

# Developing Basic Integrated Biology Book For Students Of Tadris Ipa Faculty Of Tarbiyah And Teacher Training Uin Suska Riau

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# Developing Basic Integrated Biology Book For Students Of Tadris Ipa Faculty Of Tarbiyah And Teacher Training Uin Suska Riau

Rian Vebrianto, Alaniayah Syafaren

**Abstract:** To increase professionalism, good facilities and infrastructure, in this case an integrated textbook, is ultimately needed by preservice teacher to get a holistic and comprehensive understanding before they are teaching. This is in accordance with the vision and mission of UIN Sulthan Syarif Kasim Riau to integrate Islam with science and technology and art. Therefore, the researcher and basic Biology lecturers would like to develop an Integrated Biology textbook that is in accordance with the Vision and Mission of UIN SUSKA RIAU. This is a research and development (R&D) study with 56 respondents who are the users of the textbook produced. The instrument used met the alpha cronbach of 0.866. The results of the analysis of the Integrated Biology Textbook description for the Aspects of the Content Feasibility (DIDUCTIVE) was  $M = 3.50$  and  $SD = 0.26$  that is categorized as Very Feasible. In addition, for the aspect of Presentation Eligibility (TECHNIQUE and CONSTRUCTION),  $M = 3.42$  and  $SD = 0.23$  that is categorized as Very Eligible. Moreover, for the aspect of Practicity,  $M = 3.35$  and  $SD = 0.32$ , that is categorized as Very Eligible. Furthermore, for the aspect of Islamic Science Integration Component (TEMATIC),  $M = 3.56$  and  $Sd = 0.28$  that is categorized as Very Eligible. Thus, it can be concluded that the integrated Biology textbook is very feasible to be used and applied in classroom. This has become a new and interesting learning material and source for it displays integrated science and Islam.

**Index Terms:** Islamic Science Integrated Biology, Education, Technique, Construction, Practicality.

## INTRODUCTION

Education is the key to all quality progress and development for a country. With education, humans can realize all the potential existed in them, both as individuals and as part of society [1][2]. Hence, an alternative is needed. One way to improve and develop teacher competency is to provide a good understanding of various sciences that are unified and comprehensive [3][2]. In an international benchmarking strategy, Indonesia refers to three main studies as instruments to test current global competencies including Progress in International Reading Literacy Study (PIRLS), Third International Mathematics and Science Study (TIMSS), and the Program of International Student Assessment (PISA) [4]. A 2006 study showed Indonesian students' reading literacy was 407. It means Indonesian students were among the countries that had reading literacy below the 2006 PIRLS participating countries with an average of 500. The Indonesian students' reading literacy position was in fifth place in the lowest order of participating countries in PIRLS 2006. In addition, the results of the PISA analysis showed that of 42 countries surveyed, Indonesian students were ranked 39th with a mean score of 371. This reading literacy included the skills of finding information, understanding and interpreting readings, as well as reflecting and evaluating what was read [4]. In scientific literacy at PISA 2006, from 57 participating countries, Indonesian students were in the 50th position with an average score of 393; while in the previous PISA 2003 study, the average value was 395.

This indicates the scientific literacy of Indonesian student had decreased by 2 points. Then, based on the research study conducted by TIMSS in 2007, Indonesian students occupied the 35th position out of 47 TIMSS participating countries [5]. The teacher is one of the important factors in providing a good and innovative learning process. In fact, many cases prove some teachers only master certain fields of science, for example, Biology teachers do not understand physics or even other sciences. The teachings of Islam strongly encourage people to understand the reality, which is the event of a combination of various sciences. As His Word was revealed to the Prophet Muhammad, from the creation of nature to all the things, written in the Qur'an, it involves the process of human birth through fertilization of the egg by sperm and this is not only alluded to in the biological sciences developed until now. All aspects are developed as not only scientific studies, but also other scientific disciplines such as chemistry, physics, engineering and mathematics, and technology. One of the verses, for instance, says (in meaning), "Indeed, in the creation of the heavens and earth, and the alternation of the night and the day, and the [great] ships which sail through the sea with that which benefits people, and what Allah has sent down from the heavens of rain, giving life thereby to the earth after its lifelessness and dispersing therein every [kind of] moving creature, and [His] directing of the winds and clouds controlled between the heaven and the earth are signs for a people who use reason." (QS. Al - Baqarah [2]; 164)[6]. Based on this astounding data, the responsibility of a teacher is getting bigger and must be followed up immediately by providing understanding and fertilization of various integrated scientific concepts, both in terms of science and towards the science of religion. A lot of knowledge in the hadiths or verses of Allah SWT shows and helps the development of science. Therefore, we must better understand and apply it in the exercises of the learning process in class. To increase the professionalism of a prospective teacher, special facilities and infrastructure are needed, such as books that are integrated with various kinds of knowledge. It is hoped the literacy will increase the understanding of prospective teachers with

