An analysis of development of student’s worksheets with the theme integrated science energy in life by using integrated type of integrated learning in 21st century

Dian Arima Gusti* and Ratnawulan
Departement of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, West Sumatera. Indonesia

*diaariagustin@gmail.com

Abstract: The curriculum 2013 (K-13) requires all subjects to contribute to the formation of attitudes, knowledge, and skills. One of the subjects in Junior High School that contributes to this is integrated science. The integrated science phenomenon is generally abstract, so science is a subject that is not easy to learn. Based on this phenomenon, a student worksheets integrated science is needed that can implement and integrate various concepts that have been found as expected in 21st century of learning. The 21st century of learning is learning that integrates literacy skills, knowledge skills, skills and attitudes and mastery of technology. The preliminary study is to conduct a material analysis to determine the needs of students in developing a student worksheets integrated science. Based on the analysis of the preliminary study, it can be concluded that the theme of energy in life using an integrated type of 21st century of learning to stimulate students to apply and integrate various concepts in 21st century of learning.

1. Introduction
Education is an activity process in various elements of education to achieve national education goals. The aim of national education is certainly one of the main factors in determining the quality of a nation. So the need for an update to improve the quality of national education. In Law No. 20 of 2003 concerning the National Education System, stated that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively build their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills that needed himself, society, nation and country. The implementation of a quality national education system is a determining factor in the success of educating the nation. The formal education is one of the organizers of achieving success in educating the life of a nation in the implementation of education. In formal education such as Junior High School (JHS), the implementation of education is inseparable from the educational goals to be achieved. The educational goals will certainly be achieved if there is success in education. That’s because that the purpose of education is a benchmark for achieving success in facing the challenges of the 21st century. The 21st century learning is a teaching that integrates several capabilities such as literacy, knowledge, skills and attitudes as well as mastery of the technology [1]. To face up of the 21st century of learning, everyone should have the critical thinking skills, literacy, information literacy, media literacy and master information and communication technologies [2]. This is in accordance with the demands of the curriculum of 2013,
where the curriculum 2013 demands that all lessons contribute to attitude formation, knowledge and skills for students. So, in education, students not only have knowledge skills, but also adhere to attitudes that refer to science such as critical, creative, communicative and collaborative thinking. One subject in Junior High School that refers to the curriculum 2013 is natural sciences.

Natural Sciences is one of the disciplines consisting of physics and biological sciences. So, science is a branch of science that originated from various phenomena in nature. The phenomenon of natural science is generally abstract, so that science is a subject that is not easy to learn. In the 21st century of learning, science learning in junior high school has undergone some changes. One of these changes is the scope of science learning that was previously separated based on their respective disciplines. But, now it has been developed into a scientific discipline which can later add to the students' insight namely Integrated Science [3]. Through this integrated science learning, students are expected to master a wide range of knowledge in the form of facts, concepts, laws and principles that can be applied in everyday life, so that the experience and process in the classroom can run more effectively and efficiently. In the 21st century of learning, Integrated Science learning in JHS has undergone several changes. Among these changes is referring to the concept of learning that was be expanded as an integrative science subject, not as a scientific discipline. So that the learning of the 21st century has the aim to prepare the community especially in Indonesia, so that they have the ability to live as citizens who are productive, creative, innovative and affective and able to contribute in responding to global challenges [4].

The process of learning science in the 21st century is implemented using a scientific approach that is centered on students (student centered learning). This is done so that students can grow the ability to think critically, creatively, collaboratively and collaboratively. Besides that, this learning includes competencies that must be achieved by students, including attitude competence, knowledge competency and skills competency. These three competencies have different psychological gain trajectories. Attitudes are obtained through activities such as accepting, carrying out, appreciating, living and being able to practice. Knowledge is obtained through activities such as remembering, understanding, applying, analyzing, evaluating and creating. As well as skills acquired through activities such as observing, asking, reasoning, presenting and creating. Of the three competencies, then an educator must be able to adjust learning activities in the classroom, namely by using learning models, learning media and teaching materials provided by the school in order to attract learning interest in helping students face 21st century of learning to challenges this. In this case, teaching materials are one of the supporters in helping the learning process occur. The teaching material is used as a tool for educators to create a learning atmosphere to be more effective and efficient. This is because that teaching of material is a place for educators to deliver material. So, that these teaching of materials can arouse desire and motivation and increase interest in learning to spur learners to apply and integrate various concepts that have been learned. One of the teaching materials used by educators in conveying the science concept to integrate literacy skills, skills, knowledge, skills and attitudes, and mastery of technology is the worksheet of students.

Student worksheet is one means to assist and facilitate learners in the learning process. Therefore, the use of this student worksheet can form an effective interaction between educators and students, thereby increasing interest for students in understanding the science concepts that have been learned. In designing and developing valid, practical and effective student worksheet, required their preliminary studies of so-called Preliminary Research. At this stage has been carried out a preliminary study to conducting a needs analysis and material analysis. This needs analysis is carried out to see how important the student worksheet will be developed. So, the student worksheet to be developed can contribute well in improving the various components of 21st century of learning. In addition, there are several problems that are found through the results of observations related to learning and teaching materials used, including:

a. Demonstrate that in science learning, the student worksheet used by educators is still simple. So, the student worksheet used does not meet the educational character of the 21st century (4C).

b. The student worksheet used has not been able to assist teachers in achieving learning goals.
The importance an integrated student worksheet in learning has not become a serious concern for educators so that integrated science learning has not been carried out optimally. The student worksheet is a teaching material that is used to guide students to be able to apply and integrate various concepts that have been found. So, the use of an integrated student worksheet is very important in learning, because in integrated science subjects requires a trial/experiment activity, both in an integrated manner and in groups. Therefore, it is necessary to develop a student worksheet integrated that is in accordance with the requirements for the preparation of the student worksheets. Some of the requirements in the preparation of a student worksheet must be fulfilled so that the student worksheet becomes a good teaching material including didactic requirements, constructive conditions and technical requirements [5]. Through Preliminary of Research, the student worksheet used in learning is not as expected. The expected student worksheet is an integrated student worksheet and includes attitudes, knowledge and skills competencies. But in reality, the student worksheets that were found to have non-communicative language and students had difficulty solving the natural science problems contained in the student worksheet.

