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THE DEVELOPMENT OF CONTEXTUAL BIOLOGY HANDOUT FOR ANIMALIA TOPIC

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Abstract

Teaching material is one of essential material used by teacher as teaching tools. Handout was known as one of the teaching tools. It was important for teacher to developtheir own teaching tools to achieve the learning indicators. Handout was one of the teaching materials that can be used by teachers or students in the learning process. Animalia is one of the topics that can be learned by the student. In senior high shcool, students should be able to learn the characteristic, example, the benefit of phylum for enviroment. handout is an example teaching tools to figure out the wide concept of invertebrate by appliying contextual learning. Developing handout using research and developnet design would help the teacher achieving purpose of the research. This research was done in some steps like data collection, planning, development, and evaluation stage. Subjects of this research were biology teachersand the students of senior high school. The experts' judgement result of the integrated science handout was 83, teachers responses were 81.6%, students responses were 83.2% and students' average score was 81.2 above the score of 75 as passing grade. It can be concluded that the developed handout meets the requirements as teaching materials.

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INTRODUCTION

In a learning process in school, teaching material is an important supporting factor. It should be available in a learning process, because it will be discussed, observed, and studied by the students as learning material completed with a direction (Hernawan, 2012). Teaching material is a set of leaning material which is systematically packed based on the competence that will be achieved according to learning purposes (Asfiah et al., 2013). Learning material with contextual material is an essential need for a teacher. Contextual learning is a learning that links the material with everyday life (Pratiwi et al., 2017). The fulfillment of teaching material based on the learning material would be a motivation to learn and good tool to improve students' understanding (Satriani, et al., 2012). The development of teaching material is done based on the fulfillment of needs and facilities of learning process.The range of teaching material has various forms. Handout is one of the teaching materials which is packed systematically. It contains of a set of planned-learning experiences and is designed to help the students covering specific learning purpose. At least, handout should contain of learning purpose, learning material/substance, and evaluation. This suggests that integrated science modules can generate data to answer problems or test hypotheses. The condition is in line with the results of Ajoke (2012) research that to achieve independence through creativity and process skills, students must be actively involved in the instruction process.

In designing learning materials, there are five categories of capabilities that can be learned by students: verbal information, intellectual skills, cognitive strategies, attitudes, and motor skills. (Saito, 2007). Biology is one of the branches of science that studies the relevance of biotic and abiotic elements in the environment. Biology could be taught thorugh some approaches and strategies in the learning process (Parmin & Peniati, 2012). Animalia is one of the topics in biology that is taught in some education levels. In Senior High School, animalia will be discussed in a study of animalia characteristics, the characteristics of vertebrate and invertebrate phylum, and the role of animalia in life. Based on the first survey, the study of animalia is mostly taught by memorizing the material than understanding the the application of the material in our environment, so that it appears to be a difficult topic. One of the ways to teach animalia is through contextual learning. Contextual learning is defined as a learning which connects a concept understood by the students with a new concept so that they are able to construct it into a more comprehensive understanding (Hudson & Whisler, 2007).

Contextual biology handout is developed to fulfill the needs of teaching material in animalia topic that gives a continuity of the material with the environment where the students live, so that they understand the material better by creating a new constructive understanding. The development of contextual biology handout refers to the principle of handout development with self-learning characteristics that can be used by both teacher and students based on the manual and completed with evaluation form in order to analyze the understanding of the material.

METHOD

It was a kind of Research and Development (Borg & Gall, 2003) with development process which covers four steps: (1) data collection, (2) planning, (3) development, (4) dissemination. Subjects of this research were Senior High School teachers and students in Tegal.The data were collected using check list technique, questionnaire, and test.

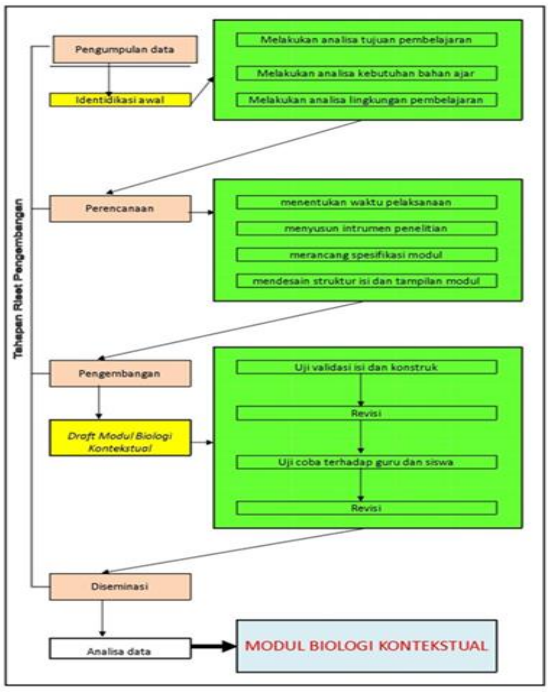

Figure 1. The Stages of Contextual Biology Handout Development

The data gained in this research were (1) Suggestions from the experts to determine the content and construct validity of the assessment component, (2) Responses from the teachers and students related to the handout, (3) The answers of sample test to find the reliability and validity of the handout. The data were analyzed to measure the validity and reliability using Pearson Product Moment Correlation formula (Arikunto, 2008).

