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RQANI: A Learning Model that Integrates Science Concepts and Islamic Values in Biology Learning

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A preliminary study showed that Biology learning in the classroom could not encourage the integration of science concepts and Islamic values. The aims of this study are to (1) develop a new learning model that integrates scientific principles and Islamic values, and (2) characterize the RQANI model's validity, practicability, and effectiveness. This study belonged to the research and development study. The learning model was developed in four stages, including (1) preliminary investigation, (2) design, (3) realization/implementation, and (4) test, evaluation, and revision. The study population included all biology education students at IAIN Ternate, STKIP KIE Raha Ternate, and UIN Alauddin Makassar in Indonesia. The study enrolled 120 fourth semester biology education students from IAIN Ternate, STKIP KIE Raha Ternate, and UIN Alauddin Makassar, Indonesia. The research instruments employed in this study are validation sheets for learning models, observation sheets for learning implementation, learning achievement tests, and response questionnaires for the learning model. The results of this study include: (1) a new learning model, namely RQANI, that consists of five learning stages (Reading, Questioning, Answering, Elaboration, Integration); (2) The validity of the RQANI prototype was very high with an average value of 3.74. The RQANI learning model was considered fairly practical and effective in improving student learning outcomes and positive responses. Therefore, it can be concluded that RQANI has met the requirements for a valid, practical and effective learning model.

Keywords: Islamic values, learning model, RQANI, science, biology learning

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INTRODUCTION

The integration of Islamic values into science learning must be supported by an effective learning approach or model (Anshori, 2021; Lubis, 2015). Scientific truth does not only refer to evidence-based reasons but also results from questions about identity, meaning, purpose and beliefs (Jacobsen & Jacobsen, 2018). The scientific characteristics of biology learning include products, processes, attitudes, technology, and strategic tools to develop various aspects of learning (cognitive, affective, and psychomotor) which are very important in shaping students' character and morals. In achieving its ultimate goals, the Islamic education system integrates and harmonizes the interests of the world and the interests of the hereafter (QS Al-Qashash, 77). Integration is the keyword guaranteeing that there is no separation between religion and science (Mustami et al., 2017). Integrated learning has been proven able to train students' critical thinking skills and build their systematic knowledge (Salam et al., 2020). Effective integrated learning can also improve students' learning skills (Winarno et al., 2020). Research conducted by (Winarso & Wahid, 2020), explains that the development of Al-Quran integrated mathematics learning models and tools is effective in developing the spiritual and religious attitudes of students in schools. Education that is integrated with the Al-Quran and Al-Sunnah can be carried out by educators by implementing models, strategies, approaches and learning methods that combine learning materials with the values of the Qur'an and Al-Sunnah (Lubis, 2015; Munifah et al., 2020).

Learning that integrates Islamic values is able to develop students' thinking skills holistically (Purwati et al., 2018; Sriatun et al., 2018; Sunhaji, 2018). Islamic values in science have the potential to help students acquire attitudes, develop character, understand their strengths and weaknesses, and recognize the truth in everyday life in society (Listyono et al., 2018). Strengthening values-based teaching is able to gradually build a strong moral foundation that plays an important role in influencing current and future decision-making and attitudes (Sulayman, 2014; Tambak & Sukenti, 2020). Integrated science learning using a guided discovery model and problem-based learning has been proven able to improve students' scientific literacy (Ardianto & Rubini, 2016; Narmaditya et al., 2018). Integrated learning can shape the concept of science teaching and increase collaboration between educators and students (Lang & Olson, 2000; Wei, 2020). According to observations and interviews with science teachers at an Integrated Islamic School, they have encountered problems thus far in creating a learning method that incorporates Islamic values with scientific concepts (Sintia & Violita, 2020). Weak integration of science and religion has been repeatedly identified as a barrier to the advancement of science, technology, and social transformation. The Director General of Islamic Education of Indonesia has instructed the Chancellor of Islamic Higher Education (PTI) to study, develop and organize the integration of religion and science (Ali, 2020). It is vital to incorporate Islamic ideals into educational practices to develop pupils who possess self-control and who embody the spirit of Islam in all parts of life (Demina et al., 2019; Kosasih et al., 2020).

The benefits obtained from developing a learning model that integrates science and religion include increasing students' understanding of religion, deepening students'

value-based knowledge, increasing the implementation of science practices in daily life, developing students' character (Adegboyega, 2018; Farihah & Septiadi, 2019; Rahardjanto & Susilowati, 2018; Suryaningsih, 2015), developing students' competence, moral values and responsibility (Ranti & Usmeldi, 2019), and providing more meaningful learning experiences (Yusuf et al., 2018). Character building through the integration of science with Islamic values can help students maintain responsibility for learning and develop ethics in the classroom (Berkowitz & Bier, 2005). It has been proven that a new mathematics learning model that incorporates Islamic principles, called the Qur'an-based learning approach (QBL) makes learning more meaningful and can effectively internalize Islamic values (Suroso et al., 2018). Internalization of Islamic principles in chemistry education might help students to elaborate on concepts, internalize specific Qur'anic verses, and internalize descriptions and the characteristics contained within them. The development of a learning model that incorporates Islamic values and Minangkabau indigenous wisdom using the plomp model design results in a valid and feasible model that contributes to the realization of a comprehensive Islamic education between parents, schools, and the community (Kosim et al., 2020).

The principles taught in the Qur'an serve as a reference for producing theory and developing learning (Sholichah, 2018). In fact, it is difficult to implement a teaching and learning process that can instill religious values in students and that can connect science and religion (Badlisyah & Munawwarah, 2018). Learning often runs independently and is not integrated with religious values, because it is often assumed that religion is only limited to religious practices. The non-contextual teaching and learning process will hinder the development of students' ability to think holistically and make it difficult for them to relate the concepts they learn in the classroom to their daily life as a Muslim (Khasanah et al., 2017; Sunhaji, 2018). As a result, students are not given the opportunity to experience learning in real-world contexts. Students at Islamic institutions not only learn how to theoretically prove information about Islamic learning and science, but also how to solve numerous problems involving religious concerns using a scientific method (Priatna, 2019). Integrating Islamic values using a learning model integrated with an e-learning platform can improve students' attitudes and attention to Islamic principles (Syarif, 2020). The Integrative Curriculum (IC) is a proven method for infusing Islamic beliefs into biology education. The Plomp development design was used to create learning materials that incorporate this integrative concept and approach (Ibrahim et al., 2018).

