



Teaching High School Biology Teaching Material Development Using Local-Natural-Resources Based Life Skill and Community Technology Science Approaches in Tomohon North Sulawesi

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Abstract-This research is conducted in Tomohon Town with consideration that this town is known as student town and education icon of North Sulawesi. This research aims to create tested teaching material that based on the study of teacher and student's need, local natural resources potential that can support the science learning process which stimulates critical thinking, creative and innovative act. It is expected that this research will obtain High School Biology teaching material that is compiled with Life Skill and Community Technology Science approaches using local natural resource potential as study object or example in Biology learning. This research uses evaluation and development research method. This research is conducted in some stages, i.e. stage 1: The study of science literacy level on teacher and students; stage 2: The study of teaching material that made by Biology teacher, which has been using in learning activities; stage 3: The study of life skill and community technology science ability of students; stage 4: High School Biology teaching material compilation with Life Skill and Community Technology Science approaching; stage 5: High School Biology teacher training and teaching material testing; stage 6: teaching material evaluation and revision; stage 7: teaching material publication and printing. The research result shows that the utilization of life-skill-based Biology learning tools in the learning process has caused the learning process more active and the life skill of students shows in the activity. Also, the utilization of life-skill-based learning tools can improve the learning interest. The utilization of life-skill-based Biology learning tools can improve the entrepreneurship interest without disturbing the learning achievement of the students.

Keywords- *Teaching Material, Life Skill, Community Technology Science*

I. INTRODUCTION

The advancement of education and human are two interrelated things. Education is supposed to always be associated with the themes of humanity. As revealed by Suhandoyo [1] and Sumampouw [2], that the essence of education is to foster the achievement of high quality life and to make the learners able to think creatively. Thus, education should be able to cultivate and develop the overall potential of

learners so that he has the ability to live in the coming era which has a complexity of problems that are much more complicated. Learning biology should also be designed so that learners are able to be creative to find their own metacognitive skills. In another word, the learning can be conducted to ensure that the learners have life skills. Moreover science education, science education with all its content and character should be able to contribute more significantly to the learners so that they have sufficient supplies in order to survive and be able to give contribution for the community. Learning science is always adjacent to the reality of nature where the learners live, as stated by Supriyadi [3] and Corebima [4] that the Natural Science is a system and method of critical thinking stimulation to understand natural phenomena, in the observation of natural events, and as body of knowledge that is obtained from an observation. Thus, science education will invites students closer to nature.

Creating humans who have critical thinking skills these days are the very urged thing to make them could face the future challenges as described above, seems to have to deal with the reality that not enough fun. Until now, the education world is still affected with practices that hinder the potential development process of learners. Most schools have translated science learning as a transfer of knowledge possessed by the teacher to the students with the memorization of formulas and theories, just to be able to answer the exam questions, but often are not able to translate them into reality around them. Learning is not sufficient to give life skills provision for learners even he was troubled from the real problems they are supposed to charge and finish. And the most concerned problem is the basic meaning of education is unattainable in these circumstances.

Science learning is very important in all aspects of life, because it needs to be studied so that all Indonesian people achieve scientific literacy, thus forming a science literate society but still in character of the nation. Learning science is responsible for the achievement of scientific literacy of the nation, because its quality needs to be improved. Improving the quality of science education is done through scientific critical thinking or science generic skill development. Corebima [5] and Sumampouw [2] states exercising the development of critical thinking can improve thinking ability and this aspect

can only be achieved through exercising metacognitive skills of the learners. It means, science is unity in diversity in line with the philosophy of the Indonesian people, i.e. Bhineka Tunggal Ika, thus learning science can develop thinking skills and character of students.

At the third millennium in this 21st century, Indonesia must be prepared to face global challenges. Global problems have been perceived by many Indonesian people today, including the uncontrolled conflict between social groups, the greater the gap between the rich and poor in the world and the need for large investments in the fields of human intellectual. The nations in the world, including Indonesia, rely heavily on the use of science and technology wisely. This ability depends on the character, distribution, and effectiveness of education received by the public. The main purpose of education is to prepare people to steer in filling life responsibly [6].

Science education can help learners to develop an understanding and habits of thinking that are needed as people who have a tolerance that can think for him and his people. Science education should also equip them when participating with fellow citizens to contribute ideas to protect people who are very open, so that in case of danger [7].

UU No. 20/2003 on National Education System Chapter 3 states that: Education serves to develop skills and form the character and civilization of dignity in the context of the intellectual life of the nation. The formation of the powerful and robust character of learners is believed to be important and absolutely owned by the students to face the future challenges of life.

