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Development of an Integrated Religious Biotechnology Textbook

Nur Hidayat[1*], Khosi'in[1], Azizah Aryati[1], Zulfikri Muhammad[1]

[1] Universitas Islam Negeri Fatmawati Sukarno Bengkulu, Indonesia.

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Corresponding Author:
Nur Hidayat
nur_hidayat@mail.uinfasbengkulu.ac.id

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Abstract: This research aims to produce textbooks that are integrated with Islamic religious values. This type of research uses RnD development research with the ADDIE development model, the instrument used is a feasibility questionnaire for religious material experts, biotechnology material experts, media experts, language experts and a user response questionnaire totaling 27 respondents consisting of 3 lecturers and 24 students. The research results show feasibility religious material expert 84.70%, biotechnology material expert eligibility 100%, language expert eligibility 88.67% and media expert eligibility 83.30%, while user response test results with a value of 91.10% show that the textbook developed is a book teaching biotechnology integrated with Islamic religious values is very precise, very appropriate, very clear, very interesting and very easy for students to understand.

Keywords: Islamic religious values; Response; Textbook

Introduction

Biotechnology is a branch of science that combines several groups of science such as biology, biochemistry, microbiology and other sciences by utilizing parts of living things or living things themselves to produce a product or service (A. Susanti et al., 2022). One of the main characteristics in the field of biotechnology is the use of biological agents in the form of microorganisms, which can be bacteria or other microorganisms (Darmayani et al., 2021).

In a clearer understanding, it is said that Biotechnology is a branch of science and technology (IPTEK) in the field of biology which studies the application of biological organisms, systems and processes in the industrial goods and services for the benefit of humans (Wahyuni et al., 2020).

The division of biotechnology is basically divided into two, namely conventional biotechnology and modern biotechnology. Techniques for processing biological materials to produce certain substances or products have been known to traditional communities for centuries. This is reflected, for example, in the use of yeast to produce tape or the use of micro-sized fungi in the soybean fermentation process to produce tempeh. This kind of technology is classified as old biotechnology or traditional biotechnology where legally traditional biotechnology is part of Traditional Knowledge (Martini et al., 2020).

Conventional biotechnology is characterized by the use of microorganisms, either parts of these microorganisms or microorganisms, a process that often occurs in conventional biotechnology processes, namely the fermentation process, namely the process of changing organic materials into other forms that are useful for human life such as bread, tape, tempeh or other (W. S. Jannah, 2022).

The simple explanation of modern biotechnology is a branch of biotechnology which is characterized by the use of human skills such as genetic engineering in manipulating living things so that they can be used to produce a product or item that can be used by humans (Wusqo, 2014). One of the characteristics of modern biotechnology is the activity of manipulating DNA using techniques that must be learned and are scientific in nature, not inherited skills(D. Susanti, 2019). Modern biotechnology plays a role in producing superior plant

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varieties that have high productivity (Faridah et al., 2019).

Biotechnology is one of the courses offered in semester V at the Tadris Science Study Program, Faculty of Tarbiyah and Tadris, Fatmawati Sukarno State Islamic University, Bengkulu. The learning outcomes of this course are expected to allow students to be able to apply biotechnology applications in everyday life.

This is because biotechnology is currently favored as the latest technology which has the ability to provide answers to various challenges faced by humanity today and in the future, regarding food production, medicine, energy and various industrial processes. The many benefits provided by biotechnology must be in line with students' understanding as a society regarding the role of biotechnology in everyday life(Zunaidah et al., 2016).

The Biotechnology course textbooks available at PTKIN are based on data searched by the author in the Master Catalog of Islamic Universities, none of which have integrated Islamic religious values (https://ptki.onesearch.id/September/2022), so the author is interested to develop biotechnology teaching materials that are integrated with past religious values.

Textbooks according to the Minister of National Education Regulation Article 1 Number 2 of 2008 are reference teaching materials that must be used at every level of education, whether primary, secondary or tertiary education. As explained above, textbooks have a function as teaching materials to facilitate teaching and learning activities in improving students' personality values, learning achievements, students' skills and abilities in overcoming problems in the surrounding environment (Khosi'in et al., 2022).

The development of this textbook is expected to be able to produce textbooks that are integrated with Islamic religious values so that they can add textbooks for students in particular and for Islamic religious universities. Textbooks are textbooks that can be used as references for students in understanding certain subjects and as material in preparing scientific papers. Textbooks have the following characteristics: source of teaching material, complete references for courses, arranged systematically and simply, and accompanied by learning instructions (Wirawati et al., 2020). In another sense, a textbook is a set of subject matter material that is systematically arranged to display the integrity of the competencies that will be mastered by students in learning activities (Suwarni, 2015).