The results of observations and interviews with Biology students from IAIN Ternate, North Maluku, STKIP KIE Raha Ternate, North Maluku, and UIN Alauddin Makassar in South Sulawesi, Indonesia revealed that Biology classrooms rarely integrated Islamic values effectively. The biological concepts taught in the universities were focused more on the cognitive domain. In addition, the theories were presented through abstract and dense materials that were difficult for the students to understand. The presentation of Biology concepts was not associated with the context of students' daily lives nor integrated with Islamic values. In some cases, the lecturers and the students had difficulty integrating Islamic studies into the science learning process so that it failed to conform to the paradigm of science and revelation in Islam (Priatna, 2019). The first

revelation received by the Prophet Muhammad contained the command to master science on the basis of faith (Al-'Alaq, 1-5). This implies that studying science can help us strengthen our confidence in Allah SWT by educating us about the nature of human creation. Science and technology are advancing at a breakneck pace, placing an increasing need on Muslims to continue expanding and deepening knowledge while adhering to Islamic ideals.

The role of lecturers in learning is not only to transfer knowledge, but also to integrate moral and spiritual values, build student's personality and character by facilitating, motivating and guiding students through meaningful learning (Kasim & Yusoff, 2014). Furthermore, argues that through a combination of content material, student's academic skills and interactive skills, educators can bring a positive impact to learning and to the development of the students (Kudari, 2016). According to (Hakim, 2012), the integration of Islamic values into the classroom can be done by combining science and Islamic teachings. Learning materials that are integrated with Islamic values will motivate students to change the way they think and behave (Purwati et al., 2018). Research conducted by (Baba et al., 2016) shows that the integration of Islamic values, directly or indirectly, makes the learning process more valuable and meaningful.

Based on the explanation, research findings, and past studies presented above, it can be assumed that the development of a learning model that can integrate Islamic values into the concepts of science is necessary. The learning model developed should be able to connect concepts in Biology with the holy verses of Al-Qur'an and Al-Hadith. The problems in this study were formulated into (1) How can a new integrated learning model be generated using the Plomp's development procedures? (2) How valid, practical and effective is the model in terms of its implementation in the classroom?. The research hypothesis is formulated into the implementation of the RQANI learning model is effective in increasing biology students' learning achievement. It is expected that the results of this study can provide insights and information about the effectiveness of an integrated learning model with Islamic values in improving students' character, especially in facing the 21st century global challenges.

METHOD

Research Goal

The current study was designed as a Research and Development (R&D) study. The product generated in this study is a new learning model called RQANI. The procedures for developing the prototype were adopted from (Plomp, 2007) consisting of: (1) preliminary investigation; (2) design; (3) realization; (4) test, evaluation and revision. The research procedures are depicted in Figure 1.

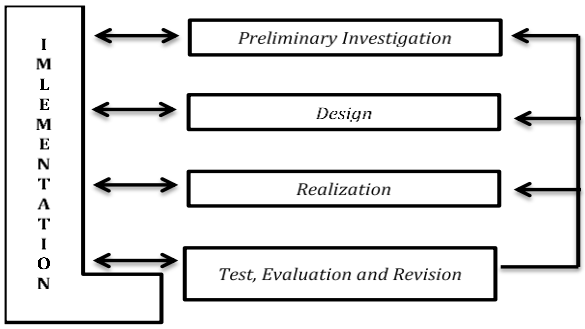

Figure 1
Plomp's Development of Model (Plomp, 2007)

The procedure for developing the RQA learning model used in this study can be described as follows.

1. Preliminary Investigation

This phase established the initial circumstances for the curriculum and learning process. In general, this phase focused on doing preliminary research to establish the rationale for developing the RQANI model. This rationale relates to the investigation of learning theories that underpin the formation of and preliminary studies on variables in research. This step strove to ensure that the learning design is consistent with the analysis of biology learning needs, particularly the integration of Islamic values and the notion of biology. The purpose of this preliminary research was to ascertain the initial conditions for (1) biology education students at IAIN Ternate in North Maluku; (2) biology education students at STKIP KIE Raha Ternate in North Maluku; and (3) biology education students at UIN Alauddin Makassar in South Sulawesi.

2. Design

This phase was dedicated to the development of the RQANI learning model's design and idea. This phase was supposed to result in the following: (1) design of the learning syntax; (2) design of the social system or supportive learning environment; (3) design of the reaction principle; (4) design of the support system; and (5) design of the instructional impact of learning and accompaniment. This design process was documented in the draft RQANI model book.

3. Realization/Implementation/Construction

This phase was dedicated to developing the RQANI learning model. This phase involved validating the learning design with experts. The term "experts" refers to lecturers who are specialists in the field of education, particularly in the construction of instructional designs, as well as experts in the field of biological education science studies. Three lecturers served as validators: an expert lecturer in biology, an expert lecturer in education, and an expert lecturer in learning biology while incorporating Islamic principles.

4. Test, evaluation, and revision

This phase aimed to evaluate the RQANI learning model prototype's effectiveness. The activities included the following: (1) conducting focus group discussions (FGD) about the RQANI learning model prototype; (2) revising the RQANI learning model prototype based on input/suggestions from validators and the results of the FGD discussions; and (3) conducting limited tryouts about the RQANI learning model prototype. The purpose of the tryout was to determine the prototype's effectiveness, particularly in relation to the research variables of character and self-efficacy. The tryout phase was conducted with students of biology education at IAIN Ternate, North Maluku; STKIP KIE Raha Ternate, North Maluku; and UIN Alauddin Makassar, South Sulawesi.

