

Prospective Biology Teachers' View towards Theory of Evolution: A Case Study at Islamic University in Indonesia

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Abstract

This study was to investigate prospective biology teachers' views towards the theory of evolution at Islamic university. This study was concerned to investigate the quality of the instruments, the profile of literacy, attitudes, and religiosity of PBTs-IU, and the relationship between literacy and attitude towards the theory of evolution with religiosity. An explanatory mixed method was conducted by using a quantitative survey and in-depth interviews. A total of 153 (16 males and 137 females) from 185 prospective biology teachers at Islamic University (PBTs-IU) participated in filling out the questionnaire. Confirmatory factor analysis and Cronbach's alpha tests have been conducted to examine the quality of the instrument. PBTs-IU profiles were analyzed by descriptive statistical test, and a correlation test was used to determine the relationship between variables. Furthermore, triangulation was chosen to analyze the results of the interviews. The results of this study showed that the instruments used are valid and reliable, the profile of literacy, attitudes, and religiosity of PBTs-IU was high level, and there was a positive and significant relationship at the 0.01 and 0.05 levels between literacy and religiosity and attitudes and religiosity. These findings concluded that PBTs-IU have good knowledge of the theory of evolution, and PBTs-IU also have strong religious beliefs.

INTRODUCTION

The debate between science and Islam (Loo, 2001; Mansour, 2010, 2011) continues, including the debate on the theory of evolution. Over the last few decades, the debate has been improved by a growing number of thought contributions by Muslim scholars. Muslim authors such al-Faruqi, Nasr, Golshani, and Guessoum, who debated the interaction of Islam and science based on Stenmark's multidimensional model for religion and science (Bigliardi, 2014). These interactions tend to be related or interconnected or

interrelated between science, religion, and education.

The inter-relationship of science and religion in learning becomes an interesting topic, especially issues about the inter-relationship of science and religion on the theory of evolution in biology classes. To reveal the inter-relationship of science, religion, and education, several previous authors have used changes in theory and facts from various responses and acceptances of the theory of evolution (Barnes et al., 2017, 2019, 2021; Smith, 2010). These inter-relationships have also been revealed from data on increasing

understanding of the evolutionary learning approach (Yasri & Mancy, 2014). There is also an inter-relationship mapped from the typology of science student involvement in viewing the concept of inter-relationship between science and religion (Hanley et al., 2014). Previous researchers have also conducted some studies on various issues related to the inter-relationship of science, religion, and education. For example, Billingsley et al. (Billingsley et al., 2020) have conducted research on developing a questionnaire to find out students' perceptions of science, religion, and the relationship between them on various topics in biology. The findings of this study indicate that students in this age group have begun to consider how science and religion relate and that despite a significant diversity of positions and proportions perceive science and religion to be contradictory. The diversity of positions and proportions is also thought to have occurred, and it was experienced by prospective biology teachers at Islamic University (PBTs-IU).

In Stenmark's theory, the interaction of religion and science is identified in four ways; (1) According to the irreconcilable model, science and religion cannot be reconciled remaining as they are: they make competitive claims over the same territory, meaning that only one of the two will ultimately prevail. (2) According to the reconciliation model, science and religion can coexist if combined. (3) According to the independence model, science and religion are compatible because they have never competed and have remained separate. (4) The replacement model states that science can develop into a new religion (4) The replacement model states that science can develop into a new religion (Bigliardi, 2014). Of course, these 4 models apply dynamically and are not the same from one place to another. Thus, Stenmark's theory needs to be proven and tested for acceptance by PBTs-IU.

Furthermore, Reiss (2009), and Stolberg (2009) cite the theoretical model of the relationship between science and religion developed by Barbour (1990). In this theory, the model of the relationship between science and religion categorizes divides in to four categories: conflict (science and religion contradict, only one is valid); independence (science and religion are different endeavors); dialogue (science and religion are linked

through the same questions and methodologies); and integration (both are assimilated to the extent that the study of nature reveals evidence of God or scientific developments can lead to the reformulation of faith beliefs). So, it is believed that integration is a form of inter-relation between science, religion, and education which is in a good position and can be accepted by many scientists and researchers.

Religiosity in science is closely related to the experience and involvement of religion in science learning. Research conducted by Huber & Huber (2012) explains that religiosity is closely related to intellectuality, ideology, public practice, private practice, and religious experience. Thus, these five aspects will be used in this inter-relational science and religion research on the theory of evolution. The statement about religiosity is supported by other relevant studies. For example, the involvement of religion in science learning has been studied through phenomena that arise from the basic concepts studied by students, such as the phenomenon of mutualism (Davison, 2020). The phenomenon of mutualism—the mutually beneficial cooperation between organisms of different species—has become an extraordinary new spotlight in the study of biology. For this reason, Davison (2020) also wrote an article on biological mutualism: a scientific survey, theology, and science. The article explains that there is a theological involvement (science-religion inter-relation) with biological mutualism. The concept of theological involvement also needs to be proven by surveying Islamic religious college science students who have also studied the concepts of biology and theology.

