Development of Students’ Book Based on Science, Technology, and Society With Integration Life Based Learning in Biotechnology Materia in the XII Grade

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ABSTRACT

Learning is organized not only to make learners have cognitive skills, but also to have the skills to apply in their life. Biotechnology is one of the areas of science that requires special skills in its application. Efforts that can be made to have skills in biotechnology applications can use quality teaching materials, that is student books. This research is a development research and using 4D model consisting of four stages but in this research only consist of three stages (define, design, and develop). The value of the validity of the books of students who developed 89.27% with the category is very valid. The average score of test book readability of students is 91.85% with very good category. The practical value of the book is 98.33% with very practicable category. These results indicate that the developed student book is valid and practical for use in biotechnology learning in grade XII SMA.

INTRODUCTION

Education is a lifelong process, from the human being born to the end of his life that makes a person a whole person. Education includes activities dealing with the relationship between teachers and students[1]. Where teachers as educators and students as educated objects. Observation of Competency Standards and Basic Competency in Permendiknas Number 47 Year 2008, Biotechnology is taught at elementary school in 4th grade of second semester, at junior high school level in first semester IX, and at high school level in second semester class 2[2].
The development of science and technology also impact the world of education and of course in the field of biotechnology science is growing rapidly. It demands enhanced quality of superior human resources. So that teachers can make learning as creative as possible to print students who have superior quality.

In fact, today's society is less interested in science and technology. Science and technology have a great impact on learning, and make it easier for students to access knowledge. Therefore an approach is needed that can connect between science and technology for the benefit of society. Ziman (1980) says that STS as a curriculum approach designed to make traditional concepts and processes found in general science and social studies programs more precise and relevant to student life so that students can easily apply in real life. STS is important in preparing lifelong learners who can participate effectively technology-oriented.

STS is similar to LBL (Life Based Learning). Because LBL (Life Based Learning) is a learning based on the life of the learning is done by closer to the life of students. LBL (Life Based Learning) emphasizes on someone who has good cognitive skills as well as adequate skills. This means that he has good knowledge and he can also perform skills that support his knowledge. This will be more useful because the science learned already exists in the lives of students and students will more easily learn and utilize the results of learning.

So it would be very good when the approach in education and learning by using STS is integrated with LBL. In learning also did not escape the role of teaching materials such as books. Of course the book contains information so that students get information from reading books. Reading is a basic skill of all learning processes and is necessary for students in acquiring languages, studying the literature, and learning other lessons. So that student book made with STS approach integrated with LBL for biotechnology materials will help students in learning and apply the imu that they get in daily life for the benefit of society by using existing technology.

The purpose of this research development are: 1) To know the validity of the book of students developed, 2) To know the practicality of the book students are developed.

METHODOLOGY

The type of research used in this study is research and development (Research and Development). The model used in this development research is the 4D model. This model has 4 stages, namely Define, Design, Develop, and Disseminate. But in this study modified into three stages (define, design, and develop). Disseminate stage is not done because the purpose of this study has been obtained at the stage of develop

The initial stage is the define which is pursued by filling in a need assessment for 6 biology teachers and 9 new students of Jember University, KI (Kompetensi Inti) analysis and class X biotechnology KD (Kompetensi Dasar), identifying skills on biotech materials, and formulating the goals to be achieved in biotechnology learning.
The next stage is the design (design) that aims to produce the desired product. This stage begins with the preparation of tests to test the cognitive students. Followed by the selection of media to optimize the use of teaching materials in the development process of teaching materials. Then determine the format in developing teaching materials in the form of student books. The final step in this design stage is to make the initial design of the student book.

The last stage is the stage of the development (development) that bertujan to produce a valid student book and has been revised based on input from some experts. This stage is validation of student's book and book trials in grade XII students of SMAN 2 Jember.