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**1** holistic and comprehensive experience before teaching. This is in accordance with the vision and mission of UIN Sulthan Syarif Kasim Riau to integrate Islam with science, technology, and art. Considering the above description, teachers need products in the form of teaching manuals that integrate Islamic knowledge with science. One implementation in this research is the science of biology that has closeness between the values of character and religion. The integrated book will produce professional teachers with holistic thoughts so that they have a comprehensive and comprehensive thinking.

### 1.1 Integrated Learning

The integrated approach is one of the Scientific Approaches. Scientific Approach in learning is a distinctive feature and becomes a special feature of the 2013 Curriculum. Regulations of the Ministry of Education and Culture No. 65 of 2013 concerning Basic and Secondary Education Process Standards have suggested the need for a learning process combining with the principles of a Scientific Approach. Generally, education is essentially a religious education. Science education is also religious education and vice versa. Religious education is part of science. Hence, there should be no ambivalence and dichotomic problems in educational orientation. Understanding the integration of Islamic values in learning science is implicit in the Qur'an. The Qur'an does not contradict science and religion. Many verses of the Qur'an emphasize humans to think always about events in nature to strengthen their religious beliefs (Q. al-Anbiyaa, 21:30)[6]. Science in this case also has a relationship with religion. Science is an integral part of Islam. The Qur'an states that science is an integral part of religion. Science explains humans about how to manage nature, carry out various processes, and produce something for the needs of life. Moreover, religion teaches humans about the value system. Religion lectures about the value of piety towards Allah SWT as well as the value of kindness to others [7]. This pattern of integration is also the principle of Universitas Islam Negeri Sultan Syarif Kasim Riau (UIN Suska Riau). UIN Suska Riau formulated the concept of scientific integration in every aspect of the Three Pillars of Higher Education. The concept of integration is reflected in the vision of UIN Suska Riau for the medium term, namely "The realization of UIN Sultan Syarif Kasim Riau as a superior tertiary institution in integrating science, technology, and art with Islam in Asia in 2018." Also, the concept of integration is reflected in the new logo of UIN Suska Riau, Spiral Andromeda. The Three Spirals Andromeda have the philosophical meaning of the integration of the three fields of knowledge; religion, science, and humanities. With this integration concept, UIN Suska Riau graduates will become individuals who have strong and professional religious beliefs in their respective fields of science. In practice, the integration of these three scientific fields must be contained in a curriculum developed within the UIN Suska Riau environment. This requires all of us to integrate teaching material with Islam in the learning model.

**3** **The learning model has four special characteristics:**

- a. Logical-theoretical-rationales compiled by the creators or developers. This learning model has a theory of thinking that makes sense. The creator or developer makes a theory by considering the theory with actual reality, and not fictionally in creating and developing it.
- b. The foundation of thought about what and how students

learn (learning objectives to be achieved). This learning model has clear objectives about what will be achieved, including what and how students learn and how to solve a learning problem.

- c. Teaching behaviors are needed so that the model can be implemented successfully. This learning model discusses the teaching behaviors needed, so the teaching objectives can be successful in its implementation.
- d. The learning environment is needed so that the learning objectives can be achieved. This learning model has a conducive and comfortable learning environment, so the learning atmosphere can be one aspect of supporting learning objectives[8].

Integrated learning needs to be implemented and revitalized. This is the core of research study in schools and universities that are based on religion, especially Islam.