Previous studies have shown that the use of several aspects to determine the inter-relation of science and religion and the theory of evolution in the learning process in universities. These studies have been conducted and reported by previous researchers (Downie & Barron, 2000; Hawley et al., 2011; Nadelson & Southerland, 2012; Rutledge & Warden, 1999). For example, Hawley et al. (2011) conducted research on the development and confirmation of the evolutionary attitudes and literacy survey (EALS). This study used 16 constructs with 104 statements on a scale of 1 – 7 which could be chosen by 371 respondents from a university.

The data that has been obtained were analyzed by CFA with Hierarchical Structural Equation Modeling (SEM). In this study, only 3 of the 17 constructs used by Hawley et al. (2011) were taken. The three constructs relate to literacy in the theory of evolution: evolutionary evolution, evolutionary misconceptions, and knowledge about scientific enterprise. Then, Downie & Barron (2000) conducted research on the attitudes of Scottish first-year biology and medical students to the teaching of evolutionary biology. The study used a survey instrument on acceptors and rejectors of the students at varying levels at the University of Glasgow. In this research, the emphasis is on 3 reasons for rejecting: the evidence for evolution is full conflict, acceptability is the literal truth of religious creation and there are good alternatives to evolution. There are also 3 reasons for accepting evolution: the evidence for evolution is clear, they know the evidence from the teachers and there are good alternatives to evolution.

The study of preservice or prospective biology teachers can improve their skill, achievement, or knowledge about content of biology. Such as the study about guided-inquiry laboratory impact on increase in research skills of prospective biology teachers (Maknun et al., 2022), study about the decision-making style regarding the socio-scientific issue (SSI) of pre-service biology teachers in four regions of Indonesia (Genisa et al., 2021). A survey and exploratory study were conducted to analyze Lake Tempe as a resource for contextual learning (Yani et al., 2021). Next, the study about the visual images of pre-service teachers who take biology courses in undergraduate education about biology by analyzing their drawings (Kızılay & Hamalosmanoğlu, 2019) However, as same with this condition, this study showed that the research has conducted was explores the preservice or and prospective biology teachers in various content of biology.

In the last decade, integrative learning has become a feature of learning at Islamic universities at the Ministry of Religion of the Republic of Indonesia. The issue of scientific integration based on transformative learning is an important part of the development of Islamic Religious Colleges (Kementerian Agama RI, 2019). The learning about evolution was found in the curriculum and applied in biology classes

at Islamic universities in Indonesia, including evolutionary learning at UIN Batusangkar. In evolutionary learning, the learning outcomes of graduates are devoted to God Almighty and able to demonstrate a religious attitude by mastering concepts in evolution. The provision of material that is theological in "nature colors" is the development of the theory of evolution in the learning process, this process is called integration.

The integration of science and religion in the curriculum at Islamic universities in Indonesia was entering a complex implementation phase (Ali, 2020), including biology classes. Theological involvement in the delivery of learning materials by lecturers and the acceptance of these materials by students have varied responses, especially to controversial biological concepts such as evolution and the origin of human life (Davison, 2020). For example, there are various responses and positions of students when studying the theory of evolution, and this position relates to the relationship between science and religion (Yasri & Mancy, 2014). The research suggests that knowing the position of students in the relationship between science and religion will determine the approach and learning methods used in the learning process. These explanations show how important it is to conduct the study about the inter-relationship of science and religion on the theory of evolution involving PBTs-IU.

Based on the previous explanations, the prospective biology teachers' view towards the theory of evolution at Islamic university was developed by the concept of the inter-relationship of science and religion on the theory of evolution. It is necessary to conduct the study about prospective biology teachers' views towards the theory of evolution with concern about the literacy, attitudes, and religiosity of the PBTs-IU towards the theory of evolution. To employ this study, the aims was to investigate (a) the quality of the instruments, (b) the profile of literacy, attitudes, and religiosity of PBTs-IU, and (c) the relationship between literacy and attitude towards the theory of evolution with religiosity.

