

Developing Culture-Based Teaching Material on Human Reproductive System Materials Class XI Senior High School

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Abstract

This study aimed to investigate the development of textbooks and also to figure out their validity, practicality, and effectiveness, in Indonesian education system. In the case of textbook validation, it is performed by three validators. In order to measure the practicality of the textbooks, it was tested in 3 high schools in the year 2022/2023 through student response questionnaires and teacher response questionnaires. Meanwhile, the effectiveness of textbooks was tested in class XI first-grade students of three high schools in Banda Aceh in the year 2022/2023. Based on the results of the trials that have been carried out, it was concluded that the textbooks have met a very valid category with an average value of 4,032 by relying on the criteria table validity ($4 \leq M < 5$). For the practicality of textbooks, it can be seen that 92.59% of the students gave vastly positive responses, and 95% of the teachers gave very positive responses in relation to the textbooks used for learning. Furthermore, to find out the effectiveness of textbooks can be seen in the student learning outcomes test. There are 47 students in total, 39 students were declared complete (passed) and 8 students were declared incomplete (did not pass) with the average percentage of the number of students who achieved a minimum completion score of 75 was 83 %. Based on the results of this study, indicated that the textbooks developed were valid, practical, and effective to be used in order to support the teaching and learning process.

Keywords: problem based learning, human reproductive system, socio-scientific issues, literature-based education

1. Introduction

In the process of learning and teaching, teachers need learning tools to support various activities that occur in the classroom. One of them is teaching materials (Romero et al., 2020). Teaching materials are any form of material used to assist teachers or instructors in carrying out teaching and learning activities in the classroom (Trinic et al., 2022). Teaching materials can be used by teachers to facilitate learning processes through the delivery of material (course content) to the students. It can be in the form of students' worksheets, modules, and any other kinds of teaching materials (Bancong & Song, 2018). The books used in schools in Indonesia consist of 4 types, namely (1) textbooks, (2) reading books, (3) source books, and (4) handbook. The book referred to by the researchers in this study is a textbook. Textbooks serve to help students to acquire the necessary knowledge in the learning process and enable teachers to enhance effectively lesson delivery and provide quality teaching. By using textbooks, students will be more engaged to actively involved in the classroom. However, there are still many teachers who have not been able to develop textbooks that meet the needs of their students (Hudha et al., 2021).

Based on the observation result, shows that the use of teaching materials has not been thoroughly used in every class at the high school. This is due to the very limited number of textbooks provide in high school, and the absence of textbooks developed by teachers, especially Biology textbooks (Atuhurra & Kaffenberger, 2022).

While, the teachers write the learning material on the blackboard and then explain it, commonly. So that the student's knowledge is only gained from what is written by the teacher. In addition, the existing textbook used still referred to the 2013 curriculum, in which there are many concepts that have not been discussed in detail. So that, some

inefficient and ineffective indicators showed that students are less motivated in learning, they do not complete assignments on time, and their learning outcomes show poor grades (Romero et al., 2020).

One solution that is assumed to solve this problem is to develop textbooks based on approaches, models, strategies, and learning methods. The selection of certain approaches, strategies, methods, and learning models greatly affects teaching and learning becomes a worthwhile activity and creates a classroom environment that is efficient, effective, and meaningful in order to pursue expected learning achievements (Ayik & Coştu, 2020). If a teacher only relies on the lecture method, then teaching and learning become monotonous activities with the result that the students become bored and unmotivated in the learning process (Raisah et al., 2021). Therefore, teachers should not only rely on the lecture method. Since 2013 curriculum has been implemented at every level of education, teachers are required to be able to create a democratic, creative, and innovative learning atmosphere in the classroom by creating a learning atmosphere so that students can be actively involved both as learning subjects and learning objects in the learning activity (Sajian et al., 2022). This condition assists students to improve their ability to solve problems on their own using their potential and talent. In addition, teachers also succeed to develop interesting and updating teaching materials (Widarti et al., 2020).

