut are then transported for the next process. Then, one of the surfaces of the stone will be cut by using a cutting machine. The cutting is done to form the shapes that are in accordance with the desires of consumers. Raw materials that have been formed to a certain size with machines will be brought to the finishing stage. The products that are often desired by consumers in this finishing process are RTM, RTA, flamed, polished, honed, acid, and graver. All of those products are widely used for interior and exterior decoration to make the building become more beautiful and natural.

The results of this ethnoscience study related to the economic activities of the stone artisans are arranged systematically. After that, it will be reviewed by relating the findings of the study and its relevance to the objectives of the social sciences learning. The results are described in the following table.

TABLE I. THE RELEVANCE OF ETHNOSCIENCE STUDY RESULTS WITH SOCIAL SCIENCES LEARNING OBJECTIVES

Ethnoscience Material	Description	Learning Objectives
The production of natural stone crafts	The production process of natural stone crafts consists of several stages including the selection of raw materials, equipment used, manufacturing process with machines, and finishing so as to produce various motifs of crafts. In natural stone business, there are four factors of production including natural resources, labor, capital, and management or entrepreneurial skills.	Students are able to formulate an understanding of inductive production correctly. Students are able to give examples of production activities in the surrounding area. Students are able to understand the factors of inductive production correctly.
The distribution of natural stone crafts	The distribution of natural stone crafts is done with a distribution channel that is selective distribution. The channel used by natural stone artisans in distributing their products are producers - consumers and producers - intermediaries-consumers.	Students are able to formulate an understanding of inductive distribution correctly. Students are able to give examples of distribution activities in the surrounding area. Students are able to understand the inductive distribution system correctly.
The consumption activities of natural stone crafts	The natural stone products are usually used as interior and exterior elements in buildings to make it look natural and luxurious. In the activity of consuming natural stone crafts, there are three economic actors such as households, companies, and the government.	Students are able to formulate an understanding of inductive consumption correctly. Students are able to give examples of consumption activities in the surrounding area. Students are able to understand the consumption activities of economic actors.

Source: Research Result 2018

Designing the teaching materials in this study is limited to the design of worksheets that are based on the results of the ethnoscience study on the natural stone artisan’s community in Lengkong Wetan Village, Majalengka Regency. A preliminary study was conducted to determine the needs of the students for the teaching materials. The results of this preliminary study are used as a reference to compile the teaching materials that suit the needs of the students. The design of teaching materials used by the researchers is based on the economic environment. To make the worksheets functioned properly, it must be arranged systematically in accordance with the steps in preparing the worksheet. As according to the Department of Education, the formulation of worksheets consists of four main steps, namely: analyzing the curriculum, constructing the map of students’ needs, specifying the title of worksheets, and writing the worksheets. The writing is in concern with the overall activities of the material preparation and the first draft. After being developed in the form of a draft, the worksheet is evaluated and revised according to the needs of the students.

The explanation of the structure of worksheet for the teaching materials is as follows:

The first structure is the introduction. In preparing worksheets, the introduction includes a cover, preface, table of contents, concept maps of competency standard, basic competencies, competency indicators, descriptions of student activity sheets, time period, and final objectives. In this section, worksheets are designed in accordance with the contents of economic activities including production, distribution, and consumption to be used in social sciences subject.

Secondly, the contents of the worksheet. In this section, the worksheets include three discussions of economic activities which are production, distribution, and consumption derived from the results of ethnoscience study on the natural stone artisan's community in Lengkong Wetan Village. However, in the contents of the worksheet, there will be a little discussion about general economic activities that aim to attract the interest of the students to work on the teaching materials provided in the worksheets. In each discussion, students are asked to observe the picture and read the description text related to the economic activities of the natural stone artisans that are based on the learning objectives to be achieved.

Last but not least, the list of targets on the worksheet. In this section, there are sheets of activities contained in the worksheets that must be done by students both individually and in groups. This includes the learning outcomes in the concept of production activities by displaying the images of the stages in the production process and the production factors of the natural stone artisan's community so that students able to deduce the meaning of production and able to explain the factors of production. Furthermore, the learning outcomes in the concept of distribution activities are in the form of displaying a text description of the distribution flow and system to make students able to explain the meaning of distribution and identify the distribution system. This also applied to the concept of consumption activities. The activity is conducted by showing the text description of consumption activities and displaying the images of consumption actors in the community of natural stone artisans. By that, students are expected to be able to explain the meaning of consumption and mention the consumption actors.

The worksheets described above are a design that will be developed through validation conducted by experienced field experts and practitioners (junior high school teachers). The validators will review and provide input for the development of the worksheets. Revisions will be made according to the recommendations of experts and practitioners. After the revision is complete, the assessment is done by filling out the questionnaires. After validation and revision took place, a hypothetical design will be obtained. The design of hypothetical teaching materials is the improvement of worksheet design that has been validated by experts such as social sciences experts, lecturers, and social sciences teachers. After going through a series of expert validation processes, it can be said that the developed worksheet is a hypothetical worksheet that is recommended for further testing.