METHOD

Research Design

This study employed a mixed-method method with an explanatory sequential design (Creswell & Creswell, 2018). The reason for choosing this design is that this study will be more complete after quantitative findings are followed by qualitative findings. Guidelines for conducting quantitative research based on the following questions: (a) What is the CFA score to determine the quality of the instrument of literacy, attitudes, and religiosity? (b) What is the profile of literacy, attitude, and religiosity of PBTs-IU towards the theory of evolution? (c) What is the relationship between literacy and attitude towards the theory of evolution with religiosity?

To complete and ensure the data has been collected quantitatively, this study needs to conduct qualitative research on religiosity. Because religiosity is an abstract behavior, it is

necessary to conduct interviews. Guidelines for conducting quantitative research based on the following questions: What is the profile religiosity of PBTs-IU towards the theory of evolution?

Participants

In the quantitative phase, data were obtained from a descriptive survey of 185 PBTs-IU from the Department of Biology Education UIN Mahmud Yunus Batusangkar, West Sumatra Indonesia. Only 153 PBTs-IU were willing to fill out the questionnaire. The PBTs-IU came from students' semesters 1st to 7th. PBTs-IU had an age of 18 to 22 years, with an average age of 21 years, with 16 male PBTs and 137 female PBTs. The complete data on the demographic participant characteristics are listed in Table 1.

Table 1. Demography Characteristics of The Participant

PBTs Demographic		PBTs Participants	
Grade / Semester	7 th	41 PBTs	26.8 %
	5 th	45 PBTs	29.41 %
	3 rd	37 PBTs	24.18 %
	1 st	30 PBTs	19.61 %
Gender	Male	16 PBTs	10.46 %
	Female	137 PBTs	89.54 %
Average Age		21 years	13.73 %
Grade Point Average (GPA)	A 3.51 – 4.00	45 PBTs	29.41 %
	B. 3.01 – 3.50	58 PBTs	37.91 %
	C. 2.76 - 3.00	34 PBTs	22.22 %
	D. 2.51 – 2.75	13 PBTs	8.497 %
	E. < 2.50	3 PBTs	1.961 %

Instrument

The survey instrument has been designed which contains 30 statement items or questions. These statements are collected in one questionnaire, consisting of measurement scales; strongly agree (4), agree (3), undecided (2), disagree (1), and strongly disagree (0). Aspect of literacy, with construct; evolutionary knowledge, evolutionary misconceptions, knowledge about the scientific enterprise (19

items); attitudes with constructs; rejectors and acceptors (6 items); and religiosity, with construct; intellectual, ideology, public practice, private practice, and religious experience (5 items). Based on these explanations, the characteristics used to determine the prospective biology teachers' view toward the theory of evolution at Islamic university were compiled and listed in Table 2.

Table 2. The Variable of Prospective Biology Teachers' View towards Theory Evolution

Variable	Indicators
Literacy	Evolutionary knowledge, evolutionary misconception, knowledge about the scientific enterprise (Hawley et al., 2011)
Attitudes	Rejectors and acceptors (Downie & Barron, 2000)
Religiosity	Intellectual, ideology, public practice, private practice, religious experience (Huber & Huber, 2012)

Data Collection and Analysis

In the quantitative phase, data has been collected by inviting PBTs-IU to fill out instrument from September 2021 to June 2022. Furthermore, the completed questionnaire was submitted by the PBTs-IU, and an analysis was carried out on the statement items.

Confirmatory factor analysis (CFA) test has been carried out to determine the quality of the instrument (Brown, 2006). The results of this test have shown the goodness of each statement item. The next aspect for CFA was also conducted such Chi Squared value of fit ($p > 0.05 / 0.01$), Degree of freedom (df), P Value, Root Mean Square Error of Approximation (RMSEA < 0.05). Cronbach's alpha test was carried out to determine the reliability of the instrument. Descriptive statistical tests have also been conducted to analyze the profile of literacy, attitudes, and religiosity of the PBTs-IU. Pearson correlation test was conducted to determine the relationship between variables. Quantitative data will be analyzed with SPSS version 26.

In the qualitative phase, data were obtained by conducting in-depth interviews with 5 males and 12 females from PBTs-IU. In-depth interviews have been conducted only on the religiosity aspect. PBTs-IU who were asked to become participants were PBTs-IU who were willing to be interviewed. The five constructs of religiosity: intellectual, ideological, public practice, private practice, and religious experience are also a grid of questions given to PBTs-IU when in-dept interviews are conducted. In-dept interviews were conducted to PBTs-IU separately from one respondent to another. The researcher keeps the participant data confidential. They are also welcome to resign if they feel uncomfortable with the questions and statements being asked. Triangulation was carried out to analyze the results of the PBTs-IU in-depth interviews.

Stages such as verification, display and conclusion describe the data that has been collected and obtained good information.

