The Development of Learning Materials Students' Book Based on Contextual that Integrated with Technopreneurship in Biotechnology Subject at XII Grade Senior High School

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ABSTRACT

Biotechnology has growth fast in the last 20 years. Biotechnology produces many products biotechnology, so in some developed countries serve as the center of bioeconomic activities. The rapid development of science and technology makes biotechnology must be mastered by academics including students. Efforts to improve the mastery of biotechnology can be pursued by using the contextual and integrated technopreneurship lesson. This research is a development research using 4D model (four D model), which consists of four stages, namely Define, Design, Develop, and Disseminate. However, the implementation of this research is limited to Define, Design, and Develop stage. The book validation value of the students developed based on experts and users is 92.23% and 92.48% with very reasonable criteria. Value of the book of students based on test book readability of student equal to 88.63% with criteria very good and result of student response after using book equal to 93.71% with criterion very good so that book can be said practical and can be used for field study activity

INTRODUCTION

The academic year 2016-2017 The Ministry of Education and Culture (Kemendikbud) will officially enact the National Curriculum 2013 revised edition nationally. There are factors supporting the success in the implementation of the curriculum of 2013 one of which is, the availability of books as learning materials and learning resources that integrate the standards of curriculum forming¹¹. Based on the revised 2012 edition curriculum, teachers are expected to link learning with the
environment, natural resources, and energy around it so that students can use it as a learning resource[2].

Education would be more meaningful if directly related to student learning with real life, one of them by using contextual-based learning or CTL (Contextual Teaching and Learning). Contextual based learning is a learning that is able to connect the concepts they learn with daily life, so that students get the experience of life[3]. This learning can help teachers to connect between matter with real-life situations and encourage students to be able to apply knowledge gained in real life as a member of the family and society[4]. This design proved able to improve student learning outcomes, because this learning dekat with student life. So that this CTL-based learning is effective enough to be applicable[5][6].

Challenges in the world of education in the 21st century is now becoming more complex and complicated, it is because of the rapid progress of information technology. One aspect that becomes the focal point of attention is the ability of technopreneurship. This capability is needed because it is able to contribute to economic growth and provide more job opportunities that can reduce the unemployment rate. Technopreneurship education is actually still referring to entrepreneurship which aims to prepare graduates to have the skills and success of their careers as they grow their business both in small and medium scale[7]. Technopreneurship based on education is able to give positive attitudes favorable to students such as leadership, creativity, innovation, spirit unyielding, and competitive[8]. So it takes a development of teaching materials based on contextual and integration with technopreneurship to be able to help students improve learning outcomes and entrepreneurship skills.

METHODOLOGY

The type of research used in this study is research and development (Research and Development). The model used in the development research is 4-D (four D model) which consists of Define, Design, Develop, and Disseminate. However, in the implementation of research and development that is used is limited to Develop stage.

The first stage is the spreading of questionnaires of the needs of teachers in 5 high schools in Jember district, questionnaires the needs of students in 9 students who have taken biotechnology materials, and interviews in SMA SMA Muhammadiyah 3 Jember to obtain data that support related learning held in SMA Muhammadiyah 3 Jember. In addition, there is also a literature study to analyze KI and KD of class XII biotechnology materials in the revised edition 2013 curriculum.

The second stage is the development, the process of making products. At this stage the preparation of the criteria test. media selection ie student text, selection of formats focused on biotechnology materials according to KI and KD, and initial design of the developed student book.

The third stage is a validation test by 3 experts and 2 users to obtain a book worthiness rating, and suggestions for book improvement. After the revision followed doing the questionnaire to test readability and difficulties of the small-scale book, using respondent 9 students, the result of suggestions by filling the questionnaire was revised again. Next do a limited-scale trial in one class with 31 students to know the effectiveness of the book, and filling the questionnaire of student responses after the use of the book to determine the practicality level of students' books.
RESEARCH AND DISCUSSION
Definition
At the stage of defining who is an early stage of development of the student book contextual based integrated technopreneurship, from questionnaire needs of teachers and students and interviews obtained from 5 senior high school is used as the respondents reported having have used curriculum 2013 revised edition. 66.67% of the teaching materials used in each school are books and student LKS, and the availability of student books in each school is sufficient. 44.45% more students understand learning by reading, 33.33% recorded, and 11.11% see the video and memorize. Student books that students expect are books that include learning mu dah applied in everyday life. During learning activities, about 40% of teachers have been associated with daily life while 60% of teachers have not linked learning with everyday life. In that case, the teacher disclosed that 25% of students did not go to college and had to enter the workforce so that 100% expects to learn by using teaching materials that can be integrated with entrepreneurship skills (technopreneurship). Results from questionnaire students get value 44,45% of the material is quite so biotechnology lit. Based on this it can be continued at the design stage.

