

Developing Model of Biology Hand Book Writing Base on Ecology and Local Oriented to Increase Students' Care Environment

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Abstract

A study using Research and Development design was conducted to produce a model of Biology hand book writing base on ecology and local oriented as an effort to increase students' care toward environment. The background of this research is the reality that the awareness and care of the school graduate toward the environment safe is still low. Besides, hard science instructional at school could not affect or intervene the graduate's characteristics, for instance in keeping the environment awareness. Whilst, there are many concepts of environment were taught through hard science especially biology, so in the researcher's point of view, biology subject has strategic role to prevent or mitigate the environment disaster caused by human error. The model was validated at paddy ecosystem. The analysis of the research result includes three aspects, namely: 1) Comprehension, 2) Environment Care Attitude, and 3) Handbook Readability. Based on the result of paddy ecosystem data analysis, it was found that (1) there was a significant difference between experimental class and control class in the paddy ecosystem base on show by $t_{\text{calculation}} > t_{\text{table}}$ ($6.150 > 2.00$); (2) there was strong correlation between students' comprehension and attitude base on show by coefficient correlation (r) 0.769. While the text readability test (Cloze Test) show (1) the readability of paddy ecosystem text is 56.72% (moderate). Therefore, the conclusion is that all of the texts in the developed book are fit and proper for Senior High School Students of grade X in East Lampung.

Keywords: hand book writing, ecology and local oriented, care environment

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1. INTRODUCTION

Graduate students are expected play an important role in communities to solve problems that occur in their environment. The involvement of graduates on the problems of life in the neighbourhood is a necessity because as an educated should share their knowledge and skills. In this position, the school should not be neutral on the problems and realities of life in society and the environment.

Educational process in schools should accommodate the realities around the students, and also look for the solutions. Education is a world of continuous change according to the nature of reality and the purpose of the school; it is not just to memorize theories, but to theorize depend on the changes in reality. Therefore, as a process of change, education must build protégé dynamic thinking and open in line with the reality around students which always changing.

The Enforcement of Kurikulum Tingkat Satuan Pendidikan (KTSP) has given impact to the realization of the decentralization of education, especially in the aspect of

the curriculum. Kurikulum Tingkat Satuan Pendidikan (KTSP) provides some signs towards the need for assessment of learning strategies that are familiar with students. In this case the role of the teacher is crucial for the successful implementation of the curriculum. Teachers required to be able to understand the motion of a change of the reality around the students.

The development of a textbook model in particular that examines environmental issues around the student, should be in accordance with the state of the area concerned by taking into account that the materials developed must be adapted to the development of learners, abilities, interests and needs. Other conditions that support the importance of textbooks that are relevant to

The needs of students is the fact that the differences in ecological processes that occur in different landscapes. For example, the circle of life that took place in paddy ecosystems are different in the types and number of organisms involved with occurs in coastal ecosystems. Textbooks used often do not consider that students who are in coastal ecosystems is "forced" only studied the food circles occur in agricultural ecosystems and land and never learn how real food circles that takes place on the beach and sea.

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On the other side, a fact shows that the impact of environmental education of awareness and concern over the school graduates environment was not significantly. There is a question in the community, why graduate students from science major cannot affect or intervene, for example in awareness of protecting the environment his life. An environment much taught in science subject especially biology. Writer agrees, biology has strategic role to prevent or at least pressing (mitigation) environmental disasters caused by human behaviour.

The availability of biology book insightful ecology and local content that aimed to increasing concern for the environment is very weak. As an effort to solve the problem may needs to develop a model of biology book for high school which insightful ecology and local content to improve the students' concern towards local environment.

1.1 The Problem Formulation

The problem formulation filed in the research is: how model of writing a biology book for Senior High School insightful ecology and local content can improve understanding and students' aware towards local environment? Specifically the problems of the research as follows:

What kind of local content that necessary and relevant to integrate in paddy ecosystem's topic which can increase students' understanding and awareness towards local environment.

How development strategy writing a biology book for high school based on ecology and local content which can increase students' understanding and awareness towards local environment.

Whether a model of writing a biology book for high school based on ecology and local content is effective to increase students' understanding and awareness towards local environment.

1.2. The aim of the research

This research was aimed to obtain an empirical finding about

- a. The local content that necessary and relevant to integrate in paddy ecosystem's topic which can increase students' understanding and awareness towards local environment
- b. The development strategy a model of writing a biology book for high school based on ecology and local content which can increase students' understanding and awareness towards local environment
- c. The effectiveness of model of writing a biology book for high school based on ecology and local content which can increase students' understanding and awareness towards local environment

2. RESEARCH METHOD

A research design used referring to research and development by Borg & Gall [1]. The design include four stages, namely: 1) introduction study; 2) program planning; 3) the program development; 4) validation and revision program.

Preliminary study was the early research consisting of literature study and field surveys to identify local material relevant .The study of literature covering assessment of relevant research, standard of writing a book, the concept of environmental analysis biology on the biology widely used in high school class X, analysis percentage the integration of the living environment material on each subject in high school.