Furthermore, Many terms are used to refer to the teaching materials. Instructional material is the term that is widely used which is cover all forms of learning such as instructions for instructors, students' modules, overhead Transparencycies (OHP), videotapes, computer-based multimedia formats, and web pages for remote education (Sukri et al., 2018). Moreover, Learning materials are a broad term for material used in teaching learning activities which include visual aids such as handouts, images, photos, and others. Thus, Teaching materials are all forms of printed and digital materials used to assist teachers/instructors in carrying out teaching and learning activities in the classroom (Djajadi & Rauf, 2020). Various kinds of printed teaching materials can be explained as follows:

Table 1. Various Kinds of Printed Teaching Materials Can Be Explained as Follows

Types of Teaching Materials	Characteristic
Module	It consists of an assortment of written materials used for self-study.
Handouts	It is an assortment of printed materials that can provide information to students. <i>This handout</i> consists of both complete print and outlined prints only), diagram tables, maps, and other additional materials.
Students' worksheets	This includes case sheets, reading lists, practicum sheets, briefing sheets on projects and seminars, worksheets, etc.

Teaching materials assist students to acquire knowledge fastly because they can read the lesson subject directly. Furthermore, various kinds of teaching materials are provided to fulfill students' needs and interests (Anif et al., 2019). On the teacher side, Teaching materials are essential and significant tools needed for teaching and learning activities in order to promote teachers' efficiency. In addition, it makes teaching effective as it enables learners to participate actively in the classroom (Subali et al., 2019).

The principle of effective teaching material development is as follows; 1) Start from the easy to the difficult, from the concrete to the abstract. 2) Repetition will strengthen understanding. 3) Positive feedback will provide reinforcement to learners' understanding. 4) High learning motivation is one of the determining factors for success. 5) Achieving a goal is like going up a ladder, step by step, eventually reaching a certain height. 6) Knowing the results that have been achieved will encourage learners to achieve learning goals (Sukma & Ibrahim, 2016).

Culture-based learning is a learning concept that helps teachers relate the material to be taught to students' real-world situations and encourages students to make connections between knowledge and their own experiences in social life. With this concept, it is hoped that learning will be more meaningful for students (Zuchdi & Nurhadi, 2019). The learning process takes place naturally by relating cultural processes in learning and students feel that they experience the learning process so that the knowledge gained is not through the process of transferring knowledge from teacher to student (Fajriah et al., 2021).

There are two kinds of cultural backgrounds that students experience in Biology teaching and learning. First, a positive effect can be appeared if the material on biology teaching and learning being studied is related to the daily knowledge (culture) of students. In this situation, the learning process supports the way students view the surrounding nature. This kind of learning process is called the inculturation process. On the contrary, the process of teaching and learning biology in the classroom becomes a 'disruptor' when the biology teaching and learning were not related to the cultural background that is already rooted in the students, and the teachers seek to impose the

biology teaching and learning through marginalizing the previous cultural background knowledge of the students. This learning process is called assimilation. In other words, the inculturation learning process improves the way students in understanding the material, on the contrary, assimilation has a negative impact on the students such as alienation from their own culture, which in turn can cause social disorder in social life (Siswanto et al., 2019).

Based on such learning conditions, teaching material is needed to overcome problems and assist students to connect activities in their social life with the knowledge they obtained from the schools (Ribosa & Duran, 2022). The development of teaching materials is one solution to help students and teachers in teaching and learning biology which aims to improve students' ability in understanding the material of the human reproduction system (Muzana et al., 2021). This is the reason that led the researchers to conduct research on the development of teaching materials, that are expected to help students in the learning process (Pratiwi et al., 2022).

2. Method of Research

The research type used in this study is the research and development method that is commonly used to produce a particular product and then measure its effectiveness (Manurung, 2015). This study develops culture-based teaching material on the human reproductive system (Nadiyah & Faaizah, 2015).

