

The Integration Of Islamic Values And Biology Education Using Pedagogical Content Islamic Knowledge (PCIK)

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ABSTRACT

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The integration of values is the mission of all Islamic Religious Colleges (IRC) in Indonesia, but many non-Islamic lecturers have not obtained the required model. Therefore, this study aims to create a model for integrating Islamic values with biology learning. The Define, Design, Develop and Disseminate method was used to review the developed documents. Furthermore, a Shared Integration Model known as Pedagogical Content Islamic Knowledge (PCIK) was developed. The result was assessed by two Islamic science experts, resulting in a Cohen's Cappa coefficient of 0.61. A Senior High School Biology teacher and a lecturer assessed the feasibility of integrating materials and pedagogy, resulting in Cohen's Cappa coefficient of 0.67. Furthermore, the results were uploaded on a website, tested, and disseminated. The insight into the spiritual value of students who used the PCIK development product is more varied. The dissemination results during the Covid-19 Pandemic showed improvements in the knowledge and competencies in integrating Islamic values and Biology as well as in Biology and pedagogy.

Keywords: *Pedagogy Knowledge; Content Knowledge; Islamic Knowledge*

ABSTRAK

Integrasi keislaman merupakan misi dari semua Perguruan Tinggi Keagamaan Islam (PTKI) di Indonesia, namun kebanyakan dosen dari jurusan non agama belum menemukan model integrasi nilai keislaman. Penelitian ini bertujuan mengembangkan model integrasi keislaman pada pendidikan biologi. Metode penelitian yang digunakan pengembangan 4D (*Define, Design, Develop, and Dissiminate*). Penelitian dilakukan secara kualitatif dengan cara mengkaji dokumen yang telah dikembangkan dan menganalisis respon tertulis peserta didik terhadap produk pengembangan. Penelitian menghasilkan model integrasi terbagi (*shared model*) yang diistilahkan *pedagogy content Islamic knowledge (PCIK)*. Hasil pengembangan integrasi materi biologi dan pengetahuan keislaman (*Content Islamic Knowledge/CIK*) dinilai kelayakannya oleh dua orang pakar ilmu islam, menghasilkan koefisien Cohen's Cappa 0,61. Hasil pengembangan integrasi materi biologi dan pedagogi (*Pedagogy Content Knowledge/PCK*) dinilai kelayakannya oleh seorang guru biologi SMA dan seorang dosen Pendidikan biologi, menghasilkan koefisien Cohen's Cappa 0,67. Hasil pengembangan PCIK diunggah pada sebuah situs, kemudian diujicobakan dan diseminasikan. Hasil ujicoba menunjukkan nilai spiritual peserta didik pengguna daripada peserta didik yang tidak menggunakan produk

pengembangan PCIK lebih kaya. Diseminasi hasil pengembangan PCIK selama masa pandemic Covid 19 menunjukkan adanya penambahan wawasan dan kemampuan dalam mengintegrasikan islam dan biologi juga antara biologi dan pedagogi.

Kata-Kata Kunci: Pengetahuan Pedagogi; Pengetahuan Konten; Pengetahuan Islam

1. INTRODUCTION

The vision of IRC is to incorporate the prominence of scientific and Islamic integration. State Islamic University Jakarta has a vision of “becoming a world-class university by integrating science, Islamic value, and Indonesian.” Meanwhile, State Islamic University Yogyakarta has a vision of “excelling and leading in Islamic integration and development for civilization.” State Islamic University Bandung has a vision of “becoming a superior and competitive revelation-based university that guides knowledge within the framework of good morals in ASEAN in 2025”. This is manifested in the vision of each program of study. Every Biology Education program in IRC has the vision to integrate Islamic values into science. Nazzarudin said that integrating these values into science had become the difference between the Biology Education program in Tarbiyah and the Teacher Training Faculty in IRC and that of the Faculty of Education in the Institute of Education and Education Personnel (Budi, 2012). The integration has been seen in the curriculum of Education programs in IRC. The shared, integrated, as well as immersed-shared integration models, were used. Lecturers have attempted integration in each course, but it has not yet been formalized. Some did not integrate Islam values into their lectures because they came from public universities and had not studied Islamic knowledge (Herlanti, 2017).

Biology Education is integrated with pedagogy, which is known as the competence of Pedagogy Content Knowledge (PCK). PCK terms were first introduced by Lee Shulman (Shulman, 1987) for interpreting and transforming knowledge to facilitate students’ learning (van Driel et al., 1998). It is the competence to connect pedagogical knowledge, for instance, “what they know about teaching,” and subject matter knowledge, such as “what they know about the things taught.” PCK is highly tailored to the concepts being taught, beyond subject matter knowledge alone, and evolves through teaching experience (Veal & MaKinster, 1999). It is not sufficient to know the science but also how to teach (Maryati & Widodo, 2013) and optimize (Sukaesih et al., 2017).

The integration of Islam and Science means that Biology Education is not only limited to PCK but also needs to develop into PCIK (Pedagogy Content Islamic Knowledge). PCIK is the integration of pedagogy, Biology, and Islam. Conventionally, Islamic knowledge has three foundations, consisting of *aqidah*, *syariah*, and *akhlak* (Anas et al., 2013). *Aqidah* relates to belief and faith, whereas

syariah refers to norms and rules. Then, *akhlak* is associated with behaviour, and the three foundations depict vertical connection with The Creator (Allah SWT) and horizontal relations among human beings.

Fogarty introduced ten integration models, within-subject and cross-subject (Fogarty, 2002). In PCIK, three subjects are integrated with cross-subject, for example, pedagogy, Biology content, and Islamic knowledge. The shared, webbed, threaded, and integrated models were selected. This study developed from these three models, which are relevant to be applied to actual biological content.

Basic biology consists of cells, cellular reproduction, genetics, the concept of evolution, biodiversity, the structure and function of animals and plants, and ecology. Materials in basic biology are the foundation of advanced concepts. Additionally, basic biology is a standard material that prospective teachers should master. The current condition is that the courses are separated from pedagogical and Islamic knowledge. As a result, content cannot be integrated with pedagogical or Islamic knowledge. Basic biology modules should be developed to strengthen the integration between content knowledge, pedagogy, and Islam.

Due to several advantages, the module was selected as a medium to achieve PCIK integration competence. Modules are flexible, can be used anytime, anywhere, and can be studied repeatedly (Wati, Syafryadin & Eka, 2021). Furthermore, it can be used with students to learn independently (Anggraini & Sukardi, 2015), but manual learning has limitations in terms of access and interaction. This limitation can be overcome by developing an e-learning module.

In the era of information technology, face-to-face interaction is required to implement blended learning. The Indonesian government declared an emergency on April 13th, 2020, due to the 2019 Corona Virus Infection (Covid-19). This statement led to online teaching and learning implementation in higher education, especially in high-infection zones (red zone). Hence, the e-learning module development was needed and relevant based on the situation.