Sample and Data Collection

The population of the study consisted of all students from the Department of Biology Education at IAIN Ternate, North Maluku, Indonesia; STKIP KIE Raha Ternate, North Maluku, Indonesia; and UIN Alauddin Makassar in South Sulawesi, Indonesia. The sample of the study contained (1) 40 students from the Department of Biology Education at IAIN Ternate, North Maluku; (2) 40 students from the Department of Biology Education at STKIP KIE Raha Ternate, North Maluku; and (3) 40 students from the Department of Biology Education at UIN Alauddin Makassar, South Sulawesi. The sample groups were determined based on the characteristics and number of the students required for every research treatment. All of the sample classes were homogeneous based on the homogeneity test using grouping test data. This study was conducted from January 2020 until July 2020. Analysis of variance (ANOVA) was used to determine the homogeneity of the research sample classes. Survey questionnaires, documentation, interviews, and field observations were used to collect preliminary data. Meanwhile, the field trial phase was carried out by validating the model, administering tests, and surveying responses. The observation sheets on the implementation of learning using the RQANI model was used to collect data on practicality, while the model's effectiveness was determined using learning achievement tests and student responses questionnaires.

Data Analysis

The data comprised (1) descriptive data about the results of the development of the learning model through the Plomp's model development procedure; (2) descriptive data about the quality of the resulting learning model (validity, practicality, and effectiveness). The validity of the learning model was examined through expert and practitioner assessments with validation sheets. The practicality of the model was examined using learning implementation sheets. The effectiveness of the model was determined through achievement test and survey. The data analysis was carried out in a descriptive quantitative manner by referring to certain criteria.

The validity of the RQANI learning model was determined by calculating the mean of each validator's scores on each criterion and aspect of the assessment. According to Nurdin (2017), the validity category for each criterion, facet, or overall is as follows: invalid category if M is less than 1.5 ($M < 1.5$); rather valid category if M is greater than

2.5 ($1.5 \leq M < 2.5$); valid category if M is greater than 2.5 ($2,5 \leq M < 3,5$); very valid category if M is greater than 2.5. ($3,5 \leq M \leq 4$). M is the mean of all aspects of validity.

FINDINGS

The Development of RQANI Learning Model through Plomp's Model Development Procedures

Phase-1: Preliminary Investigation

This phase aimed to identify the initial conditions for (1) biology education students at IAIN Ternate, North Maluku; (2) students of biology education STKIP KIE Raha Ternate, North Maluku; and (3) students of biology education at UIN Alauddin Makassar, South Sulawesi. Research data were collected through observation, interview, and survey questionnaires. Interviews were conducted with the coordinators of the study programs and biology lecturers at each of these universities.

Preliminary investigation suggests that a learning model should be developed to integrate Islamic values into Biology learning at the Department of Biology Education of IAIN Ternate, North Maluku, STKIP KIE Raha Ternate, North Maluku, and UIN Alauddin Makassar, South Sulawesi.

Table.1
Preliminary investigation results

Aspect	Descriptions		
	Campus A	Campus B	Campus C
Learning Activities	Learning activities are dominated by teacher-centered methods. The lecturers teach biology concepts through lectures or assigning paper assignments to students. In general, Biology lecturers in the campus have not integrated Islamic values into the lessons.	Learning activities are dominated by teacher-centered methods. The lecturer's main role is to teach biology concepts to the students. Learning resources consist of teacher's books which do not contain Islamic values.	50% of the learning activities are dominated by teacher-centered methods. Active learning has been implemented in the classroom, yet learning resources still consist of teacher's books which do not contain Islamic values.
Learning Models	Learning models that are commonly used by the lecturers include direct instruction, cooperative learning type STAD. RQA has never been applied in the classroom.	Learning models that are commonly used by the lecturers include direct instruction, dominated by lectures. RQA has never been applied in the classroom.	Learning models that are commonly used by the lecturers include direct instruction, cooperative learning type STAD, group investigation, problem-based learning (PBL). RQA has never been applied in the classroom.
Learning methods	The lecturers use discussion, lecturing and task-assignment methods to facilitate learning.	The lecturers use discussion, lecturing, task-assignment and student presentation methods to facilitate learning.	The lecturers use discussion, lecturing, task-assignment and investigation methods to facilitate learning.
Learning materials	Learning materials that can integrate Islamic values and Biology contents have not been developed properly.	Learning materials that can integrate Islamic values and Biology contents have not been developed properly.	Learning materials that can integrate Islamic values and Biology contents have not been developed properly.
Learning facility	The classroom environment is fine, but the number of chairs is inadequate. Not every classroom is equipped with the LCD projector.	The classroom environment is fine, but not equipped with the LCD projector, air conditioner or fan.	The classroom environment is fine, but not every classroom is equipped with the LCD projector.
Campus facility	The campus has provided the students with a laboratory, libraries and wireless internet	The campus has provided the students with a laboratory, libraries and wireless internet	The campus has provided the students with a laboratory, libraries and wireless internet