### 1.2 The Importance of Integrated Learning Programs

By increasing the interest in the natural and social sciences for preschool students or as soon as children enter school, the chances of a successful STEM (Science Technology Engineering Math) in high school will greatly increase. Learning that has holistic and comprehensive thinking like this is significant learning in the Indonesian education system [8]. STEM has three approaches in the learning process. The difference between each approach lies in the level of application of the STEM component. Three approaches in STEM education often used include the "silo" (separated), "embedded", and the "integrated" (integrated) approaches. In this study, the STEM approach used was an integrated STEM approach. The STEM approach to learning is expected to produce meaningful learning for students through the systematic integration of knowledge, concepts, and skills. The STEM approach makes students able to solve problems better. Besides, they can also be innovators, inventors, independent, logical thinkers, and learners of technological literacy. STEM learning needs to emphasize several aspects in the learning process, including (1) asking questions (science) and defining problems (engineering); (2) developing and using models; (3) planning and carrying out investigations; (4) analyzing and interpreting data (mathematics); (5) using mathematics; information technology and computers; and computational thinking; (6) developing explanations (science) and designing solutions (engineering); (7) engaging in evidence-based arguments; (8) obtaining, evaluating, and communicating information. STEM supports the development of technical studies in every other subject and starts learning since the child are in elementary school. It also encourages STEM education to be implemented for all students, not only those who are talented. In the 2012 budget, President Barack Obama replaced and expanded the reach of the "Mathematics and Science Partnership (MSP)" as a reward granted to other countries intending to improve teacher education in subjects[9]. In 2006, the United States National Academies expressed their concern about the declining STEM education in the United States. The Science, Engineering, and Public Policy Committee developed 10 actions. Three of them recommend to:

1. Increase talent in America by increasing K-12 science and mathematics education.
2. Strengthen teacher skills through additional training in science, mathematics, and technology.



3. Enlarge students' opportunities to enter college and graduate with a STEM degree.

The integration of the STEM approach will help students in analyzing and solving problems occurred in real life, so students are ready to work. Knowledge to solve these problems is the definition of scientific literacy. Scientific literacy is individual scientific knowledge and that knowledge is to identify questions, obtain new knowledge, explain scientific phenomena, and draw conclusions based on evidence. Integration is a modification and improvement of a western-world research study known as STEM. This method considers moral values and religion, especially Islam. It is clear that the States in the US only focuses on increasing knowledge without considering religious aspects. Therefore, the researcher designed and modified biology books that integrate Islamic principles in the Tadris of Science Study Program (IPA). There are many scientific explanations contained in the Qur'an as a source of Islamic law. Surah Yaasin verse 36 explains Allah created everything in pairs. In another verse, Allah also says, "And of all things We created two mates; perhaps you will remember (QS Az-Zariyat: 49)[6]." According to this verse, Allah created in pairs not only humans but everything that grows on earth and various particles invisible to the eye. A British scientist, Paul Dirac, proved that matter was created in pairs. His discovery was called 'Parite'. He won the Nobel Prize in physics in 1933 because of his discovery. This shows that many interesting facts obtained by studying the Qur'an. Science is Qur'an. Many other things are the result of the discovery and contemplation of science studies originating from Islam[10].

## 2 RESEARCH METHODS

The study was conducted in the Chemistry Education department, Tarbiyah and Teachers Training Faculty at UIN Suska Riau in 2018. The object of the study was students of the Chemistry Education Department, Tarbiyah and Teachers Training Faculty of UIN Suska Riau who took basic Biology courses from September to November 2018. This research was a research and development study using a mix method approaches (quantitative and qualitative) to produce basic biology books that are integrated with Islamic science as a form of development of study programs at Universitas Islam Negeri Sulthan Syarif Kasim [11][12]. This integrated Biology book assessment-instrument used alpha Cronbach 0.866. It attested the instruments had good quality. The basic design and stages of learning development referred to the instructional design of the ADDIE (Analyze Design Develop Implement Evaluate) model[12].

## 3 RESULT AND DISCUSSION

### 3.1 Descriptive Analysis

This questionnaire instrument had high reliability with alpha Cronbach above 0.866. According to Chua (2008), good instruments have minimum reliability of 0.6. If it exceeds that value, then the instrument is pretty good and effective as an assessment goal.