The study explores how a suitable PCIK model is developed in the basic biology module for students in Tadris Biology at Islamic Religious College, meaning PTKI in Indonesian. According to Islamic and pedagogical experts, the appropriateness of the basic biology module was also discussed with the PCIK capabilities and student responses to the developed e-learning modules.

2. METHOD

This study employed a 4D development model, namely, Define, Design, Develop, and Disseminate (Thiagarajan, Sivasailan Semmel, D.S., & Semmel, 1974). Defining is an activity to determine the development requirements. Meanwhile, designing prepares and constructs the initial product, and developing is the stage of

expert validation for testing the prototype. Finally, dissemination identifies and implements the products on a larger scale. The stage of development and research activities are illustrated in Table 1.

Table 1. Developmental Research Methods using 4 D Model

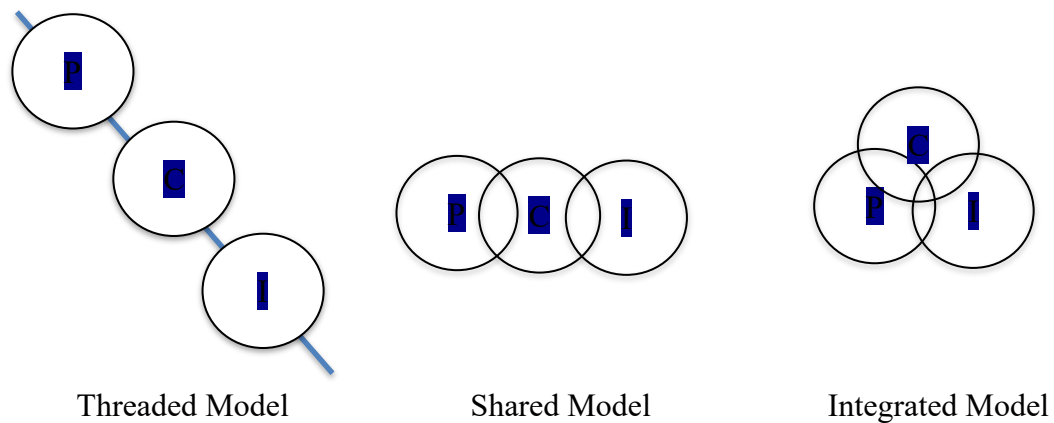
No	Stages	Activities	Data	Data Sources
1.	<i>Define</i>	<ol style="list-style-type: none"> Defining the knowledge components of pedagogy, content (Biology), and Islam Defining the integration pattern of pedagogical, content, and Islamic knowledge 	<ol style="list-style-type: none"> Pedagogical Knowledge Content Knowledge Islamic knowledge PCIK Integration 	Literature
2.	<i>Design</i>	Designing primary Biology teaching based on PCIK.	<ol style="list-style-type: none"> Content Sites building 	Literature
3.	<i>Develop</i>	<ol style="list-style-type: none"> Asking for experts' opinions to review both the design and the content integration Revising the review results Conducting trials of the essential Biology subject in the Biology Education Department of UIN Jakarta 	<ol style="list-style-type: none"> The experts' validation results The PCIK competence of Students in Biology Education Department of UIN Jakarta. The website design supports online learning. 	<ol style="list-style-type: none"> Two pedagogical Biologists. Two experts in Islamic studies. Students in Biology Education Department of UIN Jakarta.
4.	<i>Disseminate</i>	Designing a website to disseminate PCIK during Covid-19 Pandemic	The students' responses to PCIK were uploaded to: http://pcikbiologi.id	The students' responses

3. RESULTS AND DISCUSSION

a. Define: Shared Model as Pedagogy Content Islamic Knowledge (PCIK) Integrated Model

PCIK comprises three disciplines, namely pedagogy, biology (content), and Islam. Fogarty introduced five models for cross-disciplinary integrated curriculum, which are sequenced, shared, webbed, threaded, and integrated models. Shared, threaded, and integrated models are relevant to be implemented in PCIK. Shared Model presented slices between pedagogy and content knowledge, as well as between content and Islamic knowledge. The Threaded Model did not show

pedagogy, content, and Islamic knowledge slices. The three disciplines are separate fields that are bound by common skills. Meanwhile, Integrated Model depicted slices among pedagogy, content, and Islamic knowledge and Figure 1 shows the three models.



Notes:

P = Pedagogy knowledge

C = Content knowledge

I = Islamic knowledge

Figure 1. Integrated Model

Integration was conducted in Basic Biology Course, and the knowledge of Biology Content was the key. In Threaded Model, each knowledge has the same weight, though it was taught separately. The teaching model has been running in each course of Islamic Religious Colleges (Herlanti, 2017) but using “a unifying” thread still needs to be integrated. The implementation of the model is suitable for a larger scale, including study programs. These may propose a specific skill as an integrator for Knowledge of Pedagogy, Content, and Islam. The model is not suitable as an integration model for one course.

Shared and Integrated models have similarities in the slices of knowledge. However, Integrated Model needs a slice that unifies the three knowledge. It is quite complicated to find a slice in Islamic knowledge, Biology content, and pedagogy presented in the Basic Biology course. Therefore, this model was not used in composing PCIK based Basic Biology module. On the contrary, the Shared Model is applicable in learning Basic Biology courses because it is quite simple.

b. Design

The module is designed by using a shared model between pedagogy and content as well as between content and Islamic knowledge. The shared model is relevant to be applied in designing the integration of a course taught by a lecture in

a class, and an illustration can be seen in [Figure 2](#). The figure shows two integrations of Pedagogy Content (PCK) and Content Islamic Knowledge (CIK).

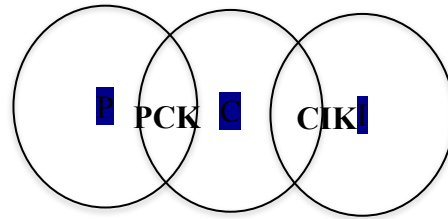


Figure 2. PCIK Integrated Model in Biology Module

Notes:

P = Pedagogy knowledge

C = Content knowledge

I = Islamic knowledge

Further details related to integrated components can be viewed in [Table 2](#).

Table 2. PCIK Content in Biology Module

No	Islamic Knowledge	Content Knowledge (Biology)	Pedagogy Knowledge
1.	<i>Aqidah: Allahu khaliq</i> <i>Aqidah: Allahu mudabbiru</i>	Evolution Cell	Curriculum and Learning
2.	<i>Syariah</i>	Genetics	
3.	<i>Akhlak</i>	Ecology	

Aqidah, *syariah*, and *akhlak* are learned in specific Islamic courses. Integration between Islamic knowledge and Biology content is limited to the essence of *aqidah*, for example, building strong confidence in Allahu khaliq without *dzan* (doubt) after watching and studying the subject of evolution and strengthening one's faith in *Allahu mudabbiru* after studying the subject of cells in Biology. The integration of Islam and Biology in the *sharia* aspect is limited to the act in daily life in which sharia law (*af'alul khamsah: wajib, sunnah, mubah, makruh, haram*) is made as a consideration when dealing with technological advances in the topics of Genetics as well as the problems from the development of genetic engineering. The integration of Islam and Biology in the *Akhlak* aspect is limited to the relationship between humans and nature. The learning objectives of Ecology are how humans behave in respecting, conserving, and employing nature as the creation of God (*Allah SWT*).