Aspect	Descriptions		
	Campus A	Campus B	Campus C
	connection. However, practicum activities are rarely done in the laboratory, literature on Biology contents is still lacking. The internet connection is good around the rectorate building, faculty and library, but is weak if accessed from the classrooms.	connection. The wi-fi signal is weak if accessed from the classrooms. The laboratory is not equipped with adequate practicum tools and materials. The libraries contain a limited number of books on biology.	connection. The laboratory is equipped with adequate practicum tools and materials. The department libraries, faculty libraries and central library contain an ample supply of books on biology number. The internet connection is good around campus.
Student's cognitive ability	In average, the students have medium cognitive ability. The students' ability to ask and argue is at the level of memorizing (C1), understanding (C2), and analyzing (C3). The students' critical thinking skills have not developed well and are in the low category.	In average, the students have medium cognitive ability. The students' ability to ask and argue is at the level of memorizing (C1) and understanding (C2), The students' critical thinking skills have not developed well and are in the low category.	In average, the students have medium cognitive ability. The students' ability to ask and argue is at the level of memorizing (C1), understanding (C2), and analyzing (C3). The students' critical thinking skills have not developed well and are in the low category.
Student's learning motivation	The students have poor learning motivation. They get easily bored because learning is dominated by lectures.	The students have poor learning motivation. They are unable to maintain their attention to every learning activity in the classroom.	The students have poor learning motivation. They need to experience learning that can integrate Islamic values and biology contents.
Student's self-efficacy	The students have low self-efficacy. They lack confidence in asking, answering questions, discussing, and collaborating with other students in the classroom.	The students have low self-efficacy. They lack confidence in asking, answering questions, discussing, and collaborating with other students in the classroom. Mostly, they are not certain about their own ideas and thinking process, so they cannot engage actively in the learning process.	The students have low self-efficacy. They lack confidence in asking, answering questions, discussing, and collaborating with other students in the classroom.
Student's character values	The students have poor character. They feel indifferent towards the campus facility, laboratory, libraries and learning environment.	The students have poor character. They feel indifferent towards the campus facility, laboratory, libraries, learning environment and self development.	The students have poor character. The students' concern about the campus facility, laboratory, libraries, learning environment needs to be improved.
Student's active participation in learning	The students cannot engage actively in the learning process; learning activities are mostly dominated by the high achievers.	The students cannot engage actively in the learning process; learning activities are mostly dominated by particular groups of students. Less than 10% of the students are confident in asking and answering questions.	Not all of the students can engage actively in the learning process; learning activities are mostly dominated by the high achievers.
Student's interest	The students have low interest in learning biology. They lack of interest in analytic, conceptual and abstract concepts of biology.	The students have low interest in learning biology. They are only attracted to particular themes. As a result, the students cannot optimize their performance in the standard of competence and basic competence set in the curriculum.	The students have low interest in learning biology. They lack of interest in analytic, conceptual and abstract concepts of biology. The students are in favor of investigative learning.
Student's responses towards Biology learning at the campus	The students have negative responses and perceptions on biology learning at the campus. They think that biology is dull, non-contextual, difficult to understand and requires memorization.	The students have negative responses towards biology learning at the campus. Stimulation needs to be provided so that the students can feel more comfortable and relaxed in understanding concepts in biology.	The students' positive responses towards biology learning at the campus need to be improved. The students sometimes face difficulty concentrating on the lessons.

Aspect	Descriptions		
	Campus A	Campus B	Campus C
Challenges faced by students in learning Biology	It is difficult for the students to develop self-efficacy, character and learning motivation. Biology learning has not integrated Islamic values so that the students can only partially obtain the knowledge.	It is difficult for the students to develop self-efficacy, character and learning motivation. Biology learning has not integrated Islamic values so that the students can only partially obtain the knowledge. New learning models should be developed, such as the integration of active learning or contextual learning and Islamic values.	It is difficult for the students to develop self-efficacy, character and learning motivation. Biology learning has not integrated Islamic values so that the students can only partially obtain the knowledge.

Notes:
Campus A: IAIN Ternate, North Maluku, Indonesia
Campus B: STKIP KIE Raha Ternate, North Maluku, Indonesia
Campus C: UIN Alauddin Makassar, South Sulawesi, Indonesia

Phase-2: Design

The RQANI learning model is constructed from the following components: syntax (phases or stages of learning), social system, reaction principles, support system, instructional impacts and accompaniment impacts. The lack of students' initial knowledge indicates that lecturers need to dedicate more effort to stimulate and prepare their students to acquire theories that are needed during the learning process. This is relevant to the design of the RQANI model, of which first phase is reading. There are five learning phases in the RQANI learning model: Reading, Questioning, Answering, Elaboration and Integration.

Phase-3: Implementation/Realization/Construction

The activity carried out in phase-3 was the realization of the learning model that had been designed in phase-2. Some of the things that were realized at this stage included (a) learning syntax; (b) social system; (c) reaction principles; (d) support system; and (e) instructional impacts. The RQANI design had to undergo expert validation. In this regard, an expert in education, an expert in the integration of biology learning and Islamic values and a field practitioner with relevant experience were invited to assess the RQANI design.

Learning Syntax

There are five learning phases in RQANI: Reading, Questioning, Answering, Elaboration, Integration. Lecturer's activities and student's activities in RQANI are presented in Table 2**.**

Table 2
RQANI learning syntax

Syntax	Learning Activities	
	Lecturer	Student
Phase 1: Reading	1. Lecturer provides students with motivation to learn. 2. Lecturer delivers learning objectives. 3. Lecturer provides students with the opportunity to read relevant literature/references/textbooks/texts/modules related to the material to be discussed.	1. Student listens to the delivery of learning motivation from the lecturer. 2. Student listens and records the learning objectives delivered by the lecturer. 3. Student reads relevant literature/references/textbooks/texts/modules related to the material to be discussed.
Phase 2: Questioning	Lecturer provides opportunities for students to formulate and ask questions related to the material being discussed.	Student formulates and asks questions related to the material being discussed.
Phase 3: Answering	Lecturer provides opportunities for students to answer questions related to the material being discussed.	Student answers questions related to the material being discussed.
Phase 4: Elaboration	Lecturer facilitates students' collaborative work so that they can understand the material that has been studied, have a dialogue and discuss difficult materials with their group members and solve problems related to everyday life.	Students work in groups to understand the material that has been studied, have a dialogue and discuss difficult materials with their group members and solve problems related to everyday life.
Phase 5: Integration	1. Lecturer provides opportunities for students to work with peers or in groups to find verses from the Al-Quran and Al-Hadith that are relevant to the material that has been studied, and write them down in their notebooks. 2. Lecturer wraps up the lesson.	1. Students work with peers or in groups to find verses from the Al-Quran and Al-Hadith that are relevant to the material that has been studied, and write them down in their notebooks. 2. Student pays attention to the lecturer and draws a conclusion from the lesson.