### 3.2 Profile and Analysis of Description of Research Participants' Perceptions

This study involved 56 students in its implementation. The

results of the analysis of the Description of students' perceptions of the integrated basic Biology book are listed in the table below:

**Table 4.1** Students' perceptions of the integrated basic biology textbook on aspects of content eligibility (Didactic)

Content Feasibility Aspect (Didactic)	N	Mean	SD	Step
The broad range of material	56	3.48	0.539	very feasible
Depth of Material	56	3.39	0.528	very feasible
The accuracy of facts and concepts	56	3.61	0.493	very feasible
Illustration accuracy	56	3.50	0.539	very feasible
Conformity with the Development of Science and Technology	56	3.54	0.503	very feasible
Contextual	56	3.52	0.504	very feasible
Salintemas (Science, Environment, Technology and Society)	56	3.52	0.504	very feasible
Experimental activities support the concept of matter correctly	56	3.48	0.539	very feasible
Content Feasibility (Didactic)	56	3.5045	0.2621	very feasible

Table 4.1 above explains the feasibility of the Integrated Basic Biology book from the active aspect. The results show that the instrument is at a very feasible stage in didactic (min = 3.50, sd = 0.262). For all items in didactic, the validators have a value of more than min, which is 3.38 to 3.61. That means the active aspects of this book have a broad range of material, depth of material, the accuracy of facts and concepts, accuracy of illustrations, conformity with the development of natural science and technology, contextual, mutual interaction and experimental activities that support the concept correctly. All items are included in the very feasible category (very good). In addition to the content feasibility component, the researcher also considered the feasibility component of the presentation, which included technical and construction components in producing this Integrated Biology book. The aspects of construction can be seen in the following table 4.2.

Presentation Feasibility and Construction	N	Mean	SD	Tahap
Coherent Concepts	56	3.37	0.524	very feasible
Systematic Consistency	56	3.45	0.502	very feasible
Student-Centered	56	3.46	0.503	very feasible
Presentation Variation	56	3.45	0.502	very feasible
Concept maps (Thematic) and a summary of theories	56	3.36	0.520	very feasible
Thematic Connection Concept	56	3.37	0.524	very feasible
Initial Knowledge and Learning Outcome	56	3.32	0.508	very feasible
Learning Sites	56	3.52	0.539	very feasible
Introduction of Case	56	3.48	0.504	very feasible

LKM examples	56	3.61	0.528	very feasible
Illustration that Supports Message	56	3.48	0.504	very feasible
Feedback / Reflection	56	3.25	0.476	feasible
Technique and Construction	56	3.42	0.238	very feasible

From Table 4.2 above, the feasibility of this Integrated Basic Biology book, from the aspect of presentation feasibility (technique and construction), has a very feasible category (min = 3.42, sd = 0.238). For all items in the feasibility for this presentation, validators have min values over min of 3.25 to 3.61. There is one point that has a feasible category, namely items related to reflection or feedback. Considering as a whole, the feasibility aspects of the presentation of this book have conceptual harmony, systematic consistency, and student-centeredness, variations in presentation, thematic concept maps, and theoretical summaries. Moreover, there are also thematic concepts of connection, initial knowledge and learning outcomes, case study learning sites, MFI examples, and illustrations that support messages. All items are considered very feasible (very good). The description of the contents of the book can be seen in the pictures below. The description is presented in the Integrated Basic Biology book formed and developed by the researcher and assessed by users; those were the prospective teachers. The overall design in this book can be seen as follows.

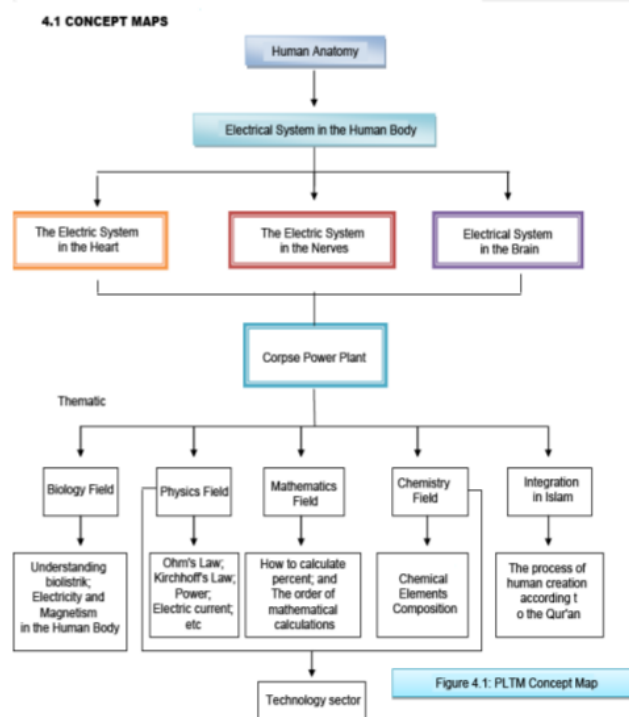


Figure 1. Concept Map



Figure 2. Learning Sites

The item developed was a technique for connecting students with various scientific disciplines to religion. They were also required to master the technology as an initial step of learning in this millennial century. This is one of the advantages of the book developed by the researcher. In addition to the feasibility component of the presentation (technique and construction), the researcher also considered the Practicality component in producing this Basic Integrated Biology book. The aspects of practicality can be seen in the following table 4.3.