Pedagogical knowledge related to curriculum, learning strategy, media, and evaluation is taught as an independent course. The integration of Biology knowledge focuses on curriculum and learning. Biology education in IRC aims to produce prospective educators in Senior High School/*Madrassa Aliah*. Meanwhile,

the integration of pedagogical knowledge aims to provide an overview to prospective educators and how to teach the topics to students.

1) Integration Design on topic 1: Introduction

The design of PCIK in the introductory chapter is shown in Table 3. It presented the integration of pedagogical knowledge, Biology, and Islam in the “observation” aspect. Al Qur’an tells human beings to observe Biology phenomena as a part of the *kauniyah* verse. Observation is the first step of scientific methods to produce research that benefits human beings.

Table 3. PCIK Design in Introductory Chapter

<i>Islamic Knowledge</i>	<i>Biology Knowledge</i>	<i>Pedagogy Knowledge</i>
Allah SWT commands His servants to observe His creations. The objectives of the observation are: 1. Increasing faith in the power of Allah SWT as The Creator and Regulator. 2. Gaining life lessons from natural phenomena to live a better life. 3. Using natural phenomena as the source of science and technology to build civilization.	Biology studies the nature of life through the process of science, as follows: 1. Observation 2. Question 3. Hypothesis 4. Prediction 5. Experiment	Biology learning at secondary school emphasizes scientific inquiry. Learning is further known as the scientific process. The 2013 curriculum in Indonesia focuses on a scientific approach that consists of observing, questioning, experimenting, associating, and communicating activities.

PCIK Integration:

Integration of the topic is in the aspect of observation. The biological object was observed carefully either by using the five senses directly or by optimizing tools such as magnifying glass and microscope. After the observation, several questions about biological phenomena were asked. The questions were answered by finding more detailed information or by conducting experiments. When the answers are found, it will strengthen the belief that *Allahu kholiku wa mudabirru*. Lessons can be taken from the biological phenomena to live a better life. Moreover, it can also be used as a source of science and technology to build human civilization.

2) Integration Design on topic 2: Cells

The topic of cells consists of living matters and molecules, exploration of cells, how cells work, and cellular respiration and photosynthesis. The integration of Islam into cells subject comprises two points. The first one is biological explanation as an elaboration of God’s (Allah SWT) revelation through scientific (*aqliyah*) pieces of evidence. The second one is biological phenomena as a means of increasing *tauhid rububiyah*. The illustration of the integration is depicted in Figure 3.

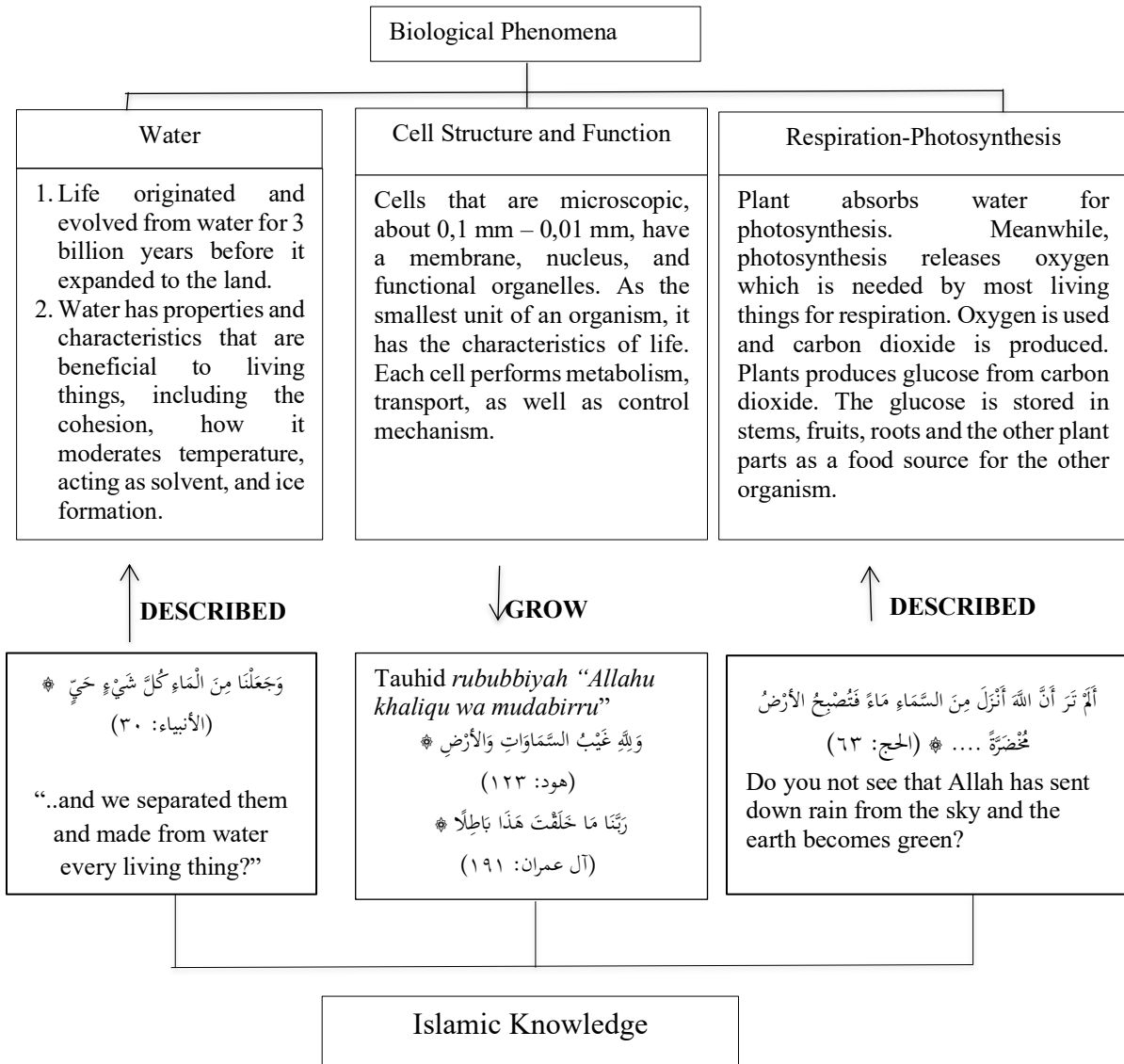


Figure 3. Islamic Integration Map in Cell topics

3) Integration Design on topic 3: Genetics

The topic of genetics is composed of Cellular reproduction, Heredity, DNA structure and function, Gene control, and DNA technology. The integration of Islam in genetics subject covers three points. The first is a biological explanation for the elaboration of God’s (Allah SWT) revelation through scientific (*aqliyah*) evidence. The second is biology phenomena as a means of increasing *tauhid rububiyah*. The last one is biological technology produces sharia law related to the objects consumed, namely *halal* as well as *haram*, and human deeds, comprising of *haram*, *mubah (ibahah)*, and *makruh*. The illustration of genetics is depicted in Figure 4.