Biology instruction began by providing opportunities for pupils to read previously released material, in this case on the digestive system of food. Following that, each student was instructed to create a question and record it on the Student Worksheet (LKM). The results of their efforts were subsequently extended by students through interaction and discussion with their groupmates. Students studied the food digestive system materials and used an application already installed on their mobile phones to search up relevant holy verses from the Koran and Al'Hadith. They then recorded the interpretations of the Quran and Hadith on the Student Worksheet (LKM) and continued discussions about the concept of food intake in Islam, food metabolism in the body, body detoxification through fasting, various causes of digestive disorders, preventative measures for disease/digestive disorders, as well as health connections with tawakal and qonaah (gratitude).

Social System

Social system describes the roles and functions of students, the interaction between the lecturer and students and learning objectives or targets. The RQANI model is a learning model designed to activate students in an elaborate learning process that integrates scientific concepts and the holy verses of the Al-Quran and Al-Hadith. This model provides an opportunity for students to prepare/equip themselves with initial concepts,

practice asking high-level questions, answer questions effectively and efficiently, work together in groups to understand the material that has been studied, have dialogue and discuss materials that are difficult to understand with group colleagues, solve every day problems and cooperate with peers or in groups to find the holy verses of Al-Quran and Al-Hadith that are relevant to the material that has been studied. On the other hand, the lecturer acts as a facilitator or a guide who arranges learning so that it can run well. This model is expected to improve student's self-efficacy, character, critical thinking skills, argumentation skills, communication skills, social skills, analytical skills, collaboration skills, elaboration skills, conceptual mastery and other skills needed in the 21st century learning.

The integration of the RQANI model in biology learning in this study established multidirectional interactions between lecturers, students, intragroups and intergroups. Lecturers facilitated discussion by establishing a congenial and dynamic environment for the students, particularly during the elaboration and integration stages of RQANI. The topic was primarily about how to express thankfulness to Allah SWT for the privilege of enjoying a healthy body that is properly kept and cared for. Maintaining a healthy physique through the consumption of halal and thoyyib foods and beverages is a requirement for all Muslims.

Reaction Principles

The RQANI learning model provides opportunities for students to be actively involved in learning. The lecturer will allow the students to develop knowledge, construct understanding, elaborate on existing knowledge and understanding, and integrate that knowledge and understanding of the Islamic from the Al-Quran and Al-Hadith. The lecturer should facilitate and provide scaffolding if students experience difficulties in learning. The lecturer also have to provide feedback on comments, arguments, questions, answers, conclusions, ideas produced by the students in the classroom. If there is a misconception, the lecturer is obliged to provide clarification of the concept and additional explanation which is supported by strong and logical arguments and relevant references. The two-way interaction between the lecturer and students is expected to increase student's activity and learning autonomy so that they are able to overcome learning problems that have been identified in the previous stage, namely in the initial investigation phase. The following is an example of a lecturer's response to the arguments given by students in the integration phase.

"The halal status of a food item is the most critical factor that Muslims must consider, particularly when it comes to food selection. The food must then be healthy (thayyib) and non-toxic to the body. It is expressly stated in the Qur'an that it is permissible to eat the fruits of the slaughter of the People of the Book, Q.S. Al-Ma'idah verse 5 states that the food (slaughter) of those who were given the Book is permissible for you, and your food is permissible for them as well."

Support System

The support system referred to in this study is additional requirements to implement the RQANI model, which includes learning tools and learning resources. Physical

requirements can be in the form of Learning Implementation Plan (RPS), Lecture Program Unit (SAP), Student Activity Sheet (LKM), lecture dictates and supporting Information and Communication Technology (ICT) media. Non-physical requirements can be in the form of student psychological condition before conducting learning, lecturer's ability to manage learning in RQANI, good communication between the lecturer and students, and conducive learning atmosphere. Biology learning was facilitated in this study using cartoons and instructional films pertaining to the digestive system of food. Then, pupils were instructed to download the Al-Quran and its translation application to their cellphones. Additionally, the students were provided with Student WorkSheets (LKM) and texts pertaining to the food digestive system.

Instructional and Accompaniment Impacts

The RQANI model was used to ensure that the learning objectives specified in the Learning Implementation Plan (RPS) and Lecture Program Unit (SAP) for the food digestive system material were met. The phases of RQANI learning have been shown to boost student engagement in biology instruction. This can be seen in the activity observation sheets, particularly in the increase in the number of students who ask and answer questions and make arguments about the digestive system's material. The third and fourth phases of RQANI have been shown to significantly improve students' elaboration and integration abilities in relation to the content being studied while maintaining Islamic beliefs. This is quantified using the student activity observation sheets and the student response questionnaire sheets during biology instruction utilizing the RQANI model. Following the RQANI learning process, a visible and quantifiable educational benefit was also observed in terms of enhancing student self-efficacy and character. The increase in scores following the application of the RQANI model demonstrates this.

The accompaniment impacts of Biology Learning using RQANI include:

1) The improvement of student's argumentation and communication skills
2) The improvement of student's social skills
3) The improvement of student's cooperation and collaboration
4) The improvement of student's concept mastery
5) The improvement of student's learning autonomy

Phase-4: Test, Evaluation, Revision

The RQANI learning model that had been developed and claimed to be valid was then tested on a limited basis to investigate changes in the character values and self-efficacy of students who took part in the tryout. The tryout was conducted on (1) students from the Department of Biology Education at IAIN Ternate, North Maluku; (2) students from the Department of Biology Education at STKIP KIE Raha Ternate, North Maluku; and (3) students from the Department of Biology Education at UIN Alauddin Makassar, South Sulawesi. The data from this tryout provided a basis for reflecting on the effectiveness of the RQANI (Reading, Questioning, Answering and Integration) prototype.