The basic principle of the characteristics of textbooks is that they can help students/learners to understand certain material so that it is easier to understand the subject matter (Devirita et al., 2021). Meanwhile, Minister of National Education Regulation no. 11 of 2005 explains that textbooks are mandatory reference books for use in schools which contain learning material in order to increase faith and piety, character and personality, ability to master science and technology, as well as physical and health potential prepared based on national education standards (Sihotang et al., 2015). Textbooks are prepared based on the learning outcomes contained in the curriculum that must be achieved by students in each course so that the books are in line with the applicable curriculum (Rohmah et al., 2017).

Islam is a religion that carries the mission of its people to provide education and teaching. According to Hasan Langgulung, Islamic education is a spiritual, moral, intellectual and social process that seeks to guide amnesiacs and give them values, principles and ideal examples in life that aim to prepare for life in the afterlife. Values will always be related to goodness, benevolence and nobility and will be something that is appreciated, upheld and pursued by a person so that he feels a sense of satisfaction, and he feels like a true human being. The values contained in Islamic content are values that must be implemented as well as possible and taught in total, in the sense of not leaving out the main points contained in the introductory educational material (Prasetyo et al., 2022).

Another opinion says that Islamic values are principles and standards based on the Qur'an, Sunnah of the Prophet, and Islamic literature that are relevant in achieving religious quality (Ogunbado, 2013), Sources of Islamic teachings include the Qur'an, Sunnah, and Ijtihad (Azra, 2002), and The values of Islamic religious teachings include aqidah, morals and sharia (Anshari, 1983). This research is the development of textbooks, the development itself is a new update based on the current era. Reforms in education aim to meet student needs and improve learning opportunities and optimize the achievement of learning goals (Sholiha et al., 2022).

Method

The research carried out is a type of R&D research with the aim of producing products. R&D type research or development research is a type of research in which there are feasibility tests and response tests from product users (Kartika et al., 2019). In another opinion, the R & D (research and development) method is research to produce or develop a product. Development research is a process for developing a new product or improving an existing product, which can be accounted for. The new product is the development of teaching materials (Khosi'in, 2019). One of the characteristics of this type of development research is producing a particular product, and testing the effectiveness of that product (Indrawari et al., 2019).

The development research model applied in this research is the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. In this research, it did not reach the implementation and

evaluation stages. The teaching materials for the Biotechnology course are integrated with Islamic religious values, which are then tested for suitability and user response testing of the teaching materials, consisting of science study program students and lecturers who teach Biotechnology courses. The eligibility criteria and user responses are as follows:

Valuation Formula: $\frac{Average\ value\ score}{Total\ Average\ Score}$ x100 = Mark (1)
(Amin, 2021)

Table 1. Validity Criteria and Validity Level

Validity Criteria	Validity Level
81 - 100	Very precise, very appropriate, very clear, very interesting, very easy.
61 - 80	Precise, appropriate, clear, interesting, easy.
41 - 60	Precise enough, appropriate enough, clear enough, interesting enough, easy enough.
21 - 40	Not precise, not appropriate, not clear, not interesting, not easy.
0 - 20	So imprecise, so inappropriate, so unclear, so uninteresting, so uneasy.

Result and Discussion

Results
Analysis

Based on the needs analysis carried out by researchers both by searching for data in the PTKIN national library and the results of interviews with lecturers and students, it was found that there was a need to develop biotechnology textbooks that integrated Islamic religious values because the biotechnology textbooks available in the library were only limited to explaining biotechnology in detail general.

Design

The textbook design developed is as shown in the image as figure 1.

Figure 1. Textbook cover design

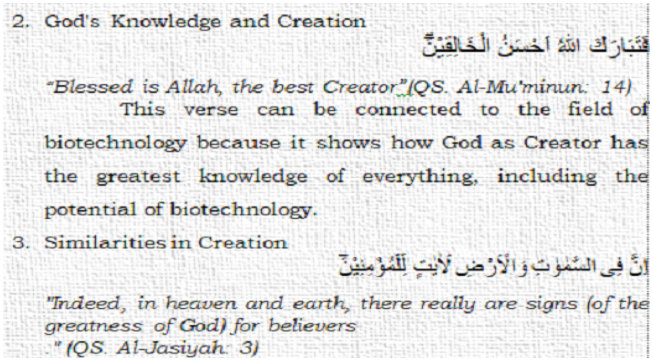

Figure 2. Example of displaying a verse from the Qur'an

Figure 3. Example of image placement and explanation

Development
Eligibility of Religious Materials Experts

Regarding the suitability of religious material experts, there are seven aspects of assessment with 5 alternative answers as follows: Very inappropriate, very inappropriate, very unclear, very uninteresting, very not easy; Not precise, not appropriate, not clear, not interesting, not easy; Precise enough, appropriate enough, clear enough, interesting enough, easy enough; Precise, appropriate, clear, interesting, easy; Very precise, very appropriate, very clear, very interesting, very easy.