On program planning activities are conducted determination to be done relate to the preparation of a great conceptual model, interview guidelines, and questionnaires.

The program development stage conducted judgment on the draft program, draft revision of the program based on the results of research, the test program that has been revised, and revision based on results of the test program. On the draft assessment program conducted based on consultation with book experts

Validation and revision program in order to obtain finalization model of writing a book and should be retested through the accuracy with validation

3. LITERATURE REVIEW

3.1. The nature of teaching book

In the minister of national education Republic of Indonesia no 11 years 2005 article 2 about the book teaches lessons mentioned 2 (two) types of teaching books as follows: (1) teaching book lessons used as a guide by teachers and students in learning; (2) enrichment books and a reference book to increase students' skill and knowledge (education ministry,2005)

Teaching book has two main mission; it must be a source of science and good medium which can help optimize the learning process .The writers realize that teaching book should be refer to the curriculum .The curriculum is not only demanded the high school student passed the national examination with a fine grade, but more than is expected to students can solve their daily problem. Studied the biological expected beneficial for students to increase humans quality.

3. 2. Insightful ecology

Insight ecology is view of something using the principle of ecology thought. Teaching book insightful ecology is containing biology concept which had enriched by the ecology though as table 1 shows. The ecological include:

integral, balance, continuity, and diversity. Each of this principle did the outlined in the principles and developed into thinking ecology. Each the concept of biology, in this research ecosystem concept, at least enriched by one principle ecology

3.3. Local Insight

The *Kurikulum Tingkat Satuan Pendidikan (KTSP)* curriculum has given motivation for the formation of decentralization education, especially in the aspect of curriculum. KTSP gives the guidelines toward the need for study of strategy learning familiar with reality around students. In this case the role of book dormitory link reality local would be very helpful the success of the implementation of KTSP at school. Along with that, Rustaman and Rustaman [2] stress some aspects should get attention in write a teaching book: utilization of and environment, local potential, and religious insight.

Local content materials are from all conditions and real life and phenomenon in the students' environment who arranged systematically which included physical environment, social, understanding, confidence, and insight local students. Local material developed adapted to the standard competency and ecosystem syllabus appropriate with KTSP curriculum. In writing a teaching biology book that need to be stressed; the physical environment understanding, and insight local students. The students' environment intended in this research is paddy ecosystem..

4. THE RESEARCH RESULT

The result of this research found in four parts arranged based on the phases of research. In the first part of identification presented by the local content in paddy ecosystems which relevant as a preliminary to be integrated into subjects of basic ecosystem. The second part is description about readability of teaching book. The third part is description about scores of teaching book by teachers and expert. The fourth part is discuss the results of the teaching book at school where treatment was done and schools non treatment (control)

4.1. Identification of the local content material

Local content materials are from all conditions and real life and phenomenon is in the students' environment who arranged systematically which included physical environment, social, understanding, confidence, and insight local students. In this research focus on agricultural ecosystem. To uncover local material used sheets of observation of the students' problems. The students' observation sheets contains three main thing that is: (1) identification nets the paddy ecosystem (2) problem of environment in paddy ecosystem and coastal; (3) local

knowledge that still do by farmers and fishermen until now, (4) chain impact (circularly) inappropriate human activities.

The identification of local content material described as follows;

a. Web life

The paddy ecosystem, quantitatively about 78 % students have just in making structure the web life. But in terms of living beings involved in the nets life is generally still not in accordance with the reality around them. There are 67 % made a net of food was not based on the fact that is especially in the inaccurately include carnivores in structure of food chain. Students still put an animal such as wolf, and tiger's base on not found again at around their environment.

b. The identification problem of local environment

Paddy ecosystem: the substance problems in the paddy ecosystem can divide into: (a) disorder pest and disease of; (b) side effects of pesticides and fertilizer; (c) weather disorder; (d) production costs

c. Local knowledge that still do by farmers / fishermen

Local knowledge in paddy ecosystems; (a) install a stick in the rice fields to eradicate the snails; (b) guard ducks base on snails prey; (c) gropyokan; (d) pengemposan; (e) fencing seedbed plastic alternation use the plant; (f) makes mounds land in fields corner.

d. Activity that produce the impact of circularly

The impact of circularly on paddy ecosystem: (a) pesticide is sprayed into leaving the rest of plants in waters fields and carried away the flow of water can kill plankton base on fish's food. Scarcity plankton cause scarcity of fish and on will give bad effect to fishermen; (b) deforestation cause a stream water shortage necessary farmers to rice cultivation especially in summer. Rice production farmers being declined and incomes producer to decline and difficulty finance their family.

4.2. Readability of teaching book

In overall teaching book was tested about 300 high school student class x in East Lampung and central Lampung. Readability test discourse book teaches developed as Cloze technically by Sadtono [3] modified by analysing the answers in every word with a view to replace word to get inferior scoring with a more precise. The readability test shows: readable category of discourse paddy ecosystem: 56.72% including medium category. Thus, drawing conclusions that can be taken to the manuscript discourse material developed is qualified and should be used by high school student class X.