RESULT AND DISCUSSION

CFA for the Quality of The Instrument of Literacy, Attitudes and Religiosity

CFA for literacy: evolutionary knowledge

The results of the CFA test showed that the factor loading score is in the range 0.09 – 0.62 (see Figure 1.a and Table 4). Furthermore, the score from the CFA test also showed that this instrument has Chi Square = 19.67, df = 12, P-Value = 0.07367, RMSEA = 0.065 (Table 3). This finding showed that the instrument that has been used is valid. The results of the reliability test with Cronbach's alpha showed a score of 0.661 with N items = 7. This finding also showed that the instrument that has been used is reliable. Finally, it is written that the evolutionary knowledge instrument that has been used is valid and reliable.

CFA for literacy: evolutionary misconceptions

The results of the CFA test showed that the factor loading score is in the range of 0.24 – 0.80 (see Figure 1.b and Table 4). Furthermore, other CFA test scores show that this instrument has Chi Square = 6.08, df = 9, P-Value = 0.73139, RMSEA = 0.000 (Table 3). This finding showed that the instrument that has been used is valid. The results of the reliability test with Cronbach's alpha showed a score of 0.753 and N items = 6. This finding also showed that the instrument that has been used is reliable. Finally, it is written that the evolutionary misconceptions instrument that has been used is valid and reliable.

CFA for literacy: knowledge about the scientific enterprise

The results of the CFA test showed that the factor loading score is in the range of 0.27 – 0.74 (see Figure 1.c and Table 4). Furthermore, other CFA test scores show that this instrument has Chi Square = 6.22, df = 7, P-Value = 0.51462, RMSEA = 0.000 (Table 3). This

finding showed that the instrument that has been used is valid. The results of the reliability test with Cronbach's alpha showed a score of 0.697 and N items = 6. This finding also showed that the instrument that has been used is reliable. Finally, it is written that the knowledge about the scientific enterprise instrument that has been used is valid and reliable.

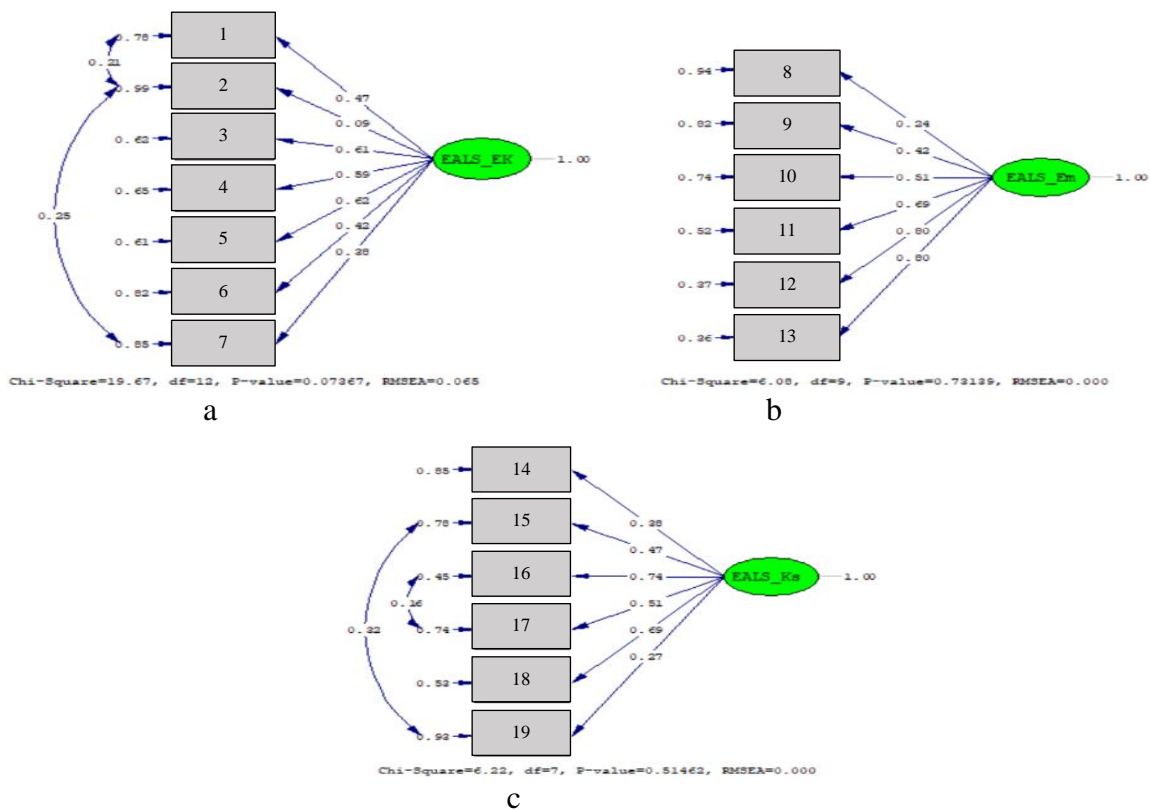


Figure 1. Confirmatory Factor Analysis for Literacy of the Theory of Evolution: a. Evolutionary Knowledge, b. Evolutionary Misconception and c. Knowledge about the Scientific Enterprise