Table 3
Students' character scores after the implementation of RQANI

	Pretest	Post-Test	Change (%)
Students from campus A	46.75	78.75	72.60
Students from campus B	44.41	73.69	68.74
Students from campus C	41.08	77.24	89.73

Notes:
Campus A: IAIN Ternate, North Maluku, Indonesia
Campus B: STKIP KIE Raha Ternate, North Maluku, Indonesia
Campus C: UIN Alauddin Makassar, South Sulawesi, Indonesia

Table 4
Students' self-efficacy scores after the implementation of RQANI

	Pretest	Post-Test	Change (%)
Students from campus A	47.65	75.28	60.73
Students from campus B	43.37	71.77	67.03
Students from campus C	43.63	75.78	75.60

Notes:
Campus A: IAIN Ternate, North Maluku, Indonesia
Campus B: STKIP KIE Raha Ternate, North Maluku, Indonesia
Campus C: UIN Alauddin Makassar, South Sulawesi, Indonesia

The Validity, Practicality and Effectiveness of RQANI

The Validity of RQANI

The validation of the RQANI learning model was carried out by three lecturers from the State Islamic Religious Universities (PTKIN) in Indonesia. They are experts in biology, biology education, and the integration of Islamic principles into biology teaching. The average of the three validators' ratings of the model was then determined. The results of the expert validation on the learning model's syntax are summarized in Table 5.

Table 5
The validation results of RQANI syntax

No	Evaluated Aspect	Mean Score
A	Objective	
	Rationales for developing the learning model are explicit.	3.67
B	Supporting Theories	
	1. The theories used in the model development are relevant to RQANI.	4.00
	2. Piaget's theory supports the development of RQANI.	4.00
	3. Vygotsky's social development theory supports the development of RQANI.	4.00
	4. David Ausubel's learning theory supports the development of RQANI.	4.00
	5. Bruner's theory supports the development of RQANI.	4.00
C	Learning Syntax	
	1. The learning stages are arranged coherently and clearly.	4.00
	2. The learning stages are logical and rational.	3.67
	3. The learning stages activities of the lecturer and of the students.	4.00
	4. The description of learning activities at each stage of the learning model reflects the flow of the activities that can be carried out by the lecturer and the students.	4.00
	5. The description of learning activities at each stage of the learning model is oriented towards constructing student knowledge.	3.33
	6. The description of learning activities at each stage of the learning model attracts student's attention.	4.00
	7. The description of learning activities at each stage of the learning model is oriented towards	3,67

No	Evaluated Aspect	Mean Score
	increasing student's learning autonomy.	
	8. The description of learning activities at each stage of the learning model is oriented towards increasing student's character.	4.00
	9. The description of learning activities at each stage of the learning model is oriented towards increasing student's self-efficacy.	4.00
	10. The description of learning activities at each stage of the learning model is oriented towards increasing student's active involvement in learning.	4.00
	11. The description of learning activities at each stage of the learning model is oriented towards increasing student's elaboration skills.	3.33
	12. The description of learning activities at each stage of the learning model is oriented towards increasing student's integration skills.	4.00
	13. The description of learning activities at each stage of the learning model is oriented towards increasing student's critical thinking skills.	3.67
	14. The description of learning activities at each stage of the learning model is oriented towards increasing student's argumentation and communication skills.	3.33
	15. The description of learning activities at each stage of the learning model is oriented towards increasing student's social skills.	3.33
	16. The description of learning activities at each stage of the learning model is oriented towards increasing student's cooperative and collaborative skills.	3.67
	17. The description of learning activities at each stage of the learning model is oriented towards increasing student's concept mastery.	3.67
D	Social System	
	1. The description of learning activities at each stage of the learning model shows that there is an interaction between the lecturer and students.	4.00
	2. The relationship pattern between the lecturer and the students demonstrates the lecturer's role as a facilitator and a guide.	4.00
	3. The description of learning activities at each stage of the learning model shows that there is an interaction between students.	4.00
	4. The relationship between the lecturer and student individuals is explicit.	3.33
	5. The relationship between the lecturer and student individuals is clear in discussion.	4.00
E	Reaction Principles	
	1. Lecturer behavior is clearly stated.	3.67
	2. The description of learning activities shows that the lecturer provides learning resources needed by students such as textbooks, online media, etc.	3.67
	3. The description of learning activities shows that the lecturer provides motivation to increase student interest in learning.	4.00
	4. The description of learning activities shows that the lecturer provides a number of activities that stimulate student curiosity.	3.33
	5. The description of learning activities shows that the lecturer encourages students to explore ideas and communicate scientifically.	3.67
	6. The description of learning activities shows that the lecturer gives students the opportunity to ask questions when they have difficulty understanding phenomena and concepts.	3.33
F	Supporting System	
	1. Learning tools are arranged according to the steps of the learning model.	4.00
	2. Learning devices are arranged in accordance with learning objectives that are oriented to increase student's self-efficacy and character.	3.67
G	Instructional and Accompaniment Impacts	
	1. The types of instructional impacts (self efficacy, character, active involvement, elaboration and integration skills) are clearly stated in the RQANI syntax.	3.67
	2. The types of instructional impacts (self efficacy, character, active involvement, elaboration and integration skills) are logically stated in the RQANI syntax.	3.00
	3. The types of instructional impacts (self efficacy, character, active involvement, elaboration and integration skills) show the goals that are going to be achieved by RQANI.	3.33
	4. The accompaniment impacts, which are in the form of critical thinking skills, argumentation and communication skills, social skills, collaboration and collaborative skills, conceptual mastery, learning autonomy, are in accordance with the learning objectives to be achieved.	3.67
H	Conclusion	
	1. The quality of the learning model in general	3.67
	2. The feasibility of the learning model based on your opinion	3.67
Mean score		3.74 (Highly Valid)

According to the validation results for the learning syntax shown in Table 5, the average score for the RQANI model's overall assessment aspect was 3.74. When corrected for the validity category rules established by Nurdin (2017), this value falls within the range of $3.5 \leq M \leq 4$ (very valid). It may be inferred that the RQANI model is highly valid according to the validators, indicating that it is suitable for use in learning.

The Practicality of RQANI

The practicality of the learning model was examined using the learning implementation sheets. Consistency test that was conducted to measure the implementation of the syntax showed a parallel significance value of 0.341, while the data coincidence obtained a significance value of 0.011. The data parallel level showed a number greater than 0.05, while the data coincidence was smaller than 0.05. These figures suggested that the RQANI learning syntax was parallel but not coincident. Although not coincident, the results of these tests indicated that the learning syntax had been carried out consistently. The consistency test results are shown in Table 6.

