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DEVELOPING OF ENVIRONMENTAL EDUCATION TEXTBOOK BASED ON LOCAL POTENCIES

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ABSTRACT

Environmental education subject aims to form students who have the character to maintain the environment. One effort to achieve the objectives of the Environmental education subject is the local Environmental Education Textbook Based on Local Potencies. This research was aimed to produce textbook of environment-based education subject Environmental education based on local potencies. This research and development using Borg & Gall model (1983). This study uses only five stages of the Borg & Gall model, namely (1) need analysis, (2) planning, (3) develop preliminary form of product, (4) preliminary field testing, and (5) main product revision, due to time constraints and cost. The results of the research and development that has been done is a textbook of environmental education based on local potencies that is suitable for use in semester 5 collage level.

Keywords: *Environmental education, local potencies, textbook*

INTRODUCTION

Learning in the broadest sense can be interpreted as an activity psychophysical to full personal development. Then inside narrow sense, learning is intended as a business mastery of science knowledge that is part of the activity towards the formation the whole personality (Sardiman, 2011). In the learning process, textbook is a very important learning material, to help students in understanding a concept (Husamah et al., 2015).

Textbook is a handbook for a course written and composed by related field experts and meet the rules of textbooks and published officially and disseminated (Ministerial Decree of National Education of Indonesia Number 36/D/O/2001). The teaching materials are designed to meet the needs of students to fit the characteristics of the students and based on the student activity plan. Currently environmental education courses at the University of Borneo Tarakan do not have adequate textbooks. The content of the course material still refers to the lecture material from other universities. This causes the teaching material to be less contextual with the conditions of the environment, the media, and evaluation. Around, although the content of existing material has been referring to the principle of environmental education. In addition, the existing material description also has not explained about the local potential of Tarakan city.

Environmental Education is one of the compulsory subjects that must be taken by students of Biology Education, University of Borneo Tarakan. Environmental education is one of the clusters of biological science that belong to applied science. One of the objectives of this course is as an effort to optimize the role of society in overcoming environmental problems. Basically, environmental education is aimed at changing people's behaviour to be more environmentally friendly so as to minimize the impact of human activities on the environment (Meilani, 2009).

The rise of illegal logging that makes conversion of forests into agricultural land and housing is due to a lack of public knowledge of the importance of forests. Environmental education subjects taught at the college level aims to form students who have the character to maintain the environment. One of the efforts to achieve the objectives of the course of environmental education one is the local environment-based education textbook, which is able to provide information about environmental

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problems and can raise the local potencies Tarakan City.

Based on observations, most respondents (students) do not know the local potencies in the Tarakan city. Based on interview result about 85% of students do not know the local potential in Tarakan City. Though environmental education closely related to wealth or local potencies. Environmental education subject plays a very vital role in building the character of a prospective educator in maintaining the environment, therefore as a prospective teacher, biology education students should be able to master the concept of environmental education and apply in daily activity.

Based on analysis, it is necessary to develop a textbook environmental education that is able to raise the local potencies and display environmental problems in Tarakan City to improve students understanding about the management and conservation of natural resources in Tarakan City. Therefore, this study aims to produce a textbooks on environmental education subject based on local potencies.

METHOD

The type of research using research and development. This research and development is conducted from January to September, 2017 at the University of Borneo Tarakan.

Research procedures

This research produces the product of textbooks on environmental education based on local potential. Local-based environmental education textbooks are reference books of the environmental education course containing the definition of environmental education, the scope and objectives of environmental education, resource management, biodiversity, environmental issues, environmental ethics, conservation, eco-friendly energy, bioremediation, Environmental impact assessment concepts, and An environmental audit that is integrated with local potential in Tarakan City. The product development carried out in this study is based on a model developed by Borg & Gall (1983). The Borg & Gall development model consists of ten stages: (1) need analysis, (2) planning, (3) develop preliminary form of product, (4) preliminary field testing, (5) main product revision, (6) main field testing, (7) revisions of products, (8) operational field testing, (9) final product revisions, and (10) dissemination and implementation. This study uses only five stages of the Borg & Gall model, namely (1) need analysis, (2) planning, (3) develop preliminary form of product, (4) preliminary field testing, and (5) main product revision, due to time constraints and cost.