CFA for attitude: acceptor/rejector

The results of the CFA test showed that the factor loading score is in the range of 0.56 – 0.79 (see Figure 2.a and Table 5). Furthermore, other CFA test scores showed that this instrument has Chi Square = 11.78, df = 7, P-Value = 0.10788, RMSEA = 0.067 (Table 3). This finding showed that the instrument that has

been used is valid. The results of the reliability test with Cronbach's alpha showed a score of 0.652 and N items = 6. This finding also showed that the instrument that has been used is reliable. Finally, it is written that the attitude instrument that has been used is valid and reliable.

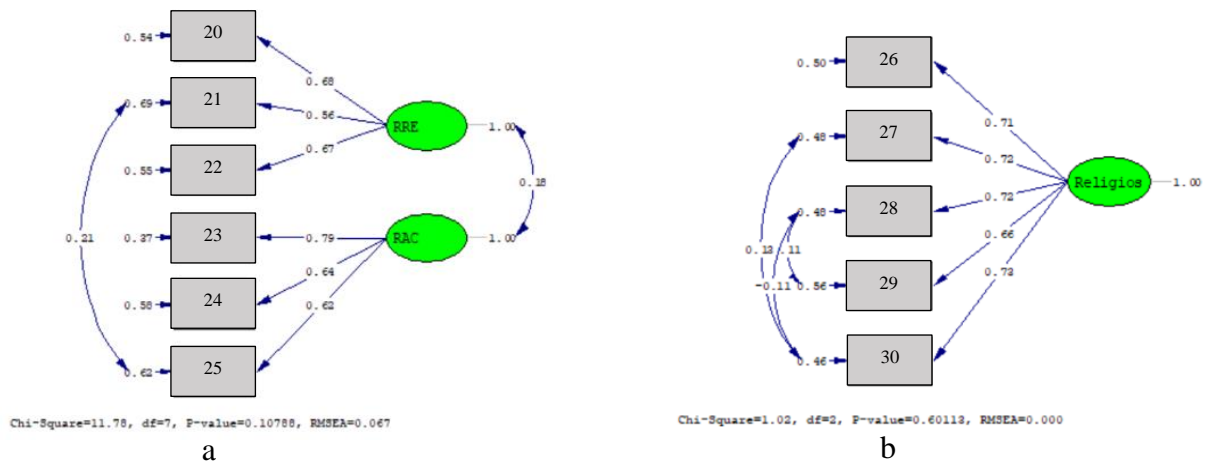


Figure 2. Confirmatory factor analysis for a. Attitude: Rejector and Acceptor. b. Religiosity

CFA for religiosity

The results of the CFA test showed that the factor loading score is in the range of 0.66 – 0.73 (see Figure 2.b and Table 6). Furthermore, other CFA test scores showed that this instrument has Chi Square = 1.02, df = 2, P-Value = 0.60112, RMSEA = 0.000 (Table 3). This finding showed that the instrument that has

been used is valid. The results of the reliability test with Cronbach's alpha showed a score of 0.841 and N items = 5. This finding also showed that the instrument that has been used is reliable. Finally, the religiosity instrument that has been used was valid and reliable.

Table 3. Summary of Score for CFA for Instrument

Variable	Aspect	N Item	Chi-Square	df	P-Value	RMSEA	Alpha Cronbach
Literacy	Evolutionary Knowledge	7	19,67	12	0,07367	0,065	0,661
	Evolutionary misconceptions	6	6,08	9	0,73139	0,000	0,735
	Knowledge about the scientific enterprise	6	6,22	7	0,51462	0,000	0,697
Attitude	Acceptor / Rejector	6	11,78	7	0,10788	0,067	0,652
Religiosity	Intellectual, ideological, public practice, private practice, and religious experience	5	1,02	2	0,60112	0,000	0,841

The Profile of Literacy, Attitude, and Religiosity of PBTs-IU towards Theory of Evolution