The development procedure used in this study is the ADDIE development model. This model consists of five stages, namely *Analysis*, *Design*, *Development or Production*, *Implementation or Delivery*, and *Evaluation*. Thus, The steps of developing learning material are as follows: first, writing a draft of teaching materials. second, validating the teaching materials to experts. Third, validation results from experts will be followed up in the form of revision of teaching material drafts, then the implementation of teaching materials on the human reproductive system in learning activities in class XI. The last is the evaluation of the implementation of the teaching material in the class and the evaluation of the students' questionnaire results, teachers' questionnaire results, and field notes (Mustadi et al., 2022)

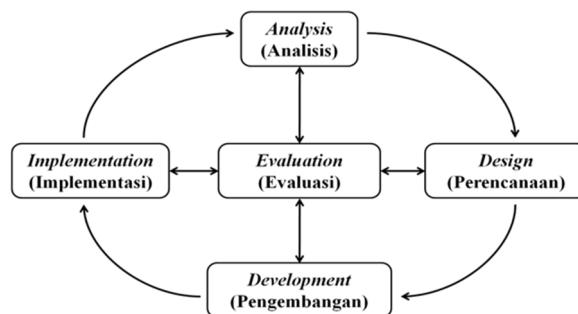


Figure 1. ADDIE Development Design

3. Results and Discussion

ADDIE development model was used to develop a culture-based material on the human reproductive system in this study. One of the objectives of this study is to produce a valid, practical, and effective culture-based biology textbook on human reproductive system material for class XI high school students. There are several phases that must be done in designing textbooks, that is called ADDIE (*Analysis*, *Design*, *Development*, *Implementation*, and *Evaluation*). The result of this study will be described in detail based on each stage along with their respective explanations (Yu et al., 2021).

The analysis phase is the earliest phase in this study. In this phase, the process of designing a textbook is carried out which consists of preliminary-final analysis, students analysis, concept analysis, task analysis, and learning objective specifications. During the analysis phase, researchers analyze problems that occur using existing learning media. After the analysis of the problem, it is necessary to develop a new learning media, then the researcher analyzes the feasibility and requirements for the development of the new learning media (D'Ambra et al., 2022).

3.1 Needs Analysis

The existence of teaching materials in Biology teaching and learning is needed to overcome problems that occur in schools, especially in the learning process of human reproductive system materials. Because this material is very broad and needs an in-depth explanation, the learning material is needed to assist students to gain knowledge and apprehend the material easily. Furthermore, Teaching materials are made to be able to support learning activities both

for classical learning in class and learning independently. Especially for independent teaching materials, the development of these textbooks is urgently needed by high school students (Sievert et al., 2021). The results obtained from observations and interviews of Biology teachers at SMA / MA in Aceh province are as follows:

- The students' competence in understanding the material given is variative.
- Textbooks used in schools tend to be on the elaboration of materials and exercises/tasks only so that the students tend to be passive and not actively involved in teaching-learning activities.
- There are no appropriate textbooks used by students to support students learning needs.
- Culture-based teaching material on the reproductive system is not sufficiently available. It is expected can prevent and reduce the risk of free-sex behavior.

3.2 Curriculum Analysis

Table 1. Core Competencies, Basic Competencies, Subject Matter, Allocation of Learning Time