Procedure of development of textbook of course of environment-based education of local environment to improve student comprehension toward natural resource potency in Tarakan city which done is as follows:

Need Analysis

Need analysis is an early stage in the development procedure. Need analysis is focused on (a) the curricula used, the number of credits required, (b) the existence of the course, (c) the availability of the textbook, (d) literature study on local potencies of Tarakan City that can be related to the subject of environmental education, (e) analyzing environmental problems occurring in Tarakan City that can be attributed to lectures of environmental education. The information obtained as follows,

a) The curricula used is a curricula compiled by the University of Borneo Tarakan refers to a competency-based curriculum. The number of credits of environmental education is 3 credits.
b) The course of Environmental Education is a compulsory subject. The subjects of Environmental Education is a subjects in semester 5.
c) Regarding the Textbook, based on the results of the observations of courses environmental education not have adequate textbook. The textbook to be developed in this research and development is a local potencies education based educational textbook to increase understanding of the local potencies of Tarakan city.
d) The local potencies of Tarakan city that can be developed and associated with the learning of environmental education is very diverse and supports the development of the course of environmental education.
e) Finding a list of environmental problems that exist in the Tarakan city that can be used as the subject matter and discussion materials of students.

Planning

At the planning stage is done by making the design of textbook environmental education based on local potencies to improve understanding of the students of the natural resources of Tarakan city. Planning of textbooks is based on the problems that have been analyzed in the research and information collecting stage.

Planning of textbook of environmental education is designed by adjusting instructional objectives in syllabus of environmental education course, while local potencies is presented by displaying images and information about natural resources in Tarakan city and raising environmental problems. The format of the developed textbook consists of several parts, namely: a) preliminary, which consists of title page, introduction, and table of contents. b) Introduction, which contains the background of environmental education textbook writing, the textbook relation with the course material, and the scope of the textbook material of environmental education. c) The content, is about the presentation of the material consisting of several chapters where the material description is relevant to the lesson plan environmental education, there is a column of your knowledge (which is about the local potencies in Tarakan city), and case studies on environmental issues occurring in Tarakan City d) Summary, and e) Exercise.

Develop Preliminary Form of Product

Develop preliminary form of product stage consists of two stages, consisting of the preparation of the textbook fomat and the validation of the validation of the textbook of the environmental education. The compilation of validation sheets is used to determine the feasibility of textbooks that have been developed.

In the validation phase, it is done by involving experts to assess the feasibility of the product according to each relevant expert. The validator is required to provide suggestions and assessments of the products that have been developed by filling out the product assessment questionnaires prepared by the researcher. The validation process includes expert validation (material experts, and practitioners).

Preliminary Field Testing

Preliminary field testing were conducted by distributing environmental education book products to students and a student assessment questionnaire. At this stage students are not only asked to provide an assessment only, but also provide advice on product development.

Main Products Revision

Revisions are made if there are improvements to the product being developed. The development flow done in this research is presented in the diagram shown in Figure 1.

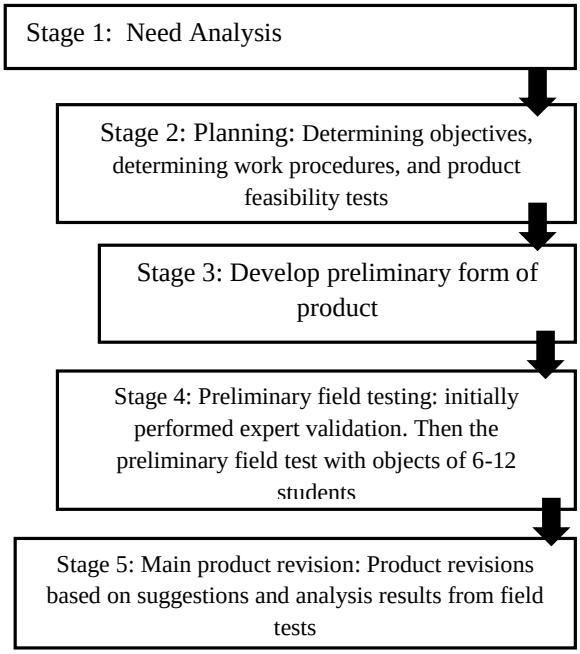

Figure 1. Local-Based Environmental education Textbook Development Model.