Figure 4 shows biological phenomena or *kauniyah* verse to explain *qouliyah* in detail. *Qouliyah* verse about human creation in pairs is explained

further in the process of meiosis and mitosis. Furthermore, like Adam’s clone, Eve’s creation is further explained in biological phenomena, as in “cell regulation.” The phenomena of heredity law are solvable to daily life problems, such as lineage (*nasab*), and have overcome law cases in society. These phenomena also produce new sharia law related to *asyaa* (product) and *af’al* (activity).

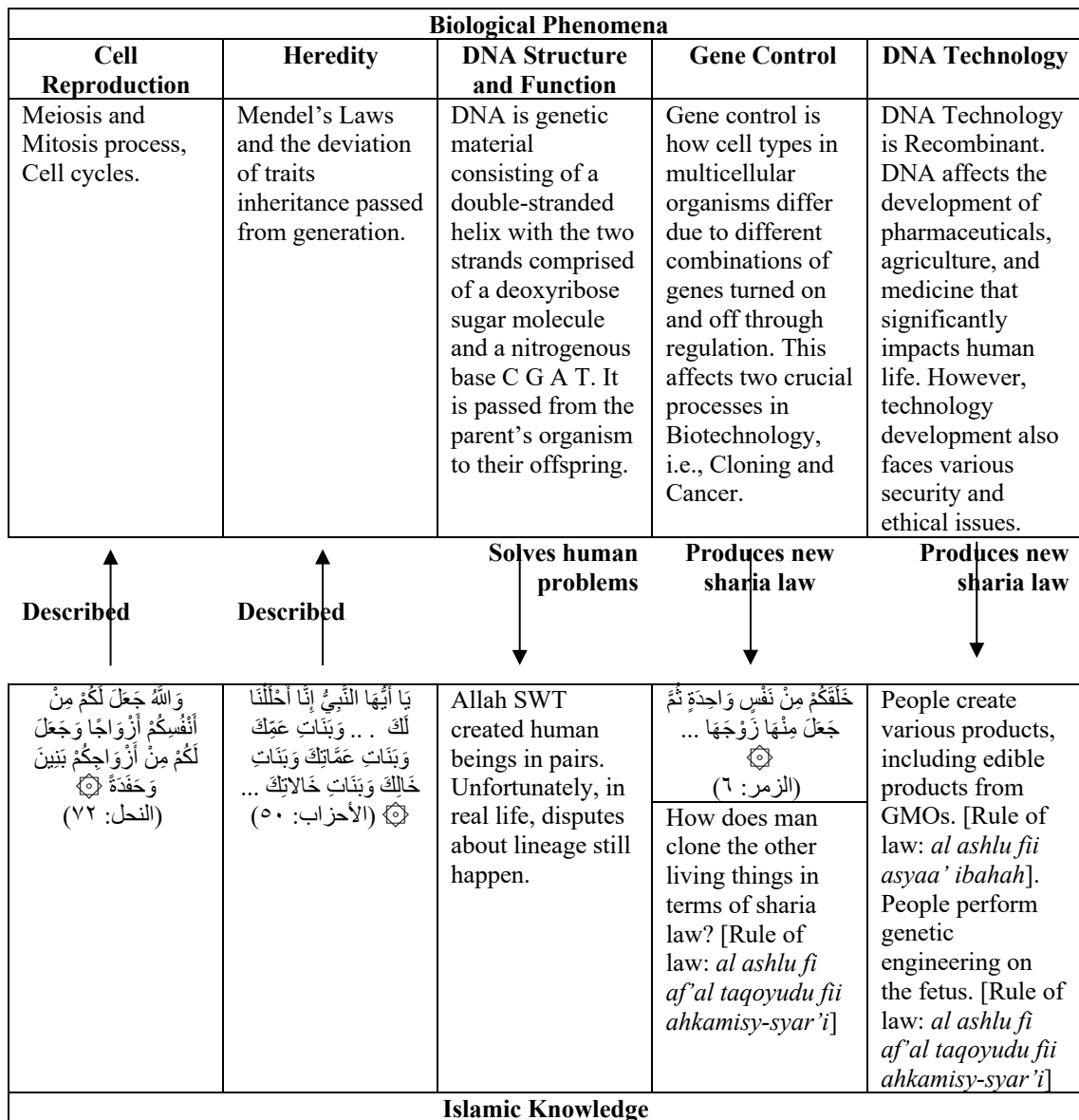


Figure 4. The Connection between Islamic Knowledge and Biology in Genetics Topics

4) Integration Design on topic 4: Evolution

The topic of evolution is quite controversial and has become a social contradiction since Darwin’s theory was put forward. The initial design consisted of five topics according to the essential Biology reference book. Based

on the results of experts' recommendations, it is focused on evolution, and the integration is depicted in [Table 4](#).

Table 4. PCIK Design on Evolution Topics

<i>Islamic Knowledge</i>	<i>Biology Knowledge</i>	<i>Pedagogy Knowledge</i>
In Surah Yasin verse 36 and Surah Luqman verse 10, Allah SWT created pairs of everything that grows from the earth. All living organisms become diverse because of reproduction.	Darwin's theory of evolution stated that (1) existing species are descendants of ancestral species, and (2) evolution happens by natural selection. Biologists widely accept this theory to explain biodiversity. The abundance produces the classification of biodiversity based on its evolutionary kinship or phylogenetics history. Classification is based on fossil records, homologous structures, and comparisons of DNA sequences. The classification of living organisms is divided into three domains, namely Bacteria, Archaea, and Eukarya.	The topic of evolution is taught in grade 12. Meanwhile, biodiversity is taught in grade 10. It discusses issues related to the conflict between evolution and religion.

PCIK Integration:

Darwin's theory prompted religious controversy. The claim that "it presented the idea of humans descending from monkeys." All religions, including Islam, view life as being created in diverse forms from the process of reproduction. This has been described in Surah Yasin verse 36 and Surah Luqman verse 10. Darwin stated that all living things today came from earlier organisms, and this statement has no contradiction with the verses of the Quran.