Core Competencies	Basic Competencies	Subject Matter	Time Allocation
<p>Appreciate and practice the teachings of their religion</p> <p>Demonstrate honest behavior, discipline, responsibility, care (mutual aid, cooperation, tolerance, peace), courtesy, responsiveness, and proactive to solve the various problems to effectively interact with the social and natural environment and place oneself as a reflection of the nation in the global relation.</p> <p>Understand, apply, and analyze factual, conceptual, procedural, and metacognitive knowledge based on his curiosity about science, technology, art, culture, and humanities with insights into humanity, nationality, statehood, and civilization related to the causes of phenomena and events, as well as applying procedural knowledge to a specific field of study according to his talent and interest in solving problems.</p> <p>Processing, reasoning, and examining in the concrete realm and abstract realm is related to the development of what he learned in school independently, acted effectively and creatively, and was able to use methods according to scientific rules</p>	<p>Analyzing the relationship between the structure of the constituent tissues of reproductive organs and their function in the process of human reproduction.</p> <p>Presents the results of an analysis of the impact of promiscuity, diseases, and abnormalities on the structure and function of organs that cause disruption of the human reproductive system and reproductive system technology</p>	<p>Cell Structure and Function in the Reproductive System</p> <p>a. Structure and function of reproductive organs in men and women</p> <p>b. The formation process of sex cells</p> <p>c. Ovulation and menstruation</p> <p>d. Fertilization, gestation, and childbirth</p> <p>e. Tool Contraceptives and breast milk</p> <p>The impact of promiscuity</p> <p>f. Diseases and abnormalities in the structure of the human reproductive system</p> <p>g. Diseases and abnormalities in the functioning of the human reproductive system</p>	<p>6 x 45 minutes</p>

The material selected in the development of textbooks in accordance with the 2013 curriculum is the material on the human reproductive system. The human reproductive system is one of the materials that is broadly used and applied in everyday life. Curriculum analysis is carried out by reviewing the current curriculum used, in this case, researchers analyze the curriculum that is being used in that school. There are several components of the 2013 curriculum that are analyzed including (1) curriculum objectives, (2) content or material, (3) implementation strategies, and (4) evaluation. Based on the core competencies and basic competencies in the table, the curriculum

analysis is composed of several elements which include the subject matter, the indicators, and the allocation of time (van den Ham & Heinze, 2018).

3.3 Stages of Model Development (Development model)

The culture-based reproductive education model is also called the PRBB model. This model was developed to create learning experiences and activities for the students, both individually and in groups, with a focus on learning-centered (student-centered learning) (Fuadi et al., 2022). The principle of the PRBB model is a learning process through cultural values prevailing from a society that can be observed directly through various activities aimed at maintaining reproductive health (Adekola & Mavhandu-Mudzusi, 2022). The details of the learning steps carried out are described in Table 5.

Table 2. Syntactic PRBB Model

Learning Steps	Teacher Activities	Student Activities
Introduction		
Apperception and Motivation	<ol style="list-style-type: none"> 1. The teacher gave an introduction basis. 2. Teachers provide motivation for learners. 	<ol style="list-style-type: none"> 1. Students actively listen to what the teacher conveys. 2. Students perform the activation of initial knowledge and experience.
Core activities		
Empirical Experienter	<ol style="list-style-type: none"> 1. The teacher instructed each study group to be in the community to observe the activities of reproductive culture. 	<ol style="list-style-type: none"> 1. Students are given the opportunity to observe reproductive cultural activities that exist in the community around where students live. 2. Students observe cultural activities step by step. 3. The student finds understanding based on the experiences he has observed.
Interpretation	<ol style="list-style-type: none"> 1. The teacher directs students to discover various cultural activities carried out by the community in an effort to provide education. 2. The teacher gives strengthening of concepts for learners. 3. Teachers facilitate context modeling. 	<ol style="list-style-type: none"> 1. Students listen to what the teacher is saying. 2. Students perform the meaning of the experience experienced. 3. Students began to have discussions. 4. Students acquire experiences through context modeling.
Rational	<ol style="list-style-type: none"> 1. The teacher provides an opportunity for learners to build knowledge (basic concepts) through direct interaction and combine it with the book that has been compiled. 2. Teachers help learners confirm what they have learned and strengthen the knowledge they have gained. 3. Teachers facilitate context modeling. 	<ol style="list-style-type: none"> 1. The student combines all the real experiences he has experienced to build a concept. 2. Students construct knowledge and experience that have been previously possessed. 3. Students personalize the experience through context modeling.
Experience App	<ol style="list-style-type: none"> 1. The teacher provides an opportunity for students to apply experiences based on what has been learned. 	<ol style="list-style-type: none"> 1. Students apply real experiences by conducting reproductive system learning activities through reproductive culture activities.
Cover	<ol style="list-style-type: none"> 1. Teachers provide appreciation, motivation, and moral messages related to reproductive health. 2. The teacher conducts evaluation and reflection. 	<ol style="list-style-type: none"> 1. Students are actively listening. 2. Students express impressions of learning.