TABLE II. VALIDATION AND REVISION OF WORKSHEETS

Validator	Comments and Suggestion	Improvement
Validator 1	The contents of the worksheets need to be clarified as for how many meetings.	Adding the time allocation in the introduction.
	There are too many practice questions and assignments, need to develop high-level thinking skills for students.	The number of exercises in the worksheets is adjusted to the goals that must be mastered by students. Tasks and questions are inductive.
	The use of sentences in worksheet assignments is unclear.	The use of sentences in assignments is adjusted to students' understanding level.
	The arrangement of worksheets must apply the learning theory used in the assignments.	In the design, inductive learning is used in a small discussion.
Validator 2	Reduce the number of exercises in the worksheets.	The number of exercises in the worksheets is adjusted to the goals that must be mastered by students.
	The title of the preface must be written in black.	Color selection in the writing of the introductory word title is corrected according to the validator's suggestion so that the color is changed to black.
	In the worksheets, the tasks should be separated between image observations and project assignments.	Based on the suggestions from the validator, the assignments in the worksheets become observation tasks only.

One of the suggestions from the validators is to ensure the learning theory used. This suggestion is followed up by arranging and redesigning the worksheet into a worksheet that is oriented to inductive learning. Inductive learning is a relentless information filtering and idea building, especially categories that provide conceptual control over information areas; the creation of hypotheses to be explored in an effort to understand cause-and-effect phenomena or to provide solutions to problems [16]. Inductive methods are developed on the premise that initiatives in providing additional stimulation for students will further enhance the learning experience [17]. On this worksheet, students will be given data about natural stone production activities. Consequently, they will explore, build, and form concepts from the data that has been obtained. The concepts of production, distribution, and consumption are concepts that students will build through worksheets that support this inductive learning. Another example of inductive learning is to use examples to construct concepts and then make assignments to induce the general descriptions of the specific examples [18]. Using specific real examples can distribute the knowledge into long-term memory [19]. It is expected that by working on this worksheet cooperatively, students will have the ability to choose, process, and use the data as a basis to construct a concept in a group. This means that they will have the skills to build hypotheses, concepts, and its implementation systems in groups.

Besides that, there is another development that is related to task questions were given to students. The questions were

designed with an inductive approach so that students start with more examples of economic activity before they formulate the concepts at the final stage. This kind of inductive questions will develop the intellectual and metacognitive skills of the students [20]. The tasks will also allow students to raise new questions so that they try to find new data and strengthen the concept of a hypothesis that they built.

Based on the discussion that has been carried out, the research findings obtained are as follows:

- Natural stone artisans have the competence to produce various forms of natural stone crafts.
- Natural stone artisans have the competencies in distribution and ways of channeling in the economic activities of the natural stone artisan's community.
- Natural stone artisans have the competence for the consumption actors and use of natural stone handicrafts.
- The structure of the worksheets sourced from the results of the ethnoscience study includes an introduction, contents, and list of targets.
- The structure of introduction in the worksheet includes covers, preface, table of contents, concept maps of competency standard, basic competencies, competency indicators, descriptions of student activity sheets, time period, and final objectives.
- The structure of contents in the worksheets includes three discussions of economic activity, namely production, distribution, and consumption derived from the results of the ethnoscience study on the natural stone artisan's community in Lengkong Wetan Village.
- The list of targets on the worksheets is adjusted to the students' understanding ability through the use of image, narration, and sentences in assignments.
- The use of worksheets is more practical in the process. Besides that, students will also be more interested in working on a series of activities with the availability of worksheets.

IV. CONCLUSION

Based on the results of ethnoscience study on the natural stone artisan's community that is used as a source of learning in social sciences, it is concluded that economic activities in this community had various competencies in accordance with the learning objectives in social sciences learning with economic activities including production, distribution, and consumption. The knowledge that is related to production activities includes the stages in the production process starts from the selection of raw materials up to the finishing stage so as to produce various forms of natural stone handicraft products. This also consists of four types of production factors that are needed in the production of natural stone crafts. Other than that, the knowledge relating to distribution activities includes the area of distribution, the scope of distribution starting from transactions up to delivery to consumers, as well as the distribution system used in the community. Lastly, the

knowledge that is related to consumption activities are the consumption actors such as family or households, companies, and government, as well as the various use of products made from natural stone.

In accordance with the design of teaching materials that are based on the economic environment, the preparation of teaching materials must be arranged systematically based on the steps in the preparation of worksheets and in accordance with the curriculum and learning objectives. The preparation of the worksheets consists of four main steps, namely analyzing the curriculum, compiling a map of the needs of students, determining the titles, and writing the worksheets. The design structure of the worksheets sourced from the results of the ethnoscience study consists of introduction, contents, and list of targets. The structure of introduction in the worksheet includes covers, preface, table of contents, concept maps of competency standard, basic competencies, competency indicators, descriptions of student activity sheets, time period, and final objectives. The structure of worksheet contents includes three discussions of economic activities which are production, distribution, and consumption from the results of ethnoscience study on the natural stone artisan's community in Lengkong Wetan Village. The list of targets on the worksheets is adjusted to the students' understanding ability through the use of image, narration, and sentences in assignments. In general, the teaching material validation shows that the teaching materials in the worksheets are good and can be used as the recommended design. This is based on the questionnaires, comments, and suggestions submitted by experts in the form of appropriateness and compatibility of teaching materials. However, there have been slight improvements in the nature of improving the design of teaching materials. By that, a hypothetical design emerges as a design of the validation results that can be recommended. The results of this recommendation are expected to be used to assist the social sciences learning process within the context of the economic subject and able to assist teachers in providing student activity sheets to increase the activities in the classroom.

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