The profile of literacy

Literacy in the theory of evolution refers to 3 aspects, evolutionary knowledge, evolutionary misconception, and evolution about the scientific enterprise. Table 4 showed that the mean and standard deviation ($\chi \pm SD$) for each construct is 18.1046 ± 3.45490 ; 15.9804 ± 3.26761 ; and 14.8039 ± 3.61841 . In general, for the three constructs, the highest profile is found in each statement item. For example, 73.20%

for item reason "Mutations can be passed down to the next generation", 71.20% for item reason "Evolution means progression towards perfection" and 79.10 for item reason "Good theories give rise to testable predictions". A score of 4% - 28% is found in the low profile. In the moderate profile, many are at a score of 30% - 40%. These findings show that PBTs-IU has very good and good literacy of theory. These findings indicate that the material on the theory of evolution given during learning can be absorbed very well and well by PBTs-IU.

Table 4. The Profile of Literacy of PBTs-IU

Reason for Literacy	Factor Loading	The Profile of Literacy		
		High	Middle	Low
Evolutionary knowledge (Mean ± SD = 18,1046 ± 3,45490)				
In most populations, more offspring are born than can survive	0,47	100(65.36)	39(25.49)	14(9.15)
Individuals don't evolve, species do	0,09	69(45.10)	56(36.60)	28(18.30)
Mutations can be passed down to the next generation	0,61	112(73.20)	36(23.50)	5(3.27)
Increased genetic variability makes a population more resistant to extinction	0,59	104(68.00)	43(28.10)	6(3.92)
The more recently species share a common ancestor, the more closely related they are	0,62	89(58.00)	44(29.00)	20(13.00)
Natural selection is the only cause of evolution	0,42	109(71.20)	19(12.40)	25(16.30)
Mutations occur all the time	0,38	73(47.70)	60(39.20)	20(13.10)
Evolutionary misconceptions (Mean ± SD = 15,9804 ± 3,26761)				
Natural selection is a random process	0,24	96(62.70)	37(24.20)	20(13.10)
Natural selection is synonymous (means the same) as evolution	0,42	71(46.40)	54(35.30)	28(18.30)
Characteristics acquired during the lifetime of an organism are passed down to that individual's offspring.	0,51	100(65.40)	45(29.40)	8(5.23)
Species evolve to be perfectly adapted to their environments	0,69	100(71.90)	37(24.18)	6(3.93)
Evolution means progression toward perfection	0,80	109(71.20)	32(20.90)	12(7.84)
Evolution is a linear progression from primitive to advanced species	0,80	111(72.50)	31(20.30)	11(7.19)
Knowledge about the scientific enterprise (Mean ± SD = 14,8039 ± 3,61841)				
Good theories can be proven by a single experiment	0,38	90(58.82)	19(12.42)	44(28.76)
For scientific evidence to be deemed adequate, it must be reproducible by others	0,47	105(68.60)	32(20.9)	16(10.50)
Scientific ideas can be tested and supported by feelings and beliefs	0,74	82(53.60)	37(24.20)	34(22.20)
Scientific explanations can be supernatural	0,51	72(47.10)	47(30.70)	34(22.20)
Theories requiring more untested assumptions are generally better than theories with fewer assumptions.	0,69	74(48.40)	54(35.30)	25(16.30)
Good theories give rise to testable predictions	0,27	121(79.10)	28(18.30)	4(2.61)

The profile of attitude

Table 5 explained that the number of PBTs-IU who refused and accepted for each of the reasons given varied. For example, 65.35% of PBTs-IU voted highly because the theory of evolution causes conflict and is full of contradictions. And the three reasons for refusal are written down, PBTs-IU are more likely to meet high numbers. At the acceptor aspect, the findings that have been written in Table 5 show that the PBTs-IU are balanced between choosing high and middle levels.

The profile of religiosity

Table 6 showed the profile of religiosity PBTs-IU at a high level. The highest score was found at 90.20%, with the reason item "I often experience situations where I feel God's intervention in my life". The lowest score was found to be 0.65%, with the reason item "I often participate in religious activities in society".