Another Darwin's theory was about natural selection as an evolutionary mechanism. It was stated that diversity came from the adaptation to the environment, where survived species can reproduce. Evolution theory produces a kinship tree, which is paramount in classifying living organisms. Human was classified in the same primate group as chimpanzees, monkeys, and gorillas (Ape). It underlies the statement that "humans came from apes." However, biological scientists did not say that humans descended from apes. They merely stated that humans and chimpanzees were classified in the same group. Therefore, humans and chimpanzees are somehow related, and this misunderstanding creates controversy in Evolution theory.

[Table 4](#) shows that Darwin's theory of Evolution and Religion has the same view that the living organisms that exist today come from the earlier living organisms. The reproduction process made the existence of living organisms on Earth possible. Revelation only explains that living organisms are diverse due to the process of reproduction. However, it does not describe how the diversity process takes place in detail. Evolution theory reveals the process of how living organisms relate to each other. The research on kinship dramatically contributes to the development of science and technology and medical technology.

5) Integration Design on topic 5: Ecology

Ecology is an important topic to study to maintain the harmony of nature. The topic is packaged in one topic, for example, the integration of Islamic knowledge, Biology, and Pedagogy as illustrated in [table 5](#).

Table 5. PCIK Design on the topic of Ecology

<i>Islamic Knowledge</i>	<i>Biology Knowledge</i>	<i>Pedagogy Knowledge</i>
A verse of Qur a states that Allah SWT is the Creator and Sustainer (<i>Allahu khaliqu wa mudabbiru</i>). In another verse, it is stated that the damages on land and sea resulted from human actions.	Ecology studies the interrelationship between living organisms and their environment. What living organisms do will have an impact on the environment. Similarly, the damage to the environment will affect living organisms. Ecology discusses an organism's ecology, populations, communities, and ecosystems.	The topic of ecology is taught in grade 10. It discusses theory and issues related to ecology and the environment.
PCIK Integration:		
Part of the moral of Moslems is how they treat nature. Ecology is the relationship between organisms and their environment. Humans are part of the organisms though they also control the other organisms and their physical environment. Humans as controllers are called <i>caliph fii al ardh</i> . The harmony of the ecosystem depends on how they control nature.		

[Table 5](#) shows the integration of Islamic knowledge and ecology in which the position of a human being is part of the ecosystem that controls the balance of the ecosystem. Human beings have a role as *caliph fii al ardh*, in charge of keeping the natural environment balanced. The position is different from the other organisms, which only depend on nature and cannot be controlled or manipulated. The integration of Islam and ecology lies in morals towards nature. It denotes how humans maintain the ecosystem balance to prevent damage on land or in the waters.

c. Developing

1) Experts Validation

a) Integration of Islamic knowledge in Biology subject (Content Islamic Knowledge Validation)

There are 12 topics and sub-topics, as well as 59 verses of integration collected. Based on the collected verses, content validation was carried out by two Islamic religious experts. They were asked about the applicability of the collected verses and the topics, hence there was no misinterpretation in the presented verses. The two experts' validation content results were then calculated using the agreement test presented in [Table 6](#).

The results show that the coefficients are categorized as Good. Both validators agreed that the presented verses are applicable as inspiration for the developed biological topics.

Table 6. Contingency Agreement of Religious Experts I and II

II \ I	I			Total
	Applicable	Neutral	Not Applicable	
Applicable	49 (a)	6 (b)	3 (c)	58 (1)
Neutral	1 (d)	0 (e)	0 (f)	1 (2)
Not Applicable	0 (g)	0 (h)	0 (i)	0 (3)
Total	50 (I)	6 (II)	3 (III)	59(N)

$$P_o = \frac{a + e + i}{N} = \frac{49 + 0 + 0}{59} = 0.83$$

$$P_e = \frac{(1 \times I) + (2 \times II) + (3 \times III)}{N} : 100 = \frac{(58 \times 50) + (1 \times 6) + (0 \times 3)}{59} : 100 = 0.4925$$

$$K = \frac{P_o - P_e}{1 - P_e} = \frac{0.83 - 0.4925}{1 - 0.4925} = \frac{0.3375}{0.5075} = 0.66 \text{ [Good]}$$

b) Integration of Basic Biology Topics in Senior High School Teaching and Learning (Pedagogy Content Knowledge Validation)

Pedagogy validation was conducted by a High School Biology teacher and a lecturer in Biology Education. The questions were given to show the compatibility between Biological content and pedagogical knowledge in senior high school. The results of the agreement between the two experts are presented in Table 7.

Table 7. Contingency Agreement of Senior High School Biology Teachers and University Biology Lecturer

I \ II	II			Total
	Applicable	Neutral	Not Applicable	
Applicable	24 (a)	4 (b)	4 (c)	32 (1)
Neutral	0 (d)	0 (e)	0 (f)	0 (2)
Not Applicable	0 (g)	0 (h)	0 (i)	0 (3)
Total	24 (I)	4 (II)	4 (III)	32 (N)

$$P_o = \frac{a + e + i}{N} = \frac{24 + 0 + 0}{32} = 0.75$$

$$P_e = \frac{(1 \times I) + (2 \times II) + (3 \times III)}{N} : 100 = \frac{(32 \times 24) + (0 \times 4) + (0 \times 4)}{32} : 100 = 0.24$$

$$K = \frac{P_o - P_e}{1 - P_e} = \frac{0.75 - 0.24}{1 - 0.24} = \frac{0.51}{0.76} = 0.67 \text{ [Good]}$$

Results of the probability test show that the coefficients were categorized as Good. Therefore, both validators agreed that the pedagogical content is compatible with the needs of Biology teaching at the senior high school/Madrasa Aliyah level.

c) Limited Trials

Limited trials were conducted to see the students' responses after studying Basic Biology associated with Islamic knowledge. The trials

involved 45 students who took the Basic Biology course. Students were divided into two groups, where the first received integrated learning between Islam and Biology, and the second only received Biology lessons. After completing the lecture on Cells, students from both groups were asked to analyze the chart in Figure 3 and express their ‘spiritual’ values. The students’ answers are presented in Table 8.