Often in the learning process, Biological materials are not in line with the reality that is faced by the students, at least at the local level. Though the educational process actually works in order to meet the needs of human resources (at least) could resolve the local issues that surrounded. It means that every educational process should contain various forms of learning with local content which is significant to the community needs. So that the output of education is a human who is able to map and simultaneously solve the problems being faced by people with life skills that they have received in their school bench.

Learning style that directs learners to be always according to text book also has turned out the creativity of learners. Borrowing a term coined by Djohar, until now the learners are taught to keep being a "scavenger" of western scientific products without ever directed to attempt to obtain the products from the original mind of its own. Learners are not accustomed to construct its own building knowledge based on knowledge that has been obtained previously and by the reader on the reality around him. This condition has led to the "death" thinking skills that are part of the concept of life skills.

Seeing this quite alarming condition, presumably the education observer and practitioner in Indonesia is required to immediately take corrective action. Problem solving that can be raised at this time based on these conditions is the development of Science teaching materials which are oriented to life skill and Society Technology Science, juxtapose the science concepts and principles that are learned by students with real daily life so the learners are expected to be able using

what they have learned in the real daily life. In the long term, it is expected to produce the Indonesian people who are creative, innovative, applying the principles of science in the face of daily life issues so that we are not easily provoked to things that threaten the nation disintegration. This approach is intended to bridge the gap between science learning in the classroom with the advancement of technology and the development of communities surround the learners. Through this approach, students are also trained to get used to be concerned about social and environmental issues related with science and technology. Seeing the foundation of the CTS approach development, it is no exaggeration if the CTS approach in science learning is emerged as an effort to improve the life skills of learners. This research is conducted in Tomohon Town with consideration that Tomohon Town has been known for long time as the student town and the education icon in North Sulawesi. In Tomohon, there are several well-known schools in Indonesia, among others Lokon High School, Binsus Christian High School, Stella Maris Catholic High School, etc.

II. RESEARCH METHOD

A. Population and Sample

The population of this research is all high school students and teachers in Tomohon Town. Samples are determined using the lottery method that is 50 percent of the total high school in Tomohon Town.

B. Method

The development of this model uses Research & Development research model that aims to produce Biology learning evaluation model at highschool and highschool Biology learning evaluation guide. Education research and development is the kind of research that mostly used to solve practical problems in education world.

As what Borg & Gall (1983) in Sumampouw [2], said that education research and development is a process that used to develop and validate education product. The used development model in this research is the development model by Kirkpatrick that has been modified.

- a. Research and information collection, including a literature review, classroom observation, and reports preparation;
- b. Planning includes defining expertise, objective which determines the arrangement of the circuit, and small-scale trials;
- c. Development of a preliminary pattern of product including teaching materials, handbooks, and evaluation tools;
- d. The field experiment organizes school 1 to 3 schools using 6 to 12 subjects. The Interview, observation, and questionnaire data are collected and analyzed;
- e. Major product revision if it is suggested by the previous field tests result;
- f. The main field experiment organizes 5 to 15 schools with 30 to 100 subjects. Quantitative data on the

implementation of a subject series before and after collected. The results are evaluated with respecting objective circuit and compared with the control group data, if it is appropriate;

- g. Operational product revision as suggested by the main results of the field test;
- h. Operational field test is set at 10 to 30 schools, including 40 to 200 subjects. Interview, questionnaire and observation data are collected and analyzed;
- i. Final product revision as suggested by the results of the field test;
- j. Deployment and implementation of report on products in professional meetings and in journals. Working with publishers is assumed as commercial distribution. Monitoring the distribution as completing quality control.

C. Data Analysis and Discussion

The research result data is analyzed quantitatively and qualitatively according to the research stag

TABLE I. OUTCOMES AND INDICATOR OF ACCOMPLISHMENT

No	Outcomes	Accomplishment Indicator
1	Evaluation data of science literacy of high school students, especially at Biology subject.	Obtain data of science literacy of high school students, especially at Biology subject.
2	Evaluation data of teaching material using by subject teacher and its implication on the Biology science and life skill mastery of the learners.	Obtain teaching material data which is used by teacher (self-made and others-made) Obtain analysis data of the effect of teaching material using on life skill of the learners.
3	Highschool Biology teaching material with the tested life skill and CTS approach so that it is developed into teaching material that used at highschool.	The draft of highschool Biology teaching material with life skill and CTS approaches is compiled.
4	Teacher training in using teaching material using life skill and CTS approach so that it will imprve the professionalism of teacher.	Biology teacher who is able to use the teaching material effectively and efficiently
5	Publishing the research result on national and international journal. Publishing the ISBN-teaching-material	National and International journal Highschool Biology textbook with local-natural-resource-based life skill and CTS approaches

III. RESEARCH RESULT

A. Result

This research is focused on evaluation data exploration of students and teachers' science literacy level, especially on Biology subject. The evaluation data of teaching material usage of subject teacher and its implication on students' Biology mastery and life skill. The high school Biology teaching material with tested *life skill* and CTS approaches, so that it is developed into teaching material that is used in High School.