Table 5. The Profile of Attitude PBTs-IU

Attitude: Reasons for Acceptor / Rejector	Factor Loading	The Profile of Attitude		
		High	Middle	Low
The evidence for evolution is full of conflicts and contradictions	0,68	100(65.36)	47(30.72)	6(3.92)
I accept the literal truth of a religious creation account that excludes evolution	0,56	77(50.33)	65(42.48)	11(7.19)
I think that there are good alternatives to evolution that explain the origin and distribution of species	0,67	82(53.59)	61(39.87)	10(6.53)
The evidence for evolution is clear and unambiguous	0,79	74(48.37)	53(34.64)	26(14.38)
I tend to accept what my teachers say: they know the evidence much better than I do	0,64	74(48.37)	57(37.25)	22(14.38)
I do not think there are any good alternatives to evolution that explain well the origin and distribution of species	0,62	60(39.22)	60(39.22)	33(21.57)

Table 6. The Profile of Religiosity PBTs-IU

Reason for Religiosity	Factor Loading	Profile of Religiosity		
		High	Middle	Low
I often think/study about religious topics	0,71	135(88.24)	15(9.80)	3(1.96)
I believe in the evidence of God's power	0,72	139(90.85)	11(7.19)	3(1.96)
I often participate in religious activities in society	0,72	131(85.62)	21(13.73)	1(0.65)
I often perform the obligatory and Sunnah prayers	0,66	133(86.93)	18(11.76)	2(1.31)
I often experience situations where I feel God's intervention in my life	0,73	138(90.20)	11(7.19)	4(2.61)

Relationship Literacy, Attitude, and Religiosity of PBTs-IU towards Theory of Evolution

The results showed that a positive and significant relationship at the 0.01 and 0.05 levels was only found between literacy and religiosity, and between attitudes and religiosity. For both, data from Table 7 showed that the score of Pearson's correlations has .237** and .174*. While the relationship between other variables was not found. The

results of the ordinal regression test showed that the literacy odds ratio score is 1.06, the estimate value is 0.055, the significance is 0.004 <0.05. This finding shows that literacy tends to increase religiosity by 1.06%. This finding is in line with previous findings, that the literacy aspect is related to the level of religiosity (Table 7).

Table 7. Relationship Literacy, Attitude and Religiosity

	N	Pearson Correlation	Sig. (2-tailed)
Literacy vs Religiosity	153	.237**	.003
Attitudes vs Religiosity	153	.174*	.031

** Correlation is significant at the 0.01 level (2-tailed) and * Correlation is significant at the 0.05 level (2-tailed)

The Profile of Religiosity

However, to completely the profile of religiosity, this study was conducted in depth interview. The finding on qualitative showed that corroborated and consistent with the results of in-depth interviews with PBTs-IU. Some excerpts from the transcripts of the interviews are listed in the following section.

The transcript of the interview about intellectuals has been written in the following section.

Question: Do you often study religious topics
Answer : Yes, I often study Islamic religious issues, whether implemented on campus or in the general community. For example, I participated in the tahsin and tahfiz programs from the campus religious laboratory. (Student MNS)

The interview transcript about ideology has been written in the following section.

Question: Do you believe that there is the power of God?

Answer : yes, I believe in that. The universe, the heavens and the earth and their contents are proofs of the power of Allah SWT (Student AS)

The interview transcript about public practice has been written in the following section.

Question: Do you often follow and actively participate in religious activities?

Answer : In particular, I deepen my religious knowledge in campus da'wah institutions.

The interview transcript about private practice has been written in the following section.

Question: Do you often perform the obligatory Sunnah prayers?

Answer : Inshaallah, my obligatory prayers are always on time. For Sunnah prayers, I only do the shalat sunat rawatib (Student DF)

The interview transcript about the religious experience has been written in the following section.

Question: Do you believe that God is always there in your every activity?

Answer : I often experience situations where I feel God's intervention in my life. For example, when I had difficulty getting money to pay for college. Allah SWT showed me the way to apply for scholarship assistance to Baznas. Alhamdulillah, I got a scholarship to pay my tuition. Now, I still receive the scholarship (Student MS)

The findings of this study showed that the factor loading scores shown in tables 1 and 2, and Tables 3, 4, 5, and 6 are greater than 0.1. This finding shows that the coefficient for CFA is satisfactory and meets the requirements if it exceeds a score of 0.1. Furthermore, Suhr (2018) stated that CFA is a description of the simplification of interrelated steps, and the number of constructs and structure factors to determine the content or meaning of these factors. The finding of this study also shows that Cronbach's alpha score which has been written in Table 3 is greater than 0.00. Regarding the use of Cronbach's alpha as a test of reliability (Taber, 2018) stated that (a) Cronbach's alpha is a statistic used by the

authors to show that tests and scales have been constructed or adapted for research projects, and (b) high alpha scores provide evidence which is limited from the reliability of the research instrument. Based on these explanations, it can be concluded that the literacy, attitude, and religiosity instruments that have been used in this study are valid and reliable and can be used for studies or to collect further data.