Practicality Aspects	N	Mean	SD	Step
Easy to use because it has a systematic arrangement of modules	56	3.41	0.565	Very feasible
The ability to present in a way that is simple and easy to understand	56	3.41	0.496	Very feasible
The learning process becomes efficient because of the various scientific connections.	56	3.37	0.558	Very feasible
Apart from being a concept, it can too prove the theory through an experimental process	56	3.38	0.489	Very feasible
The accuracy of the model in the information in the learning module	56	3.20	0.483	Feasible
Practicality	56	3.3536	0.3236	Very feasible

From Table 4.3, the feasibility of the Basic Integrated Biology book has a practical aspect in the very feasible category (min = 3.35, sd = 0.323). For all items in Practicality, validators have a value of more than min between 3.25 to 3.41. The Practicality aspect of having one item included in the appropriate category is the item accuracy of the informative model in the learning module. Other items are included in the very feasible category (very good), such as easy to use because it is equipped with a systematic arrangement of modules, the ability to present in simple language and easy to understand, the learning process becomes efficient because there are connections from various knowledge fields and have concepts that can prove theory through an experimental process. In addition to this Practicality component, researchers also considered new aspects, which were aspects of excellence from the Basic Integrated Biology book, namely the integration component of Science and Islam. This is explained in the following table 4.4.



**Table 4.4** Students' perceptions of the Basic Integrated Biology book on aspects of Integration of Islamic Science

Aspects of Integration of Islamic Science	N	Mean	SD	Step
The ability to present Islamic-Science elements in an Islamic-based science module	56	3.63	0.489	very feasible
The truth of the Islamic concept is in accordance with that expressed by religious / Shar'i experts.	56	3.63	0.489	very feasible
Conformity between the verses of the Qur'an and the Hadith with the concept of science (biology)	56	3.77	0.426	very feasible
The accuracy of the informative model in the learning module	56	3.27	0.522	very feasible
The ability to absorb Islamic values	56	3.57	0.499	very feasible
Material integration with the level of understanding of students	56	3.39	0.493	very feasible
The material in Islamic-science based learning modules has benefits for students	56	3.66	0.478	very feasible
Integration Component of Islamic Science	56	3.558	0.283	very feasible

From Table 4.3, the feasibility of the Basic Integrated Biology book has a practical aspect in the very feasible category (min = 3.35, sd = 0.283). For all items in Practicality, validators have a value of more than min of 3.27 to 3.63. All the items are included in the very feasible category (very good). Based on the data above, this Basic Integrated Biology book was very feasible to be developed and implemented as learning material. The validators concluded the book was classified as good and very useful as a guide for students to carry out practical work. Furthermore, this book was also suitable for guidelines for making student worksheets because it contained systematic rules. The second validator stated the model of delivering the material in the book was quite good, because it was able to explain each concept from the basic to the specific. The materials were packaged regularly and had links with religion and other aspects. Hence, students could increase their scientific level. The third validator confirmed the relation of the contents of the book to religious material could stimulate student awareness about the important role of religion in people's lives. Based on the results of the interview above, in the case of data triangulation, this Basic Integrated Biology book was very effective and efficient in supporting the learning process, because it improved the quality of students' reasoning and critical thinking.

## 4 CONCLUSION AND SUGGESTION

### 4.1 Conclusion

Students' perception of the Basic Integrated Biology book shows that this book is very effective and efficient in the learning process because it improves the quality of students' reasoning and critical thinking. Besides, from the analysis of the description, this book is very feasible to be developed and practiced in learning basic Biology at the college level.

### 4.1 Suggestion

Several steps need to be considered by stakeholders relating to this issue because it is related to the vision and mission of UIN Sulthan Syarif Kasim Riau. As an Islamic university, UIN Sulthan Syarif Kasim Riau must be able to collaborate on various aspects of scientific and religious knowledge as the soul of a more Islamic generation change. Furthermore, it is hoped that there will be a publishing house whom willingly to improve and assist the researcher to publish this basic Integrated Biology book.

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