4.3. The assessment results of the user and the experts

The assessment results of the feasibility manuscript model of teaching materials which was carried out by a practitioner (teachers), two people teachers derived from high school located within the paddy fields. Both of teachers who were asked to assess all of them said the manuscript of teaching materials good on the subjects of the ecosystem paddy fields worthy of and whether for use by high school students a class X.

While the experts validation can be described as follows: Based on experts assessment, both text paddy ecosystem and coast are deserves to be used .There are five important advices from the expert: (1) there are some long sentences which hard to understand(2) the results of the assigning should be implemented well because the effect are empathy and students' responsibilities with their environment; (3) Every biotic component should include ecological aspect ; (4) to agricultural ecosystem add the success story of agriculture organic in several areas , sonic bloom effect , and comparison the advantages and disadvantages of organic fertilizers and inorganic and pesticides chemical and bio-pesticide.

4.4. The results of the application of model

Tests on the performance score results of study conducted by comparing the results of studying high school biology class X which the learning process use the model textbooks and local ecology-minded with the conventional one on the subject of the paddy ecosystem. Learning outcomes which compare is a students' score (gain) based on the difference of pre-test and post-test were normalized (gain normalize).

Table 2. Independent Test Results Sample T-Test Treatment Group and non-treatment on Paddy Ecosystem

		F	Sig.	t	Sig.
SKOR Treat vs non Treat	Equal var assumed	.651**	.421**	6.150**	.000**
	Equal var not assumed			6.150	.000

note. ** Significant $\alpha=0,0$

From the data values shown in Appendix 2 shows that the scores obtained by the treatment and non-treatment groups when analysed using Independent samples t-test Test results differ significantly, $t > t$ table ($6.150 > 2.00$). This shows that the ecology-insight use of textbooks and local content material has influence on improving student learning outcomes in the material paddy ecosystem.

The average score of learning outcomes of treatment group (71.56) is higher than the non-treatment group (64.06). This shows the average student does not have trouble understanding the concepts in textbooks used. Textbooks used also lead students to explore more of the

problems that occur in the paddy ecosystem around students will discover new knowledge that had never existed in the minds of students' minds even though it was about the students. This is evident from some of their findings well as working instruments to capture prior knowledge or when working on problem-solving tasks in the textbook. For example, first, the increasing scarcity of the number of crickets in the fields thought to be the trigger strong rat population explosion in the fields because the rat was evidently displeased with the sound of crickets. Scarcity of crickets in the fields now this is just one example of the negative effects as the use of insecticides used to kill insect pests in the fields.

Second, the rice field which quickly hardens (sodden) if they do not get it in a few days. This shows that the shortage of agricultural land so that organic fertilizers decreased retention power of the water as a result of excessive use of chemical fertilizers. In line with the results of the Department of Agriculture [4] those 5 million hectares of agricultural land in Indonesia shortage of organic substances. In addition, low friability and porosity of the soil caused by the decrease of soil fauna were also killed by the pesticides used by farmers to kill pests. Thirdly, the students a better understanding that many other ways those are more environmentally friendly to control pests and diseases in rice fields compared to the use of chemical substances. For example, to eradicate snails sufficiently established the stakes in the middle of rice fields, to eradicate the caterpillars and insects multiply planting trees seeds that endeared insectivorous birds.

To determine the strength of the relationship between students' knowledge and concern of the paddy environment then performed Pearson correlation test was done. Pearson correlation test results as shown in Table 3.

Table 3. The Results of Data Analysis Pearson Correlation between Students' Knowledge and Attitudes towards paddy ecosystem material.

		Knowle dge	Attitudes
Knowledge	Pearson Correlation	1	.769**
	Sig. (2-tailed)		.000
	N	80	80
Attitudes	Pearson Correlation	.769**	1
	Sig. (2-tailed)	.000	
	N	80	80

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the significance of less than 0.05 then Ho is rejected and it can be concluded that there is a relationship between knowledge and attitudes of students in the material paddy Ecosystem in the treatment group. As for the strength of the correlation as shown in the table on the data analysis, the correlation between knowledge and

attitudes provide coefficient (r) of 0.769. Because the coefficient $r = .60-.799$ above it can be concluded that: The relationship between students' attitudes and knowledge on the material for the group treatment paddy ecosystem. A positive number indicates a positive relationship, i.e. if knowledge increases, the attitudes increased as well. One of the main causes of the strength of the relationship is the students' understanding of the paddy ecosystem sustainability gained from learning to use the book models.

5. CONCLUSIONS

The use of ecology and local text books influence on improving student learning outcomes in the material paddy ecosystem.

There is a strong correlation between the understanding and attitudes of the students whose learning using a textbook insightful ecology and local in the paddy ecosystem material.

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