Table 8. Spiritual Value on Basic Biology Teaching

Spiritual Value	Linguistic Features of students’ comments in the group that accessed the site http://pcikbiologi.id	Linguistic Features of students’ comments in the group that did not access the site http://pcikbiologi.id
Bringing up the value of monotheism (<i>tauhid</i>) in a written opinion.	Allah is The Creator (5), The Most Great (1), The All-Powerful, The Most Just (1), The All Giving (1), The Preserver (1), The Almighty (1), The Life-Giver (1), The Most Careful (2)	Allah is The Creator (9), Allah is The All-Knowing (1), Allah is Overseer (2), Allah is The Watchful (1), Allah is The Compeller (5). Allah is The Absolute Truth (3), Allah is The King and Owner of Dominion (1)
Bringing up the value of morals (<i>akhlak</i>) in a written opinion.	Make human beings glorify (1), be grateful (1)	Getting closer to Allah (1)
Bringing up the inspirational opinion for life (<i>ibrah</i>) from the Qur verses and Biological phenomena	The Quran verses as inspiration to reveal natural phenomena (2). Biological phenomena are used as analogies in the verses of the Quran (2)	-
It does not bring spiritual value to the opinion	(1)	(2)
Numbers of students who commented	20	25

*The number in the bracket is the number of students who commented

Table 8 shows that both groups acquired various spiritual values after learning. However, more understanding of monotheism values was acquired after learning about Cells, and several students could not express their spiritual values. The first group expressed their opinion on monotheism (*tauhid*) aspects, morals (*akhlak*), and lessons (*ibrah*) for life.

d) Interactive e-Learning Module Basic Biology for supporting learning during Pandemic Covid-19

PCIK design developed into a website, i.e., <http://pcikbiologi.id>. The content is developed from Basic Biology content. There are six topics, i.e.,

Introduction, Cells, Genetics, Evolution, Biodiversity, and Ecology (Eric J, Simon; Jean L, Dickey; Kelly A, Hogan; Jane B, 2017). The topic of Cells is developed into living matters and molecules, Cells exploration, Cells work, Cellular respiration, and photosynthesis. The five sub-topics in Genetics are cellular reproduction, heredity, structures, and functions of DNA, Gene control, and DNA technology.

In each topic and sub-topic, Islamic knowledge is developed in the form of inspirational verses related to the topic. Biological content is elaborated as a concept map of the topic. Meanwhile, pedagogical content is built into the topic and sub-topic implementation in Senior High School. The development of PCIK in the website is depicted in Figures 5 to 9.

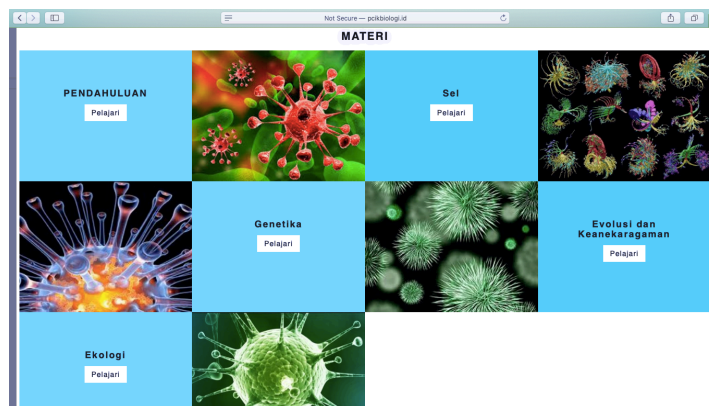


Figure 5. The display of the development results of five subjects in Basic Biology

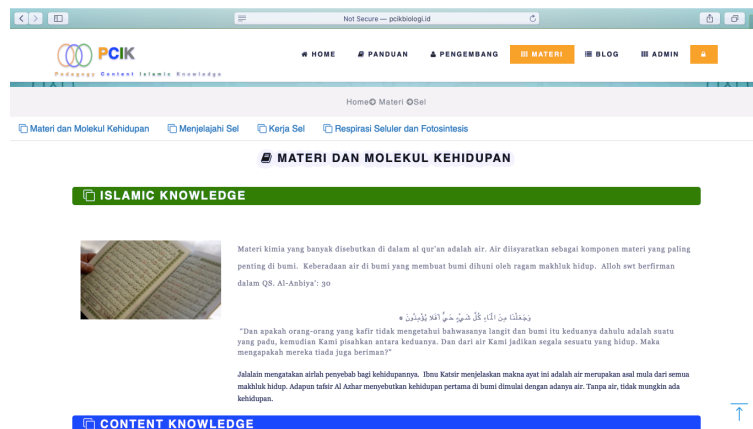


Figure 6. The topic introduces Islamic knowledge through verse inspiration

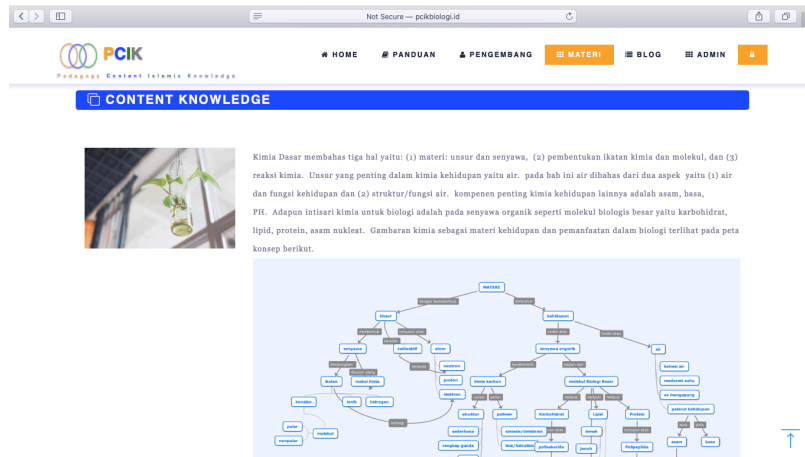


Figure 7. The second topic shows the mapping concept of Biology content

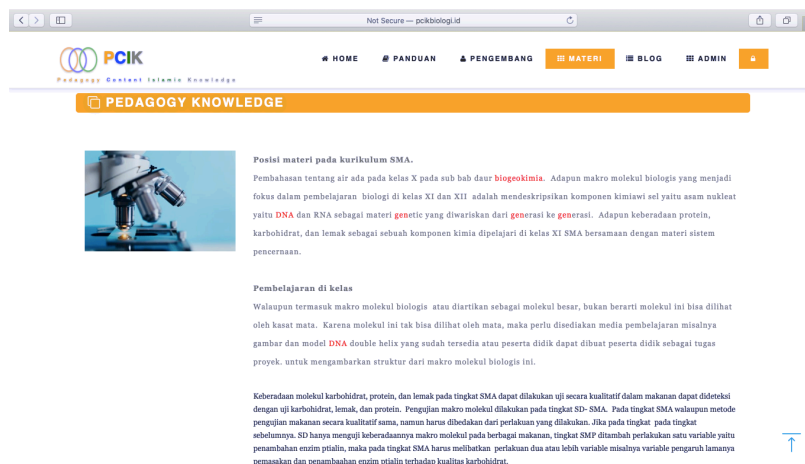


Figure 8. The third topic presents pedagogical knowledge, namely, how to teach the topic in Senior High School