Apart from that, at this stage the media is revised by media experts, material experts and Islamic religious experts in order to receive improvements and then validate its suitability for use in learning. The media was

validated by media experts, material experts and Islamic religion experts using questionnaires provided by researchers (Kurniawan et al., 2021). The material expert eligibility questionnaire was given to three lecturers who were experts in the field of the Koran and Al-Qur'an interpretation. This was proven by the education and profession of the three resource persons, the results of the questionnaire were as follows:

Table 2. Feasibility Analysis of Religious Material Experts

Assessment Aspects	Number of Values	Grade Average	Mark
Accuracy of integrating material with Al-Quran verses	12	4	80
Suitability of application of material to Islamic phenomena	13	4.30	86.70
Conformity of textbook material with the spiritual dimension, namely faith and noble morals	12	4	80.0
The suitability of textbook material with cultural dimensions, namely a strong and independent personality, social and national responsibility that emphasizes a good Muslim personality.	14	4.70	93.30
Conformity of textbook material with dimensions of intelligence that can lead to progress, namely intelligent, creative, skilled, disciplined, work ethic, professional, innovative and productive.	12	4.0	80
Appropriateness of Islamic religious terms in textbook material	13	4.3	86.70
The accuracy of writing the Al-Quran as displayed in textbooks	13	4.3	86.70

Eligibility of Biotechnology Subject Matter Experts

In terms of material expert eligibility, there are ten aspects of assessment with 5 alternative answers. The material expert eligibility questionnaire was given to two lecturers who were experts in the field of science. This was proven by the education and profession of the two resource persons, the results of the questionnaire were as follows:

Table 3. Material Feasibility Analysis

Assessment Aspects	Number of Values	Grade Average	Mark
Suitability of textbook material with course learning outcomes	10	5	100
The truth of the material concept is viewed from a scientific aspect.	10	5	100
The sequence of each material in the textbook	10	5	100
You can use pictures and illustrations	10	5	100
clarify student concepts/material.	10	5	100
Suitability of the questions to the material and learning objectives	10	5	100
Emphasis on contextual learning	10	5	100
Clarity of terms used in textbooks	10	5	100
Conformity of textbooks with the MBKM curriculum	10	5	100
Use clear directions and instructions, so as not to give rise to multiple interpretations	10	5	100

Eligibility of Linguists

In terms of material expert eligibility, there are ten aspects of assessment with 5 alternative answers. Material expert eligibility questionnaires were given to three lecturers who were experts in the field of languages. This was proven by the education and profession of the three resource persons, the results of the questionnaire were as follows:

Table 4. Eligibility Analysis of Linguistic Experts

Assessment Aspects	Number of Values	Grade Average	Mark
Accuracy of sentence structure	13	4.30	86.70
Sentence effectiveness	14	4.70	93.30
Standardity of terms	13	4.30	86.70
Ease of presenting material for students to understand	15	5	100
Suitability of language with students' intellectual development	13	4.30	86.70
Suitability to the level of emotional development of students	14	4.70	93.30
Grammatical correctness	14	4.70	93.30
Accuracy of spelling and punctuation	12	4	80
Use of terms	13	4.30	86.70
Use of symbols or icons	12	4	80

Media Expert Eligibility

In the suitability of material experts, there are ten assessment aspects with 5 alternative answers. The media expert suitability questionnaire was given to three lecturers who are experts in the media field. This was proven by the education and profession of the three sources, the results of the questionnaire were as follows:

Table 5. Results of Media Expert Feasibility Analysis

Assessment Aspects	Number of Values	Grade Average	Mark
Attractive cover design and image.	11	3.70	73.30
Interesting type and size of letters.	13	4.30	86.70
Readability of text and writing.	13	4.30	86.70
Matching color combination.	13	4.30	86.70
Clarity of illustration display	12	4	80
The attractiveness of the images displayed	13	4.30	86.70