In this study, the research findings showed that a high-profile score indicates that PBTs-IU has good literacy and attitudes toward the theory of evolution. This result is based on the results of other studies that have been reported by previous researchers (Barnes et al., 2021; Glaze et al., 2015; Truong et al., 2018). The findings of these previous studies indicate that the material on the theory of evolution given during learning can be well received by PBTs-IU. As found by Sanders & Ngxola (2009) that evolution was an extremely controversial topic to teach, raising serious concerns for teachers in other countries. In line with this, the findings of Konemann et al. (2016) showed that there is evidence of attitude and the benefits of the approach presented are discussed in the context of previous studies that focus on the acceptance of the theory of evolution.

The research findings also showed that the religiosity profile of PBTs-IU is also high. This finding indicates that the intellectual, ideological, public practice, private practice, and religious experience of the PBTs-IU are at a good level. This finding is supported by the theory of religiosity written by Glock & Stark (1965). This theory explained that religiosity was the totality of the functions of the individual soul which includes beliefs, feelings, and behaviors that are realized consciously and seriously in the form of five dimensions, namely ideology, intellectual, ritual, experience, and consequential dimensions. The same opinion is also explained by El-Menouar (2014), using the concept of Glock and Stark to measure the dimensions of Muslim religiosity with five aspects of basic religiosity, main obligations, religious experience, religious knowledge, and orthopraxis.

Furthermore, these findings are also supported by subsequent findings, namely that there is a positive and significant relationship between literacy and religiosity, and attitudes

and religiosity. At this aspect, this finding is also in line with Ayala's opinion, which explains that the theory of evolution by natural selection is Darwin's gift to religion, in addition to its centrality in biology (Ayala, 2009). Although considered a creationism topic, as described by Basel et al. (2014), but the findings of this study show that the arguments raised in the questionnaire were responded to highly and favorably by PBTs-IU.

In line with this, the results of research on Muslim Indonesian biology teachers' perceptions of teaching the theory of evolution reported by Rachmatullah et al. (2022) showed that teachers might use multiple border-crossing approaches to help them teach evolution. This is supposed to avoid conflicts of thought between students and teachers, or fellow students. However, the findings of this study indicate that the teacher's fear of conflicting thoughts in learning does not occur. Learning tends to go well and harmoniously. These findings indicate that there is an attitude of openness and tolerance towards scientific developments that characterize the PBTs-IU.

At implementation, the results of this study prove the theories related to the inter-relation of religious science and learning. For example, Stenmark's theory of the reconciliatory interrelationship of science, religion, and education, that is, science and religion can coexist when combined (Bigliardi, 2014), dialogue and integration (Barbour et al., 1990), and even the theory of integration proposed by educational thinkers' Islamic religious education in Indonesia such as theanthropocentric-integralistic (Abdullah, 2006), *tarbiyah ulul albab* (Suprayogo, 2012) and global Muslim society (Azra, 2015).

The findings of this study are also full of evidence that integrative learning at Islamic universities in Indonesia leads to the formation of a new scientific paradigm that is tolerant and harmonious. These findings show that integration is more chosen and used and has been able to reveal the relationship between science, religion, and education, especially used in learning at Islamic universities in Indonesia. Building science with this new paradigm may be theanthropocentric-integralistic in nature, *tarbiyah ulul albab*, and global Muslim society have been combined with the application of integrated curricula theory (Drake & Burns,

2004; Fogarty & Pete, M, 2009). It should be, it is necessary to conduct more intensive research on the use of inter-relationships between science, religion, and education that uses an integration pattern in the learning process (Haviz et al., 2018, 2020). Finally, it is necessary to prove with related and relevant studies that are more and more comprehensive to further show that integrative learning at Islamic Universities in Indonesia has led to the formation of a new scientific paradigm that is tolerant and harmonious.

CONCLUSION

The study about the prospective biology teachers' view towards the theory of evolution at Islamic university at quantitative provides conclusions were (a) The instrument of literacy, attitude, and religiosity is valid and reliable after conducting the test of CFA and Cronbach Alpha; (b) The profile of literacy and attitude of PBTs-IU towards the theory of evolution was at a high level; (c) There is a positive and significant relationship at the level of 0.01 and 0.05 between literacy and religiosity and attitudes and religiosity. The result of qualitative showed that the profile of religiosity PBTs-IU towards the theory of evolution also was at a high level.

The findings of this study also showed evidence that integrative learning at Islamic universities in Indonesia leads to the formation of a new scientific paradigm that is tolerant and harmonious. This statement needs to be proven with more and more comprehensive related and relevant studies, especially on the aspect of how the inter-relationship influences science, religion, and education in the learning process. For example, more specific learning outcomes, how to master 21st-century skills such as critical thinking, problem-solving, creativity, and metacognition with inter-relational learning based on science, religion, and education.

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