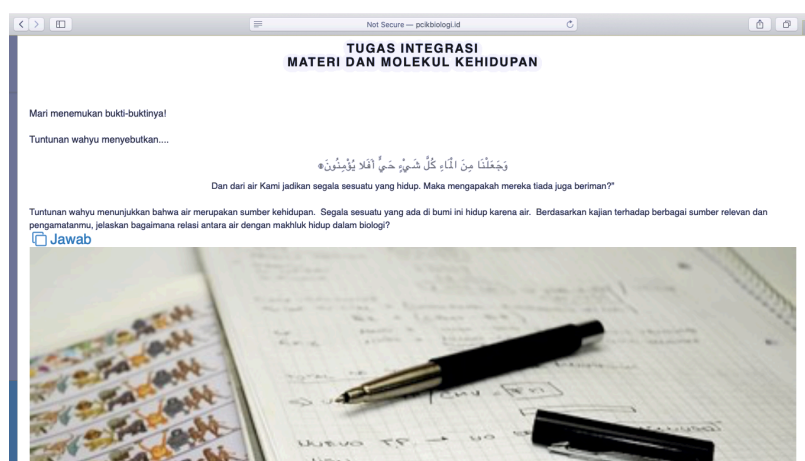


Figure 9. It gives an integration task that aims to evaluate the competence in the integration of Islam and Biology

d. Dissemination: Interactive e-Learning Module Basic Biology for supporting learning during Pandemic Covid-19

The dissemination of PCIK was carried out during the Covid-19 pandemic by employing the site <http://pcikbiologi.id>. A total of 51 students who took basic Biology gave their responses about using PCIK on the following site <http://pcikbiologi.id>. The students were asked to rate 1 to 5 how well they understood the mapping concept (content), the integration of content and Islam (*Content Islamic Knowledge/CIK*), and the integration of pedagogy and content (*Pedagogy Content Knowledge/PCK*), and also CIK integration assignments. The results of the students' assessment are illustrated in Figure 10.

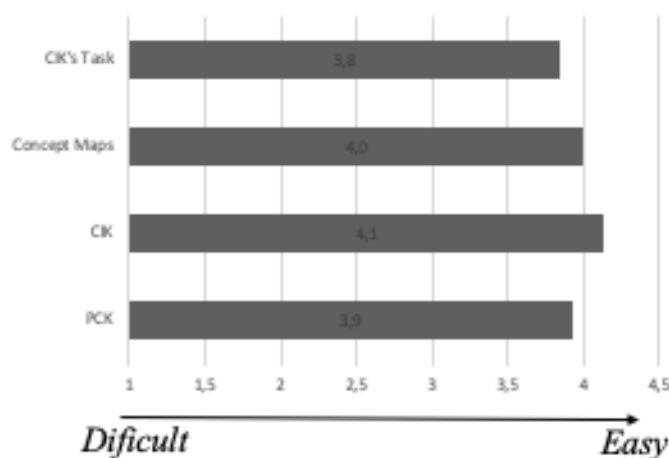


Figure 10. Students' Assessment on PCIK e-module

Figure 10 shows that the assessment for content and CIK is extensive because students of introductory Biology courses focus on content and the integration with Islamic knowledge. PCK has not become their focus in the first semester. The students' assessment of CIK assignments is small enough since they encounter technical problems in doing the assignments. Here are some of the comments.

Sometimes it is accessible but takes a long time to access.

RR [1/7/2021 15.46.27]

While accessing PCIK, I have difficulties submitting the answers. Also, characters are limited in typing the answers to the questions. RIP [1/7/2021 15.59.40]

The average assessment from students for PCK is (3.9), CIK (4.1), mapping concept (4.0), and CIK assignments (3.8) on a scale range of 100 is 76 - 82. It shows that the students well receive PCIK presented in <http://pcikbiologi.id>, and some of their responses are given below.

It is very good and beneficial in increasing my knowledge. PCIK enables students to access lessons anytime, anywhere. ZM, 1/7/2021 18.25.52

Accessing the Basic Biology subject through PCIK is beneficial because it increases my new insights and lets me express the gained knowledge. Even though I sometimes have difficulties submitting the answers, it helps me increase my insights because I can modify or add the answers to the questions in PCIK. MPP, 1/8/2021 6.23.01

The students' responses who used the PCIK module (<http://pcikbiologi.id>) in the Introductory Biology course during the Covid-19 pandemic are depicted in [table 9](#). It shows that the PCIK module is very well received. The majority responded positively to the use of the module, especially from the aspect of providing insight into Biological knowledge, Islam, and the integration of Islam and Biology. However, there are negative responses because students still encountered technical problems accessing the site. This can be reduced by inserting an interactive question and answer platform in e-modules such as book widgets. [Nugraha et al. \(2021\)](#) showed that booklets are an effective interactive learning platform. At the university level, interactive book widgets are quizzes and mind maps.

Table 9. Students' Responses After Employing PCIK Module in Learning during pandemic Covid-19

Responses	Category	Aspect	Number of comment	Linguistic Features
Negative	Technical	The site's difficult access	10	Confused, difficulties in submitting answers, server error, difficulty access
	Content	Language Methods	1 1	Difficult to understand Need more energy to think and understand the topic.
Number of Negative Responses			12	
Positive	Technical	The site's accessibility	5	Accessible, user interface simple,
	Content	Language	5	Easy to understand
		Insights/Knowledge on the integration of Islam and science	28	Great, fun, intriguing, thankful, Alhamdulillah, deepen and increase Biological content knowledge, Islamic knowledge, and the integration of Islam and Biology.
		The competence/Ability to integrate Islam and Biology	4	Understand more, increase insights, mind-opening, Islam and Biology integration.
	Media		2	Feasible, helps a lot during online learning while doing some tasks and learning Biology.
	Methods		2	The topic can be reviewed, and integration tasks increase critical thinking.
Total positive responses			46	
Total responses			58	

The students who access the PCIK site gained more insights into the integration of Biology and Islamic knowledge as well as Biology and Pedagogy, as stated below.

My impression of accessing Biology through PCIK is that I understand the integration concept of Islam and Biology and relates to the lessons I studied in High School. I studied in Vocational High School, and Biology was only taught in grade 10. Therefore, PCIK enables me to increase my knowledge and understanding of the subject. [APY, 1/7/2021 15.31.22]

Students also said that the PCIK site helped their study during the pandemic, as expressed by RU below.

To me, PCIK is intriguing because students have other media for learning. It is beneficial, especially during the pandemic, where all classes are conducted online. [RU, 1/7/2021 16.07.10]

According to [Figure 1 \(Forgaty, 2022\)](#), this study resulted in PCIK as a shared model in [Figure 2. Wahyuni \(2020\)](#) stated that there are shared, webbed, and integrated models in science education. According to the Islamic Science Integration model ([Mufid, 2014](#)), PCIK is the unity of Islamic knowledge. Biological knowledge depends on Integrative-Interdependence and Integrative-Qualificative model. Integrative-Interdependence means that religion without science cannot be understood (see [figure 3](#)). Meanwhile, the integrative-Qualificative model means that sciences are justified by religious values (see [figure 4](#) and [Tables 2 & 5](#)). [Table 3](#) shows the contradictions between religious and biological views. This strengthened the opinion ([Hajiyeva, 2018](#)) that natural sciences and religious feelings within a specific framework do not intersect with each other as different spheres in the accessible environment. The topic of evolution concerning science and religion is categorized as an independent typology. However, it can be developed into an integration typology to obtain common ground on issues considered contradictory. The function of science is to strengthen beliefs about God as the creator of the universe ([Hidayatullah, 2019](#)).