User Response

In the user response test of the teaching materials developed, there are ten assessment aspects with 5 alternative answers. A user response test questionnaire for teaching materials was given to 27 respondents consisting of 24 students and 3 lecturers. The results of the questionnaire were as follows:

Table 6. User Response Analysis Results

Assessment Aspects	Number of Values	Grade Average	Mark
Readability of text and writing	126	4.70	93.30
Clarity of illustration display	124	4.60	91.90
The attractiveness of the textbook appearance	122	4.50	90.40
The attractiveness of the images displayed	120	4.40	88.90
Ease of understanding sentences used in textbooks	124	4.60	91.90
Clarity and ease in understanding textbook material	124	4.60	91.90
Clarity of instructions in textbooks	124	4.60	91.90
The use of textbooks provides an interesting learning experience	124	4.60	91.90
Smooth use of textbooks in learning	123	4.60	91.10
Ease of understanding evaluation questions in textbooks	120	4.4	88.90

Discussion

At the analysis stage, it was discovered that there were no biotechnology books that were integrated with Islamic religious values, either in the national library or in the Fatmawati Sukarno Bengkulu State Islamic University library. At the textbook design stage, it was concluded that the textbook design depicted the integration of biotechnology with Islamic religious values so that it received a good response from users. During the development there were several feasibility tests and user response tests using instruments in the form of questionnaires: First: Feasibility of religious material experts, consisting of three respondents who provided data that the material on religious values in the textbook being developed was very suitable for use with an average score of 84 .76 there are several suggestions from experts, namely to add verses to the Al-Qur'an related to biotechnology. Second: Suitability of biotechnology material experts, there were 3 experts who were used as respondents who gave an assessment that the biotechnology material was very suitable for use by students of the Natural Sciences Education Study Program with an average percentage score reaching 100%.

This is in line with the research results of Hendrian Syahputra et al, namely 92.50% indicating that the material prepared is in accordance with the criteria (Syahputra et al., 2022). Third: Suitability of language experts, there are three experts who are experts in language assessment who are used as respondents to provide an assessment that the language used in biotechnology textbooks integrated with Islamic religious values is suitable for use with an average score of 88.67, there are several suggestions from linguists, namely to pay more attention to writing foreign languages and add use for the world of agriculture in Indonesia, this is in line with the research results of Putri Fadilah et al, obtaining 78% with good/decent criteria in terms of language (Ulfah et al., 2021), Meanwhile, the results of the summing research produced language feasibility data from linguist validation of 88%, so that in terms of language it is very suitable for use (Sumining, 2021).

Fourth: Suitability of media experts, there were 3 media experts who were respondents who gave an assessment that the appearance of the design and images was in accordance with the understanding of Natural Sciences students and was suitable for use with an average score of 83.3. There were suggestions for improvement, namely that the brightness of the display needed to be paid attention to. The media expert's serviceability results are in line with the research results of Ita Aulianingsih et al. at 93% (Aulianingsih et al., 2021), with the same category is very suitable for use, while the research results of Liliana Liga Puri et al. obtained a media expert eligibility percentage of 76.67 5 with the appropriate category (Puri et al., 2020).

Fifth: User response, there were 27 respondents consisting of 3 lecturers and 24 students of the Science Education Study Program (IPA) Fatmawati Sukarno Bengkulu State Islamic University who responded that the biotechnology textbook integrated with Islamic religious values was very appropriate, very appropriate, very clear, very interesting, very easy, with an average score of 91.10, there is an assessment from respondents that the book is very interesting, especially for Muslims, because the book explains not only about biotechnology but also its relationship in Islam, words that listed is also easy to understand. The response results obtained by the researcher are in accordance with the research results of

Raudhatul Jannah, et al, namely the results obtained from limited trials, namely, the teaching materials displayed are very good, can make it easy to understand and understand, increase insight, and can understand material that is not yet understood (R. Jannah et al., 2023).

Conclusion

This research produces textbooks that have been validated for the suitability of religious material experts, the suitability of biotechnology material experts, language suitability experts, media suitability experts, apart from testing the suitability of textbooks, user response tests for both lecturers and students are also carried out.

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Author Contributions
Nur Hidayat contributed in determining the research concept, Khosi'in contributed in creating the design and materials for the textbook, while Azizah Aryati and Zulfikri Muhammad contributed in searching for data about appropriate values and verses of the Koran.

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Conflicts of Interest
The author declares that there is no conflict of interest in writing this paper.

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