Product Trial

1. *Trial Design.* Product trials as part of the preliminary field test development phase. Data obtained from preliminary field test is data validation results and student responses to textbooks produced.
2. *Test Subject.* The subjects of this study are students who have taken the course of environmental education.
3. *Data Type.* The data obtained from this research is data related to validation and responses from material experts and practitioners as well as the students' responses to the developed local-based environmental education textbook.

Data Collection Instruments

The data collection in this study used the instrument i.e. the validation sheet of the local environment-based education teaching book and student response questionnaire.

Data analysis technique

There are two data analysis techniques used to process data from the results of expert review, namely using qualitative descriptive analysis and quantitative descriptive analysis. In detail described as follows.

Qualitative Descriptive Analysis

Qualitative descriptive data analysis is used to process data from the validation results of material experts, in the form of comments and suggestions of improvements contained in the validation instrument. Data analysis is used as a reference to improve or revise the product.

Quantitative Descriptive Analysis

Quantitative descriptive analysis is used to analyze the data obtained in the form of percentage analysis. The percentage analysis technique is used to present data which is the frequency of the response of the test subjects to the product is analyzed by using the percentage formula to know the criteria of the prevalence of the developed textbook. The data that has been collected in the validation questionnaire is basically a qualitative data, because each statement item is divided into categories not very good, not good, good and very good. The data is first converted into quantitative data according to the Arikunto's (2002) formulation:

$$\mathbf{P} = \frac{\sum x}{\sum x_i} \text{ x } 100\% \quad (1)$$

Description:

P = percentage

$\sum x$ = The number of respondents in 1 item

$\sum x\, i$ = ideal score in the item

100% = constants

The result data of assessment on instructional device developed analysed descriptive, determining the feasibility criteria and product revision in Table 1.

Table 1. Eligibility criteria and Product revision

Level of achievement (%)	Qualification	Explanation
81-100	Very good	Not
61-80	Good	revised/valid
41-60	Enough	Not
21-40	Less	revised/valid
0-20	Very less	Revised/invalid
		Revised/invalid
		Revised/invalid

(Source: Suwastono, 2011)

RESULT AND DISCUSSION

The product of research and development resulted the textbook of Environmental Education based on local potencies. Initial drafts are first generated by validation by material experts and practitioners, after which improvements are made in accordance with the suggestions provided by the validator. Then a preliminary field trial was conducted. Preliminary field trials were conducted by students who have taken the course of environmental education. The validation results from the material experts can be seen in Table 2.

Table 2. Result of Expert Material validation

No.	Aspect	Percentages of ratings (%)
1	Material	82.69
2	Language	100
3	Presentation	91.67
4	Full view	100
Mean		93.59
Categories		Very Good

(Source: primary data, 2017)

Based on the validation results from the material experts (Table 2) obtained 93.59% percentage of the assessment entered in the category very well. Then the validation results from practitioners of environmental education course can be seen in Table 3.

Table 3. Results of Practitioner Validation

No.	Aspect	Percentages of ratings (%)
1	Material	89.42
2	Effects of the Textbook on learning	90.63
3	Language	90.62
4	Presentation	88
5	Full view	82.81
Mean		88.29
Categories		Very Good

(Source: primary data, 2017)

Based on the validation result from the practitioner (Table 3) obtained the percentage of assessment of 88.29 categories is very good. After validation by the material experts and practitioners, the next draft of the textbook is revised in accordance with the advice given. Then the textbook that has been through the revision phase 1, tested on the student try. This field trial stage was conducted with the subject of 6 students who have taken the course of environmental education. The student's response

to the local potential-based environmental education textbook can be seen in Table 4.

Table 4. Results of preliminary field test

No.	Aspect	Percentages of ratings (%)
1	Simplicity	89.74
2	Attractiveness	93.75
3	Understanding	94.27
Mean		92.58
Categories		Very Good

(Source: primary data, 2017)

Based on the results of student responses in Table 4 can be concluded that textbook into the category is very good. That is because the textbook contain local potential, make it so interest for student. Marlina et al. (2015) states that the potential local module can increase the attitude of environmental care student. Sarah & Maryono (2014a) states that teaching sets based local potential can increase the responsibility. Noviar et al., (2013) states that the student give the high score for encyclopedia base local potency. That is because the material teaching contain of case study around them.