RESEARCH AND DISCUSSION

Define

The defining phase of the early development process of Science-based, Technology, and Society student book with Life Based Learning integration is done by giving the questionnaire to 6 biology teachers and 9 new students of Jember University. Teachers who use the Science, Technology, and Society approach are only 10%. While 100% of students stated the need for a certain approach in biotechnology learning. As many as 60% of teachers stated that there are obstacles in implementing biotechnology learning, so that only 66.67% of students are able to apply biotechnology science in can in everyday life. In addition 80% of teachers stated that the teaching materials used in biotechnology learning were students' books, and 100% of students also said so.

This defining stage is also carried out task analysis as well as concept analysis on biotechnological material. From the analysis that has been done got the goal to be achieved in the learning process. The objectives to be achieved in the book of students developed are students able to explain the principles of biotechnology, students are able to connect several disciplines with the development of biotechnology, students are able to compare products of conventional biotechnology, students are able to identify organisms that play a role in biotechnology process, students are able to classify products conventional and modern biotechnology, students are able to identify the impact of biotechnology for human life.

Design

At this stage the product design is ready to be validated by the validators through the preparation of the test, media selection, format selection, and initial product design. The test used is a cyclic test consisting of three cycles using 5 essay questions. The media and the format used are student books. And the initial design is tailored to the media and formats used, complemented by the usual components in student books, such as keywords, bio info, etc. All components are arranged in such a way and use a language that is easy to understand by students that will facilitate students in using the student's book.

Develop
This stage begins with product validation. Validation is the process of requesting recognition or approval of the suitability of instructional materials to the needs in learning [12]. Validation is done by four experts consisting of three lecturers and one biology teacher of SMA XII class. Student book validation results can be seen in Table 1.

Table 1. Results of Student Book Validation

<table>
<thead>
<tr>
<th>Aspect</th>
<th>%</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>94.05%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>Development</td>
<td>87.5%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>Media</td>
<td>83.43%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>Users</td>
<td>92.1%</td>
<td>Very Valid</td>
</tr>
<tr>
<td>The overall average</td>
<td>89.27%</td>
<td>Very Valid</td>
</tr>
</tbody>
</table>

Student book validation result developed (Table 1) for all aspects ie material, development, media, and user is 89.27% with valid category. This means that the developed student book can be used in the field for learning activities, so it can be used in the next process, which is tested in the learning process.

The next stage is a limited-scale trial. This stage is to assess the legibility of developed student books. Readability is an important thing to do to help teachers determine the proper use of textbooks used for students [13]. The results of this legibility test can be seen in Table 2.

Table 2. Result of test of legibility

<table>
<thead>
<tr>
<th>Aspect</th>
<th>%</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>97.78%</td>
<td>Very Good</td>
</tr>
<tr>
<td>Present clarity</td>
<td>91.67%</td>
<td>Very Good</td>
</tr>
<tr>
<td>Attractiveness of design (appearance), new information, and clarity of use</td>
<td>86.11%</td>
<td>Very Good</td>
</tr>
<tr>
<td>The overall average</td>
<td>91.85%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Based on Table 2. Average results of legibility test on a limited scale of 91.85% with very good category. This indicates that the student's book is ready to be field-tested.

The next stage of course test the product on the subject that has been determined. The selected subject is one class XII MIPA 2 SMAN 2 Jember. In this stage, the data of practicality and effectiveness. Practicality assessment is obtained from student response questionnaire. Questionnaire This student response is given at the end of biotechnology learning. The results can be seen in Table 3.

Table 3. Result of students’ response

<table>
<thead>
<tr>
<th>Aspect</th>
<th>%</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>100</td>
<td>Very practical</td>
</tr>
</tbody>
</table>
Table 3 shows the value of practicality is 98.33% which means that students' books are practical in use in the learning process of biotechnology. Being practical means that the learning activities undertaken using this developed student book are effective and functional. In addition, this student book makes students easy and happy in using the student's book.

CONCLUSION

Based on the process of development and testing of science-based student books, technology, and society with life-based learning integration, it was found that the validity of the books of the developed students was 89.27% with very valid categories. Practical value of student's book is 98,33% with very practical category mean student book easy and interesting to use.

Suggestions in the development of this book is to mengemabngkan book until the stage of dissemination (phase disseminate) by using 4-D model.

REFERENCES