Table 6
Consistency test results of RQANI

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	34024.645	3	11341.548	688.487	0.000
	b1, b2	15.055	1	15.055	0.914	0.341
	b1, b2, b3	154.999	2	77.500	4.705	0.011
	Residual	1910.884	116	16.473		
	Total	35935.529	119			

The Effectiveness of RQANI

The effectiveness of RQANI was measured based on (1) the students' test scores and (1) the students' questionnaire responses. The students' test results after the implementation of RQANI are summarized in Table 7.

Table.7
Recapitulation of Student's Learning Achievement

	Campus A	Campus B	Campus C
Highest score	93	90	98
Lowest score	82	80	86
Score range	11	10	12
Mean score	85.25	83.19	89.22
Test Completion	100	100	100

Notes:
Campus A: IAIN Ternate, North Maluku, Indonesia
Campus B: STKIP KIE Raha Ternate, North Maluku, Indonesia
Campus C: UIN Alauddin Makassar, South Sulawesi, Indonesia

The students'responses towards RQANI learning model are presented in Table 8.

Table 8
Summary of students' responses towards RQANI

No	Statement	University			Mean score	Inter-achievement
		Campus A (%)	Campus B (%)	Campus C (%)		
1	For me, learning using RQANI is interesting.	94.44	94.44	97.22	95.37	Very good
2	For me, learning using RQANI is fun.	88.89	91.67	94.44	91.67	Very good
3	RQANI helps me follow the lesson well.	86.11	86.11	88.89	87.04	Very good
4	RQANI helps me improve my learning motivation.	88.89	88.89	91.67	89.81	Very good
5	RQANI helps me improve my collaboration skills.	88.89	94.44	94.44	92.59	Very good
6	RQANI helps me improve my learning autonomy.	83.33	86.11	88.89	86.11	Very good
7	RQANI helps me improve my self-efficacy.	94.44	94.44	97.22	95.37	Very good
8	RQANI helps me improve my character.	97.22	94.44	97.22	96.30	Very good
9	RQANI encourages me to be actively involved in learning.	88.89	88.89	88.89	88.89	Very good
10	RQANI helps me improve my elaboration skills.	88.89	86.11	86.11	87.04	Very good
11	RQANI helps me improve my ability to integrate biology concepts and Islamic values (the holy verses of the Al-Quran and Al-Hadith).	94.44	94.44	97.22	95.37	Very good
12	RQANI helps me improve my reading interest.	91.67	88.89	91.67	90.74	Very good
13	RQANI helps me boost my confidence in asking questions.	91.67	91.67	88.89	90.74	Very good
14	RQANI helps me improve my ability to answer questions.	86.11	86.11	91.67	87.96	Very good
15	RQANI improves my learning experience.	83.33	86.11	86.11	85.19	Very good
16	RQANI helps me realize that I need to study harder.	86.11	91.67	91.67	89.81	Very good
17	RQANI adds clarity to the learning material.	86.11	94.44	88.89	89.81	Very good
18	RQANI improves my curiosity.	88.89	86.11	88.89	87,96	Very good
19	RQANI helps me regulate learning.	86.11	83.33	86.11	85.19	good
20	RQANI helps me evaluate learning.	80.56	83.33	83.33	82,.41	good
21	RQANI improves my critical thinking skills.	83.33	83.33	86.11	84.26	good
22	RQANI improves my argumentation and communication skills.	86.11	86.11	88.89	87.04	Very good
23	RQANI improves my social skills.	91.67	88.89	86.11	88.89	Very good
24	RQANI helps me develop cooperation and collaboration with classmates.	88.89	91.67	91.67	90.74	Very good
25	RQANI helps improve my concept mastery.	86.11	88.89	88.89	87.96	Very good
	Mean score	88.44	89.22	90.44	89.37	Very good

Notes:
Campus A: IAIN Ternate, North Maluku, Indonesia
Campus B: STKIP KIE Raha Ternate, North Maluku, Indonesia
Campus C: UIN Alauddin Makassar, South Sulawesi, Indonesia

Table 8 shows that the average score of students' responses towards the implementation of RQANI in IAIN Ternate, STKIP KIE Raha Ternate, UIN Alauddin Makassar was 89,37 and categorized very good. Syntax or learning stages are the basic steps that must be taken in implementing a learning model (Fuad et al., 2017; Purwanto et al., 2020).

In this study, the reading stage for learning biology was conducted at the beginning of the session with the goal of providing students with an early comprehension of the lecture topic. As a learning resource, the lecturer created and distributed a textbook containing information about the digestive system. This is to ensure that the learning needs identified during the preliminary inquiry stage are met. After using the RQANI learning approach in the classroom, it was seen that students gained confidence in disputing and participating actively in elaboration and integration tasks. At this stage, each student is given the opportunity to read the material before entering the classroom, so the students can build initial knowledge that is useful for asking questions, answering questions, providing arguments and doing a discussion. This stage helps students gain understanding of a text by analyzing and interpreting it so that their learning autonomy can gradually increase. Student's initial knowledge is significantly influenced by experience in reading materials that are going to be studied or discussed in the classroom (Hikmawati & Taufik, 2017). In addition to improving student's cognitive ability, the development of reading interest also leads to the development of positive behavior towards the environment.

After instructing students to study the textbook on the digestive system of food, the lecturer instructed them to practice writing questions on the Student Worksheet (LKM). Individual questions are ordered in a methodical manner, beginning with the simplest and progressing to the most complicated. *Questioning* in RQANI has the potential to stimulate students to formulate quality questions. At this stage, students are accustomed to asking questions that encourage reasoning skills and higher-order thinking skills. All students are required to be able and courageous to ask questions. The questions asked can activate their previous knowledge, focus their learning efforts and help them examine their knowledge. The act of arranging questions will focus students' attention on the learning content, main ideas, and help them evaluate whether they have understood the material being studied. Continuous practice can build students' positive self-concept towards their potential. This positive self-concept will help the students to become more independent learners who have high self-efficacy.