The student worksheet to be designed is a student worksheet integrated science with the theme of energy in life using an integrated type integrated in 21st century learning. Integrated learning makes learning in the classroom more relevant, effective and efficient so that it provides variety when teaching [6]. Where this integrated type is a type of learning that combines various subjects/disciplines by establishing a priority to find overlapping concepts, skills and attitudes [7]. Integrated learning is not only an integrated type, but there are ten types of integrated learning models in the curriculum. These types of models are fragmented, connected, nested, sequenced, shared, webbed, threaded, integrated, immersed and networked [8]. The substance of science subjects in the JHS curriculum is integrated science of learning. The integration of science learning is stated in the Ministry of National Education (2011) which is that a science learning approach that integrates various fields of science study into a single discussion unit. So, the learning model used in this study is a model of integration. The integration model is a learning model that combines a number of topics from different subjects/disciplines, but still in the same of essence. In this integration model, the theme chosen in the research that will be conducted is the theme of energy in life, which is integrated with 21st century of learning. The theme of energy is a combination of two subjects, namely physics and biology. Physics material that is in accordance with the theme is material energy while biological matter is photosynthesis.

2. Research Methods
This research is a descriptive study. Descriptive research is a form of research aimed at describing existing phenomena, both natural phenomena and man-made phenomena. Descriptive research can produce a picture of the phenomenon under study, describe the processes that occur and present various important of information about the variable. The study population was all students of SMPN 11 Padang. Sampling is done by non-probability sampling technique that is accidental sampling, where the subject is those who are met and in accordance with the criteria of the research objectives. The research sample was VII grade students of Padang 11 Junior High School. The data used in this research is the primary data, that’s data obtained through a questionnaire. Then the questionnaire used to analyze the assessment that teachers do. The data analysis technique uses a Likert scale. Where the variable to be measured will be broken down into sub-variables, then it will take the form of a number of positive statements and negative questions starting from very good, good, sufficient and lacking. So, the results of the questionnaire obtained will be calculated by calculating the score given by the respondent and using the Likert scale criteria.

3. Result and Discussion
The results obtained from the instruments that have been developed are:
3.1 Graduates' Competency Standards of Analysis

Graduates' Competency Standards are qualifications of graduates' abilities which cover students' attitudes, knowledge, and skills that must be fulfilled [9]. Graduates' competency standards stating that each learning must have competence in 3 domain dimensions, namely: attitude dimensions, knowledge dimensions and skill dimensions [10]. Graduates' Competency Standards is shown in Figure 1.

![Figure 1. Graduates' Competency Standards of Analysis](image)

Figure graduates' competency standards shows that the dimensions of attitude have a higher value compared to the dimensions of knowledge and skills. This shows that in the learning process only demanding dimensions of attitude, resulting in lack of formation of integrated learning in the 21st century.

3.2 Character of Students of Analysis

The condition and characteristics of students is one of the considerations that must be considered before compiling a teaching material, both concerning the interests of students, motivation to learn, learning styles and abilities possessed by each student. Analysis of the character of students can be seen in Figure 2 below.

![Figure 2. Character of Students of Analysis](image)
Figure analysis of the character of students shows that the indicator of student analysis is not very significant. Based on the results of the analysis there are three indicators that have the lowest percentage, namely learning styles, skills and knowledge, with values of 64.2, 63.8 and 63.2 respectively. This is because science learning delivered by educators still looks common, making it difficult for students to understand science concepts.

3.3 Analysis of Student Worksheets

Analysis of student worksheets serves to help students during the learning process, so learning in the classroom will be more attractive to these students. If a student is able to understand the student worksheets provided by the educator, then the students will be motivated to learn so that mastery of the material will be carried out properly. Analysis of student worksheets used by educators at Junior High School of 11 Padang can be seen in Figure 3 below.

![Figure 3. Analysis of Student Worksheets of Analysis](image)

Figure analysis of student worksheets shows that there are gaps in the use of student worksheets used by educators. It is seen that the student worksheets used by educators are still simple so that they are not as expected. Where an educator must be able to make and use student worksheets that can attract interest in learning, so the student worksheet is able to help students solve science problems and improve students' critical thinking skills.

Based on the results of the analysis that has been carried out, it can be seen that learning cannot be carried out optimally in accordance with national education goals, one of which is answering global challenges. Global challenges can be faced if the applied learning is in accordance with the 21st century learning. Where in the 21st century of learning requires the students to be able to integrate of attitude, knowledge and skill, as well as mastery of technology. If an educator has been able to develop a student worksheet on integrated integrated science, then learning in the 21st century will be able to be implemented well later.

4. Conclusion

Learning analysis activities are important in describing the learning achievement between an educator and students. In this analysis there were three aspects that were carried out at Junior High School of 11 Padang. First, the analysis of graduate competency standards shows that in the learning process only requires an attitude dimension, resulting in a lack of integrated learning in the 21st century. Second, the analysis of students shows that there are three indicators that have the lowest percentage, namely learning styles, skills and knowledge. This is because science learning delivered by educators still looks common, making it difficult for students to understand science concepts. And the third is the
analysis of teaching materials in the form of student worksheets that are still simple, so that learning has not been as expected.

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