Expert material validation results percentage of textbooks education environmental based on local potencies on the material aspect obtained a percentage of 82.69%. This indicates that the description of the material contained in the textbook is accordance with the important concepts that exist in environmental education. Situmorang (2016) states that nature give a large potential as contextual learning resource. Prabowo et al. (2016) states that module based local potential make it easy student for learning. Then in terms of language obtained a percentage of 100%, the use of written language in textbooks that have been prepared using the appropriate rules of the Indonesian language. From the presentation aspect get the percentage of 91.67% and the overall appearance of 100%. Overall the textbooks compiled to obtain the value of material experts amounted to 93.59% of this indicates that the material contained in textbooks that have been prepared can be tested.

Then the validation result from the practitioner is 88.29%, it indicates that the local-based environmental education textbook that has been arranged is feasible to be used. There are several suggestions given by practitioners, before the trial is done that displays the image with the source and foreign terms to be italicized. Aspects assessed by practitioners include material, textbook effects on learning, language, presentation, and the overall look. The advice given by practitioners related to the material is on the Environmental impact assessment concepts concept chapter to be added to the technical implementation of the Environmental impact assessment concepts. With examples that exist in the Tarakan city.

Then the advice given by the practitioner to the effect on learning is on the evaluation section to make the matter in the form of the case. Because solving the problem in the form of cases can train students to think critically. This is in line with the statement put forward by Karim (2011), that thinking process is a process done by someone who done when he faced a problem. The thinking process begins with an understanding of the problems faced.

Student response to environmental education textbook based on local potencies is 92.58% included in very good category. Some of the respondents commented that education environmental textbooks based on local potentials are very interesting and communicative in the delivery of materials. That is make the student like to read the textbook. Budiarso (2016), happy to read can increase motivation student. In terms of ease of obtaining a percentage of 89.74%, based on the percentage can be interpreted that textbooks are prepared to provide convenience for students to understand the concepts of environmental education, and local potencies in the Tarakan city.

In terms of attractiveness, the percentage is 93.75%, based on the percentage, it can be interpreted that the compiled textbook has an appeal that lies in the presentation of materials that are integrated with local potencies and interesting images related to local potential in the Tarakan city.

In terms of percentage understanding of 94.27%, based on the percentage can be interpreted that environmental education book based on local potential generated contains content that can be easily understood by students. Yulicahyani (2017) get positive response about the module IPA base local potencies. According to Lase (2016) and Haerullah (2017) worksheet based local potential (utilization mangrove gastropod) valid and feasible for learning. Based on the student respond, that module give experience for student. The textbook very important for learning. Irmawati (2016) says that the textbook have the most function for learning. If the

learning out came to become student have multitalented, so the planning must suitable.

Environmental education textbook based on local potencies include resource management, biodiversity, conservation, environmental issues, and additional information on the concept of environmental impact analysis and environmental audit concepts. In resource management materials, the local resource management activities contained in the Tarakan mangrove conservation area (Figure 2). Resources Potencies in the Tarakan city, among others, *Nepenthes* sp as an ornamental plant that has a high economic value, fishery products (such as fishes, fish and seaweed), mangrove tuna that has an important role in the balance of aquatic ecosystems, and the proboscis monkey (*Nasalis larvatus*, an endemic mammals at Tarakan city). Local potencies in Tarakan City should be exposed in the learning, so that learners can know details.

Resource management materials that are integrated with local potentials are considered very attractive by respondents. Because it presents images and the translation of material relevant to the local potential that existed in the Tarakan city.

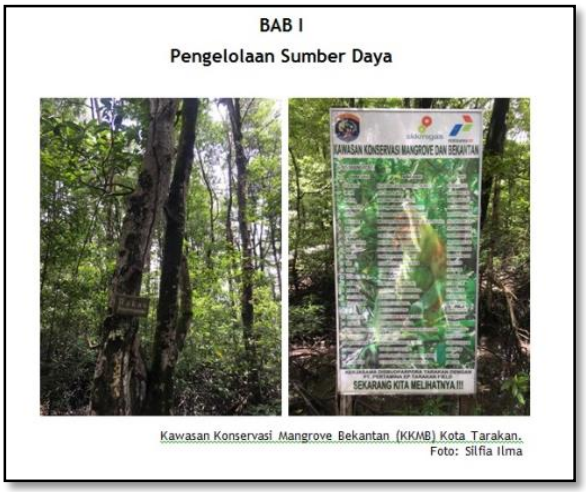

Figure 2. Management of existing resources in the Tarakan city. (Source: Textbook of environmental education based local potential)

In the Textbook of environmental education based local potencies it is also described that maximal resource management will bring high economic benefits to society and improve welfare. Then the local potential that is contained in the biodiversity material is about the diversity of *Nepenthes sp.* Which is in the Tarakan city (Figure 3).