3.4 Teaching Material Validity Test Stage

At this stage, the teaching materials are handed over to the experts to assess the validity of the teaching materials that have been compiled. The expert team selected as validators consists of experts from three different universities; (1) Dr. Wiwit Artika, S.Si., M.Ed (Validator 1) from Syiah Kuala University; (2) Dr. Muhibbuddin, M.Si (Validator 2) from Syiah Kuala University; (3) Dr. Dian Aswita M.Pd (Validator 3) from Serambi Mecca University and, (4) Dr. Sehat Ihsan Shadiqin (Validator 4) from UIN Ar-Raniry.

A validation test carried out by experts is the validation of content in terms of substance, construct, language, and practicality. It is carried out by providing an assessment questionnaire to validators, where the questionnaire has been previously validated (Hoogland et al., 2016).

Table 3. Description of the Results of Expert Assessment of Textbooks and Assessment Instruments

Validation sheet	Indicators	Valuation	Information
Textbooks	1. Eligibility of Contents	3,807	Valid
	2. Feasibility of Presentation	4,038	Very Valid
	3. Language Eligibility	4,25	Very Valid
Thb	1. Validate Contents	3,833	Valid
	2. Language	4	Very Valid
Students' questionnaire	response1. Hint Aspects	4	Very Valid
	2. Language Aspects	3,625	Valid
	3. Content aspects	3,9	Valid
Teachers' Questionnaire	Response1. Hint Aspects	4	Very Valid
	2. Language Aspects	3,625	Valid
	3. Content aspects	4, 25	Very Valid
Average validation results		3,098	Valid

The PRBB model, THB, and observation sheet instrument teaching materials in terms of the indicators are 3,098 in the valid category because every aspect for each type of device is at intervals besides that all validators give the conclusion that the teaching materials that have been developed are good and can be used with a slight revision. Regarding the validation of culture-based teaching materials on validator assessments, it produces very valid values.

Table 4. The Results of the Validation of Culture-based Teaching Materials

Sheet Validation	Indicators	Valuation	Information
Textbooks	1. Eligibility of Contents	3,807	Valid
	2. Feasibility of Presentation	4,038	Very Valid
	3. Language Eligibility	4,25	Very Valid
		4,032	Very Valid

4. Conclusion

The inheritance of cultural values needs to be carried out and planned seriously. One of the efforts to inherit cultural values can be done through the educational process. Culture-based reproductive education can be used as a concept of culture-based character education that can be used in an effort to protect and prevent free sex behavior among students. The PRBB model refers to the paradigm of experimental learning, which sees learning as the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience. The focus of learning activities is in the form of direct observational practices and emphasizes the existence of mutual interaction between personal factors in the learner, behavior, and the surrounding environment. So that learning occurs when someone can construct their own meaning through experience. In other words, it can be concluded that the PRBB model aims to create personal development of a person, both in the realm of knowledge, attitudes, perspectives, skills, emotional, spiritual and others, in order to bring people to as full a realization as possible of what it is to be a human being.

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Authors contributions

This culture-based reproductive education model was developed with the aim of designing learning experience activities for students both individually and in groups, with the learning focus focused on the learning participants (student-centered learning). The principle of learning through cultural values born from society which can be observed directly through various activities aimed at maintaining reproductive health.

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Competing interests

The authors declare that we have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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