RESULTS AND DISCUSSION

Data collection stage was done by initial identification including the analysis of learning purposes, the requirement of teaching material through syllabus and lesson plan, and the analysis of learning environment. The result of data collection stage became the basis of planning stage including research time, the compilation of research instrument, handout specification, and content and display design. Handout was compiled using handout compilation technique (Kejuruan, 2008). Handour are effective when easily understood to achieve certain competencies. In addition, handout efficiency is also based on affordable cost of copying, while feasible from the systematic writing of modules is easy to understand, the material is relevant to the competencies measured and the references used up-to-date (Rahayu, 2010). In thedevelopment stage, the draft of contextual biology handout was created. Validity test, teachers and students' responses test, and small scale try out were ready to be conducted for the draft. Results of the tests are:

1. Validity Test of the Handout

A set of validity tests for the handout had been conducted by experts covering content validity (Table 1) and construct validity (Table 2).

Table 1. The Result of Construct Validity

Construct Validity Aspect	Score
Handout Systematic	29
Graphic	25
Ordering	27
TOTAL SCORE	81
Average	4.3
Conclusion	Handout can be used with a few revisions

Table 2. The Result of Content Validity

Content Validity Component	Score
Material conformity	19
Language	14
Handout readability	15
Material contextuality	19
Validity of the concept	18
TOTAL SCORE	85
Average	4.5
Conclusion	Handout can be used with a few revisions

The indicators of content validity consisted of the conformity of the material with the competence, language, material contextuality, the readability of the handout, and the validity of the concept. The score was 85 with a note to do a few revisions. The indicators of construct validity consisted of handout systematic, graphic, and ordering. The score was 81 with a note to do a few revisions. The average validity score of the handout was 83.

2. Teachers and Students' Responses

Revised handout was tried out to the teachers and students to gain their responses related to its feasibility.

Table 3. Teachers' Responses Recapitulation

No	Indicator Component	**Average Score (%)**
1	Handout systematic	10.7
2	The independence of handout usage	9.5
3	The conformity of the material with learning purpose	11.2
4	Evaluation sets	10.1
5	Language	9.3
6	Handout readability	9.7
7	Material contextuality	11.2
8	Graphic	9.9
	TOTAL SCORE	81.6
	Conclusion	The handout is appropriate to be used

The indicators of teachers' responses questionnaire consisted of handout systematic, the independence of handout usage, the conformity of the material with learning purpose, handout contextuality, evaluation sets, graphics, and language. The result was 81.6% which was categorized as proper or appropriate

to be used (Table 3). The indicators of students' responses consisted of handout readability, language, the independence of handout usage, ordering, and graphic. The result was 82.3% which was categorized as proper or appropriate to be used (Table 4)

Table 4. Students' Responses Recapitulation

No	Indicator Component	**Average Score (%)**
1	Handout readability	18.2
2	Language	16.5
3	The independence of handout usage	15.1
4	Ordering	11.8
5	Graphic	16.7
	TOTAL SCORE	82.3
	Conclusion	Handout is appropriate to be used

3. Small Scale Try Out

Small scale try out was conducted for students through a multiple choice test to determine the effectiveness of evaluation tool created in the handout.It was also used to determine the conformity of the material with the contextual element in the handout. The data analysis was done by testing the difficulty level, distinction capacity, questions reliability and validity (Table 5). There were 30 questions to be tested. The average score of small scale test was 82.1 and above the score 75 as the passing grade.

Table 5. The Result of Small Scale Try Out

Test component	Score	Conclusion
The average of written test	82.1	Above passing grade
Difficulty level (average)	0.35	Intermediate
Distinction capacity(average)	0.54	Good
Reliability	0.71	Excellent
Validity	0.78	Excellent

The last stage was dissemination stage or the analysis of the data from development stage to complete the contextual biology handout so that it could be used as teaching material in Senior High School.The final product of contextual biology handout contained of some learning components in the form of (1) teacher's manual, (2) student's manual, (3) animalia material, (4) student's worksheet, (5) student's answer sheet, (6) question sheet, (7) answer key, (8) glossary. Based on the manual of handout development technique (Kejuruan, 2008), the minimum components of a handout are learning purpose, material, and evaluation tool. The indicator of contextual learning approach was applied in the material display, worksheet, and question sheet. The average score of validity given by the experts was 83. It means that the handout can be used with a few revisions. Some revisions were done for the learning material and ordering components which were expected to focus on the element of contextual approach. Revised handout was used to gain teachers and students' responses which were concluded that the handout was appropriate for use. The result of data recapitulation was 81.6%, while the minimum assessment standart was ≥ 75%. The result of students' responses was 82.3% above 75% as the minimum standard of the handout feasibility. The average result of small scale try out through written test was 82.1 above the score of 75 as the passing grade. The reliability (0.71) and validity (0.78) were included in high category. Based on the small scale try out data, contextual biology handout is able to help the students understanding animalia topic. It is shown by the average score of learning result which is above the passing grade. The development of handout as teaching material will improve the reasoning ability and the mastery of concept connection (Ramdani, 2012). Using contextual learning approach into a handout helps the students constructing the concept and achieving the learning purpose (Satriani et al., 2012). Students' ability in connecting the animalia learning material with the phenomena in our environment to create a new understanding is the learning purpose of contextual biology handout. An effective learning can be conducted by using a learning material which is able to combine science learning experience with the ability to respond some phenomena around the learning environment (Powell & Kalina, 2009). Even though the cognitive and social constructivist approaches emphasize different elements in learning, their main argument about the acquisition of knowledge or the achievement of

learning is actually the same. This argument is that knowledge cannot be transmitted from the outside; it has to be a personally constructed process (Öztürk, 2016).

CONCLUSION

The result of the research shows that contextual biology handout is appropriate to be used as teaching material in animalia topic for Senior High School level. It is supported with the experts' validity towards the handout with average score of 83, teachers' response (81.6 %) and students' response (82.3%). It means that the handout is appropriate to be used. The result of small scale try out is reliable and valid with the average learning score of 82.1.

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