After compiling the questions, the lecturer allowed students to respond to the prepared questions. If they were having difficulty answering the question, they could consult a nearby friend to discuss possible proper responses. Answering in RQANI stimulates students' ability to answer questions effectively and efficiently. This phase can improve students' self-efficacy or self-confidence in opinions or arguments that are born from their respective learning experiences. They are trained to have the courage to answer questions both from peers and from the lecturer appropriately. This stage can also improve students' learning outcomes. Low academic self-efficacy will appear in situations that suppress students' emotional condition (Sudirman et al., 2020). It is vital to provide suitable learning settings to promote self-efficacy to develop career

orientation in students (Kotova et al., 2021; Sides & Cuevas, 2020) and produce more professional competences (Dos Santos, 2020; Dwiretno & Setyarsih, 2018; Setyaningsih & Sunaryo, 2021). Educators are also required to provide learning resources such as student activity sheets to aid promote thinking orientation (Suhirman et al., 2021).

The next stage in RQANI learning in biology learning assisted students in associating the concepts of the food digestive system material with occurrences that occur in everyday life. They studied the function of carbs, proteins, lipids, vitamins, minerals, water for daily body activity. They also explained probable ailments or digestive disorders that are typically observed on a regular basis. The students then wrote their conclusion of the activity on the Student Worksheet (LKM). Elaboration in RQANI provides an opportunity for students to work in groups to understand material that has been studied, have dialogue and discuss with their group members about difficult materials and solve everyday problems. This stage also trains students' cooperation and empathy skills so that they can improve their performance. Peer support can increase students' self-confidence and motivation, which in turn can increase self-efficacy. Students who initially have low self-concept and self-efficacy can be motivated through support and assistance provided by more capable/expert peers. Peer support can help these students improve their self-concept and learning patterns for the better. Social control and continuous evaluation also need to be done to continuously monitor changes in student behavior towards a positive direction (Sitorus et al., 2019). Collaboration is required in the design of learning to promote student motivation and self-confidence (Anwar et al., 2020).

The following stage is the integration of biology studies with the Qur'an and Hadith values. The students in this study discussed the concept of food intake in Islam, the process of food metabolism in the body, body detoxification through fasting, various causes of digestive disorders, preventative measures for disease/digestive disorders, and the relationship between health and tawakal and qonaah (gratitude). These students had been urged to install the Al-Quran application and its translation on their own mobile phones to assist with this stage. The students were then instructed to jot down Qur'anic verses and their associated interpretations on the accompanying Student Worksheet (LKM). This activity was carried out in groups. *Integration* in RQANI provides an opportunity for students to discuss with their peers about how to integrate biology concepts and the holy verses of the Al-Quran and Al-Hadith. Through the integration of learning with the holy verses of Al-Quran and Al-Hadith, this phase teaches students that every concept in Biology is contextually related to everyday life. The following is an illustration of the integration results obtained by one of the groups in biology education that used the RQANI model.

"Biology is a branch of science that studies organisms, life and the environment around them. Al-Qur'an and Al-Hadith contain a complete and perfect system that covers all aspects of human life, including scientific activities or scientific investigations. One of the physiology that occurs in the body is the food process. Allah SWT makes it easy for humans to obtain energy intake from food they eat, whereas plants carry out the photosynthesis process. Meanwhile, herbivorous animals obtain energy by consuming

plants, carnivorous animals obtain energy by consuming meat and omnivorous animals consume plants and animals to survive. In the Al-Qur'an, humans have been instructed to choose good food (Q.S Al-Baqarah verse 168, Q.S Yunus verse 59, Q.S Luqman verse 20, Q.S Al-Maidah verse 5; H.R Ahmad). The integration of biology learning with Islamic values can increase gratitude for all of Allah's creation. Biology learning is essentially a bridge to religious truth. It supports the understanding of the Al-Quran verses, especially those related to the greatness of Allah SWT that exist in nature and in living creatures, including humans (Ridwan, Adnan, & Bahri, 2018)."

CONCLUSION

The development of a learning model through the Plomp procedures conducted in this study resulted in a new learning model called RQANI (Reading, Questioning, Answering and Integration with Islamic Values). RQANI consists of five learning phases namely Reading, Questioning, Answering, Elaboration and Integration. The validity of the RQANI prototype was very high with an average value of 3.74. The RQANI learning model was considered fairly practical and effective in improving student's learning outcomes and positive responses. As a result, the RQANI model has satisfied the validity, practicability, and effectiveness criteria for a high-quality learning model.

It is hoped that this study can provide a reference for lecturers of biology education and lecturers of other subjects to implement RQANI in the classroom as an effort to improve the quality of the integrated science-Islamic values. The results of this study can also provide insights for teachers in SMP/MTs and SMA /MA about the effectiveness of the RQANI learning model in improving the quality of learning and in creating a learning atmosphere that is more conducive, innovative and integrative.

Despite the significance of the findings, we acknowledge a limitation to the study. The tryout conducted at the Test, Evaluation and Revision phase was only limited to four-meeting lessons due to the Covid-19 outbreak. Therefore, future studies may need to involve a quasi experimental design to examine the effect of RQANI on science process skills, critical thinking skills, metacognitive skills, argumentation skills, communication skills and scientific literacy skills of students with different academic abilities, different gender and different ethnic backgrounds.

The development of the RQANI model has the potential to significantly improve the quality of science education, particularly in biology, by incorporating Islamic principles. This form of education can assist students in merging the relationship between what they have learned and what they already know from daily experience, as well as their integration with Islamic principles. This can have a good effect on students' character development and self-efficacy, as well as their active participation in school activities. Students who pass on positive beliefs about the ability to investigate, elaborate, integrate, reflect, and condition spiritually can benefit from this. All of these abilities can be developed into life skills for learners as they prepare to tackle the challenges of learning in a globalized, comprehensive digital era.

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