PCIK applied to e-learning media using the website facilitates the blended learning process. In line with other successfully implemented studies, it supports independent learning in intrinsic solid motivation, learning styles, resources, and cognitive strategies ([Gaikwad & Tankhiwale, 2014](#)). Additionally, e-learning can improve the quality of learning ([Putra et al., 2019](#)).

4. CONCLUSION

Islam integration in the basic Biology module for students of the Biology education department is developed in cellular mode. This enables integration between Islamic knowledge and Biology as well as biological and pedagogy.

The integration of Islam in the module includes the aspect of *tauhid rububiyah*, sharia law in the products and human deeds, and morals/*akhlak*. The topic of cells is 100% related to *tauhid rububiyah*. Meanwhile, there is a 40% relation to sharia law on the topic of genetics and the others are related to the increase of *tauhid rububiyah*, which is the strengthening of beliefs towards *Allahu khaliq wa mudabiru*.

PCIK Integration will be evident in discussing socio-scientific issues, i.e., how students deal with Biological issues such as clones, DNA engineering, and evolution. Furthermore, the issues were discussed in the classroom during Basic Biology subject.

The implementation in the trial period shows that the PCIK module brings about the expected spiritual values, i.e., monotheism (*tauhid*). Furthermore, the users can express greater spiritual values from the element of monotheism (*tauhid*), morals (*akhlak*) and life lessons (*ibrah*).

In the dissemination stage, the students encountered technical problems in the online teaching and learning during the Covid-19 pandemic. However, there was solid evidence of an increase in insight and ability to integrate Biology and Islam as well as Biology and Pedagogy.

The ability to integrate content and Islamic knowledge has not been measured, hence this should be considered in future research. Furthermore, Pedagogy Content Knowledge (PCK) has been developed into Technology Pedagogy and Content Knowledge (TPACK). Therefore, the development of Technology Pedagogy Content Islamic Knowledge (TPCIK) should also be considered.

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6. REFERENCES

- Anas, N., Alwi, E. A. Z. E., Razali, M. H. H., Subki, R. N., & Bakar, N. A. A. (2013). The Integration of Knowledge in Islam: Concept and Challenges. *Global Journal of Human Social Science Linguistics & Education*, 13(10).
- Anggraini, A., & Sukardi, S. (2015). Pengembangan Modul Prakarya dan Kewirausahaan Materi Pengolahan Berbasis Product Oriented bagi Peserta Didik SMK. *Jurnal Pendidikan Vokasi*, 5(3), 287–296.
- Budi, A. (2012). *PTAI Tetap di Bawah Kendali Kemenag*. Beda News. www.bedanews.com/ptai-tetap-di-bawah-kendali-kemenag
- Eric J, Simon; Jean L, Dickey; Kelly A, Hogan; Jane B, R. (2017). *Intisari Biologi* (A. Safitri (ed.); Edisi 6). Erlangga.
- Fogarty, R. (2002). *How to Integrate the Curricula*. Pearson Skylight.
- Gaikwad, N., & Tankhiwale, S. (2014). Interactive E-learning Module in Pharmacology: a pilot project at a rural medical college in India. *Perspect Med Educ*, 3(1), 15–30. <https://doi.org/10.1007/s40037-013-0081-0>

- Hajiyeva, N. (2018). *Science and Religion: Contradiction or Unity*. [Http://Bakuresearchinsitute.Org](http://Bakuresearchinsitute.Org).
- Herlanti, Y. (2017). An Analysis on Pedagogy Content Islamic Knowledge of Indonesia Qualification Framework in Biology Islamic Education Program. *Tarbiya: Journal of Education in Muslim Society*, 4(2), 176–183.
- Hidayatullah, S. (2019). Agama dan Sains: Sebuah Kajian Tentang Relasi dan Metodologi. *Jurnal Filsafat*, 29(1), 102–133. <https://doi.org/10.22146/jf.30246>
- Maryati, & Widodo, E. (2013). Analisis Pedagogic Content Knowledge (PCK) Terhadap Buku Pegangan Guru IPA SMP/MTs Kelas VII pada Implementasi Kurikulum 2013. *Artikel Ilmiah*, 66, 37–39.
- Mufid, F. (2014). Islamic Sciences Integration. *QIJIS (Qudus International Journal of Islamic Studies)*, 2(2), 144–160.
- Nugraha, D., Handayani, F., Mansyur, A. S., & Zaqiah, Q. Y. (2021). Improving PAI Online Learning Outcomes with Bookwidgets as a Media during the Covid-19 Pandemic. *Jurnal Tarbiyatuna*, 12(1), 33–38. <http://e-journal.ikhac.ac.id/index.php/NAZHRUNA/article/>
- Putra, A. B. N. R., ; Zahro, A. H., Mukhadis, A., Ulfatin, N., & Ashar, M. (2019). Learning Innovation Online Course Based on Blended Learning for Interactive Learning in the Era of Education 4.0. *Journal of Disruptive ...*, 1(1), 47–56. <http://journal2.um.a>
- Shulman, L. S. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Education Review*, 57(1), 1–21.
- Sukaesih, S., Ridlo, S., & Saptono, S. (2017). Profil Kemampuan Pedagogical Content Knowledge (PCK) Calon Guru Biologi. *Lembaran Ilmu Kependidikan*, 46(2), 68–74.
- Thiagarajan, Sivasailan Semmel, D.S., & Semmel, M. . (1974). *Instructional Development for Training Teacher of Exceptional Children: A Sourcebook*. Indiana University.
- Van Driel, J. H., Verloop, N., & de Vos, W. (1998). Developing Science Teacher's Pedagogical Content Knowledge. *Journal of Research in Science Teaching*, 35(6), 673–695.
- Veal, W. R., & MaKinster, J. G. (1999). Pedagogical Content Knowledge Taxonomies. *Electronic Journal Science Education*, 3(4).
- Wahyuni, A. (2020). Integration of Islamic Values in Science Education “A Reconstruction Effort in Education.” *Halaqa: Islamic Education Journal*, 4(2), 163–168. <https://doi.org/10.21070/halaqa.v4i2.1000>
- Wati, S., Syafryadin., & Apriani, E. (2021). Learning module development on compiling exposition and argumentation text using project-based learning. *English Review: Journal of English Education*, 9(2), 355–366.
- Zamzami, Z., & K, C. M. (2018). Blended Learning Method Within Indonesian Higher Education Institutions. *Jurnal Pendidikan Humaniora*, 6(2), 69–77.