Figure 3. The diversity of existing *Nepenthes* sp. In the Tarakan city. (Source: Textbook of environmental education based local potencies).

Then the local potencies is contained in the material environmental issues such as waste and flood problems that exist in the Tarakan city. Students are given a project to identify the cause of environmental problems that occurred in the Tarakan city then find a solution to solving the problem. Conservation activities in the Tarakan city include conservation areas mangrove of proboscis monkey (*Nasalis larvatus*), orchid conservation, nursery and breeding areas of local crocodiles. Later on the local potency-based environmental education textbooks were composed with additional materials in the form of environmental impact analysis concepts and environmental audit concepts. Because in the Tarakan city there are several industrial companies. So the student must know about environmental impact analysis concept and environmental audit of a company.

The Environmental educational textbook based local potencies contains interesting images of the local potencies of Tarakan city (Figure 4), such as picture of *Nepenthes sp.* on biodiversity topic, mangrove conservation areas in resource management topic, petroleum pumps and use Solar energy on environmentally friendly energy topic, and contains environmental problems that occur in the Tarakan city. This makes readers more interested in reading textbooks on environmental education.

Based on research results Suwarni (2015) states that the textbooks based on local potential can facilitate the learning process so as to help achieve the completeness of the competence of

learners. This is in accordance with the results of research and development of textbooks environmental education based on local potencies that has been done. The existence of textbooks environmental education based on local potential is very helpful for students in understanding the concepts of environmental education materials as well as students can also recognize the local potencies of Tarakan city. Students can also directly see the direct application of the concept of environmental education in Tarakan city environment.

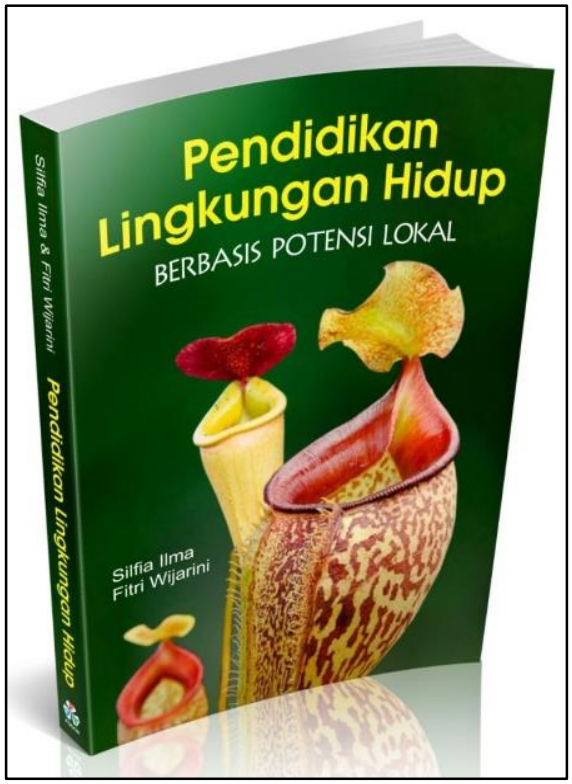

Figure 4. Textbook of environmental education based local potencies

The local potential contributes enormously to the learners in the learning process. The existence of local potencies that is integrated with teaching materials can help learners in understanding the concepts to be taught. Mumpuni et al (2013) states that the form of integration of learning materials in accordance with the surrounding environmental issues, can make it easy for the learners in solving environmental problems. Sarah & Maryono (2014b) and Ardan (2016) states the effect of textbook based local potencies to learning out came. The existence of local potencies in a learning process gives effect to the closeness between the object to be taught with the learner.

CONCLUSION

Based on the results of the validation that has been done, it can be concluded that the environmental education textbook based on local potencies that is suitable for use in semester 5 collage level.

SUGGESTION

Suggestions that can be put forward for improving the quality of research, namely:

1. In the future, it is expected that this textbook can be implemented directly in the lecture of environmental education in order to know the effectiveness of this textbook to the students' knowledge.
2. Print textbook quality should be a special attention so as not to affect the ease of the delivery of information available in the textbook.
3. Further exploration is needed to the border area of North Kalimantan to know the local potencies.

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