Design
At the design stage which is the second phase of the development of research book student based on contextual that integrated technopreneurship, the book is designed in accordance with the curriculum of 2013. Starting from preparation tests as a measure of success in the learning process, the selection of media such as books students, the selection format with a contextual basis and integrated with technopreneurship , as well as the initial plan of book design from cover, how to use the book, the book's character, the content of the book, the features in the book, the question of evaluation, to the summary, glossary, and index in the book.

The design of the book is chosen contextually based because every concept learned can be related to the circumstances surrounding the students, so that they get concrete and meaningful experience. In addition, students will be more motivated to learn and move\textsuperscript{[9][10]}. So that will be able to improve student learning outcomes. In the book raised the problems that are in Jember, and the potential that is owned by Jember. In addition, also integrated with the ability of technopreneurship, because it can hone the ability of students to entrepreneurship by utilizing what is around him. In this book is inserted entrepreneurial souls, innovations-products biotechnology products that can be commercialized, and motivation that encourages students to entrepreneurial interests. The use of technopreneurship integration aims to make them feel that any material they learn can be useful for their lives.

Development
At the stage of development which is the third stage in this study the development of textbook students based on contextually integrated technopreneurship. The product development stage was undertaken to design a student teaching material\textsuperscript{[11]}. Books that have been designed then printed and tested validated on 3 experts namely, material experts, development and media and 2 users. Validation tests by validators aim to determine the extent of validity and the feasibility of developed instructional materials\textsuperscript{[12]}. In addition, the validation process aims to produce an effective medium or instructional material prior to use\textsuperscript{[13]}. The validation performed is corrective, ie it seeks to find errors, weaknesses, and shortcomings in teaching materials, so that the assessment results can be a quality control of the developed teaching material \textsuperscript{[14]}. Student book validation results by validators and users can be seen in Table 1.
Table 1. Results of Student Book Validation by Experts

<table>
<thead>
<tr>
<th>Expert</th>
<th>Average Assessment Results</th>
<th>Eligibility Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>97.44%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Development</td>
<td>95.37%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Media</td>
<td>83.87%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Average Validation Results</td>
<td>92.23%</td>
<td>Very Decent</td>
</tr>
</tbody>
</table>

The result of validation of students’ books developed and assessed by experts (Table 1) for the entire expert (material, logging and media) was 92.23% with very reasonable criteria.

Table 2. Results of Student Student Book Validation

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Mean Result Rate</th>
<th>Eligibility Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>95.00%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Presentation</td>
<td>93.27%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Language</td>
<td>89.17%</td>
<td>Very Decent</td>
</tr>
<tr>
<td>Average validation results</td>
<td>92.48%</td>
<td>Very Decent</td>
</tr>
</tbody>
</table>

The results validate the students’ books (Table 2) the feasibility aspect of content, presentation and language obtained an average 92.48%. Based on the validation results by experts and users obtained criteria is very feasible, meaning that the book can be used for learning activities in the field. The next stage is the legibility test and the level of difficulty of student books with scale trials small. The respondents were 9 students and asked to fill out the reader test questionnaires and the level of the students' books that have been developed.

Table 3. Legality Test Results and Difficulty Levels

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Mean Result Rate</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legibility</td>
<td>77.78%</td>
<td>Very good</td>
</tr>
<tr>
<td>Present Clarity</td>
<td>88.11%</td>
<td>Very Good</td>
</tr>
<tr>
<td>Attractiveness of design, updated information, and use elegance</td>
<td>100%</td>
<td>Very good</td>
</tr>
<tr>
<td>Average</td>
<td>88.63%</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Based on the results of the readability test and the student's book difficulty level (Table 3) on a small scale obtained an average of 88, 63% with very good criteria and the book is ready to be used for a limited scale test in one class.

The results of a limited-scale trial at the end of the study in obtaining the results of the data questionnaires filled with the number of respondents 31 students.
Based on the results of a questionnaire filled with student responses (Table 4), yang aims to determine the practicality of the book that has been developed. Practicality is a criterion of the quality of learning devices one of which is a student book, which is viewed from the level of convenience of students in using the book [15]. The result of the questionnaire of the response of the students of the limited scale obtained a value of 93.71\% with very good criteria so that the use of the book can be said to be practical.

### CONCLUSION

1. Developing text books of students based on contextually integrated technopreneurship on the subject of biotechnology class XII SMA, can be described as follows:The developed student book presents biotechnology materials that are contextual with the problems and potentials raised from the surrounding environment ie Jember.
2. Student books embedded with modification Entrepreneur Intelligence (EI), as an effort to provide knowledge and experience to students related to entrepreneurship.
3. The result of validation of student's books by the expert gets the value of 92.23 \% and by the user gets the value of 92.48\% both are included in the criterion is very feasible.
4. The results of small-scale readability test before the learning using the book of students who developed the value obtained 88.63\%, the result of student responses after the learning using the book students who developed the value of 93.71\% both received very good criteria and said to be practical.

### REFERENCES