The introduction study is literature study, empirical studies including the initial conditions study of the research object through observation and interviews, especially the condition of the students, teachers and facilities. Furthermore, the needs analysis of study object and learning devices compilation are conducted. Then, the development of learning devices is done by the nature of biology as a science that includes products, processes and attitudes. Based on the need analysis, the research result is expected to contribute to teaching and learning process in schools.

B. Discussion

Based on the study result of introduction exploration, then the need analysis of study object and learning devices compilation are conducted. The developed life-skill-based learning devices are textbooks, student worksheets and instructional design. The instruments which are used to retrieve the research data are observation and questionnaires sheet of learners' perceptions on the tested teaching materials. Then the learning tools and instruments are used for the validation determination.

Generally, practitioners agree with the compiled draft of life-skill-based biology teaching materials, but there is a good special input from practitioners to be accommodated in addition to the writing correction inputs. The results of two-stages test (experts and practitioners) serves to improve and refine the draft of life-skill-based learning devices on Genetic lesson to improve the comprehension of the learners. The revised learning device draft based on input from the two tests is a hypothetical design which is then tested on the field.

Implementation or testing of teaching materials in school has two functions, i.e. to determine the extent of Hypothetical design can be understood by students so that the learning process can be carried out smoothly, while the second function is to determine whether the learning process that uses the hypothetical design can foster learners' interest in learning.

C. Limited test of Life-Skill-based teaching material in choosed High Schools

Homogeneity test is used as a prerequisite prior to the research execution. Pre-test is conducted in two classes of study subjects to determine the homogeneity of the respondents in terms of learner preferences as well as a comparison on the state interest in learning after participate the learning process, the pre-test results of students' learning interest of both classes of research subjects. The results of Levene's test for the pre-test data between the experimental group and the control group is 0.052 with $p = 0.737 > 0.05$, which means that the variance of the two groups' pre-test data is not significantly different. Thus the value distribution of the top, bottom, and middle group of the two groups are not much different. T test result obtains $t = -0.017$ with $p = 0.928 > 0.05$, which means that the average of two groups' pre-test is not significantly different. Thus both groups depart from the same initial conditions.

At the early part, the learning device is implemented in a small class to determine the readability level of the questionnaire, from the advice/comments sheet given to students after reading the questionnaire to check if it contains

some incorrect sentences and terms which cannot be understood by the students, then the questionnaire is improved in accordance to the suggestion notes. Based on the data, it is shown that the average learner interest in the control group between before and after learning is relatively similar, i.e. at enough category, so the increase of interest in learning is low with the gain average value of 0.1.

Based on the results of pre-test and post-test, it obtains the increase data of students' learning interest as follows. Pre-test and post-test result. Based on the data, it shows that the average interest of learners in the experimental group between before and after is relatively different, which is 57.96 with enough criteria and after the learning process, it increases to 85.61 with the very high category.

The life-skill-based learning device after compiled and validated by experts and practitioners is applied in the experimental class. To see the extent of which the activity of the emerging life skills in the classroom, in every learning process in this study involves four companions to observe the life skill activity of students. Most of all students conduct life skill activities that have been planned in the learning device. There are three elements of skill that all students perform these activities, i.e. participating in the learning process, writing opinion/ideas and hearing and speaking well. While the skill element that is least done by the learners, is stringing tool skills. There are three students who perform all skills, one who gets the highest test scores (82) has a low proficiency score (6).

The relation of life skill activities and interest increase of learners in the experiment class is interesting to be found. From the data of learning activity and interest, it obtains regression results of the effect of life skills activities on learning interest, which is $Y = 78.29 + 0.201 X$ with Y states learning interest and X states life skills activities. The model shows that an increase in one activity in life skills learning will be followed by an increased interest in learning of 0.102 and vice versa. The positive regression coefficient indicates that the life skills activity of students is directly proportional to the interest of learners. The regression model is tested using the F test, and it

obtains $F_{\text{count}} = 22.058$ with $p = 0.000 < 0.05$, which means life skill activity gives significantly positive effect on the learners' interest in learning. The contribution of the life skill activities on the interest of learners reached 36.7% (R square).

IV. CONCLUSION

The utilization of life-skill-based learning devices in the learning process has caused the learning process more lively and the life skill elements of students are shown in the process activity. The utilization of life-skill-based learning devices can improve the learning interest of the students. The utilization of life-skill-based learning devices can improve the entrepreneurship interest of the student without disturbing the learning achievement.

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