

Scientific Attitude of Pre-Service Islamic Teachers: Gender and Grade Level Differences

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Submission date: 05-Apr-2022 10:56AM (UTC+0800)

Submission ID: 1802030640

File name: Article_Cina_April_2022_Mr_Adi_Fadli_Mr._Subhan_Achim.docx (69.14K)

Word count: 6626

Character count: 39607

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Abstract:

This research explores the level of scientific attitude of pre-service teachers and investigates the correlation between gender and grades on scientific attitude. There were 200 pre-service Islamic teachers (70 males, 130 females) as the samples at State Islamic University of Mataram, Indonesia, taken using clusters random sampling techniques. The research design employed was a mix method through correlational method and semi-structured interview. Then the data were collected using the interview guidelines and the scientific attitude questionnaire. The results show that there is significant difference in scientific attitude based on gender in favor of females and there are also significant differences in scientific attitude among the pre-service teachers based on their grades in favor of sophomores. Significant difference is shown in the sensitivity to the environment dimension in terms of grades. In addition, there is no significant correlation between gender and grades in scientific attitude. However, there are positive and significant correlations among the dimensions. Therefore, it is recommended that lecturers develop positive attitude through problem-oriented and collaborative learning environment.

Keywords: exploring, opinions, scientific attitude, gender, grade levels, pre-service Islamic teachers

INTRODUCTION

In reference to the demands of 21st century learning, learning does not only prioritize cognitive aspect, but also develops scientific attitude and skills. Development of cognitive ability, attitude, and skills of students will result in individuals who are ready to face complex problems in the era of globalization. These efforts are able to hamper the emergence of moral and spiritual crisis which has an impact on the occurrence of multidimensional crisis (Asmani, 2012; Luvat, Dally, Clement, & Toomey, 2011; Asrori, 2013). However, based on the results of previous research, they showed that current learning tended to improve cognitive aspect. On the other hand, the development of scientific attitude and the formation of character and social skills in science learning (Cheung, 2007; Hofstein, Ben-Zvi, Samuel, & Tamir, 1977; Wahyudiati, 2010; Ismiani, Syukri, & Wahyudiati, 2017; Shinta, & Khumaedi, 2015), as well as social science, especially Islamic studies (Ibrahim, Hassan, & Hashim, 2016; Al-Attas, 1979) were ignored.

Scientific attitude is very important for students because it can develop critical thinking and is for dealing with everyday problems. Through the development of scientific attitude, graduate students are not only intellectually intelligent, but also emotionally, morally, and spiritually intelligent. According to Lawson (1982), scientific attitude is absolutely necessary to bring a more balanced perspective in dealing with conflict and social problems to lead to a better world change. In addition, the cultivation of scientific attitude as one of the affective aspects can improve the ability of students to understand teaching materials in order to gain knowledge, and even to improve the quality of their thinking (Olasahinde, & Olatoye, 2014; Sharma, 2007; Suciati, 2007). However, the problem faced by students is that teachers only emphasize the understanding of concepts to be recorded and linked in daily life without developing

scientific attitude (Ismiani, Syukri, & Wahyudiati, 2017, Cheung, 2007; Ebenezer, & Zoller, 1993; Zeidan, & Jayosi, 2015). This shows that the educators have responsibility to develop scientific attitude, both at the primary, secondary and tertiary levels.

Attitude is defined as a psychological tendency to learn positively or negatively and as emotional feeling, which is shown through the level of kindness or displeasure towards concepts, people or conditions (Oskamp, & Schultz, 2005, Zeidan, & Zayosi, 2015, Eagly, & Chaiken, 2005). Psychologically, attitude is an internal condition of an individual that can be concluded through observations or responses given (Krosnick, Judd, & Wittenbrink, 2005; Eagly, & Chaiken, 1998). Therefore, attitude is not behavior but tendency in acting and ways of responding to certain objects, and it is related to mental processes (Eagly, & Chaiken, 2005). In fact, attitude is an expression that arises from human needs and reflects one's intellectual processes (Wheeler, Goodale, & Deese, 1974). Therefore, scientific attitude is an important aspect that must be developed in the learning process to print ready individuals face global challenges.

Scientific attitude refers to the behavioral trait expected from individuals including honesty, awareness, responsibility, and critical thinking (Hamilton, & Swartzel, 2007; Mei, Kaling, Xinyi, Sing, & Khoo, 2007). The scientific attitude dimensions are rationality, curiosity, open-mindedness, honesty, objectivity, tolerance, respect for other people's views, creativity and invention, collaborating with others, critical thinking, and caring towards the environment (Harlen, 1999). The components of scientific attitude must absolutely be developed from the level of basic education to the level of higher education. Moreover, developing a positive attitude towards science or scientific attitude is one of the goals of higher education (Thomas, Koballa, & Crawley, 1985).

The development of scientific attitude in higher education must absolutely be done in order to create young generation who is not only intellectually intelligent, but also emotionally, socially, morally, and spiritually intelligent. This is in line with the demands of the KKNI or the Indonesian National Qualifications Framework curriculum, namely the graduate competency standard for the minimum criteria for qualification of graduates of Bachelor's Degree include three aspects: attitude, knowledge, and general and special skills (Minister of Education and Culture of the Republic of Indonesia Number 49 of 2014). However, empirical studies in Indonesia show that scientific aspects and skills are only the accompanying effects of learning processes and results, by merely emphasizing the mastery of cognitive aspect in each of the lessons learned, both in the field of science (Mukhtar, 2017; Nurhayati, & Subroto, 2012; Irwanto, Saputro, Rohaeti, & Prodjosantoso, 2018a; Wahyudiati, 2017; Nurhayati, 2009) and in the field of Islamic studies (Asrori 2013; Sadia, 2013; Lonto, 2016; Aziz, 2011). Based on these empirical studies, it was revealed that these conditions were caused by more teacher-centered learning practices and a lack of application of scientific methods in the learning process. This has become a very urgent problem to find an alternative solution to influence the scientific attitude of Islamic studies students.

Numerous previous literature studies have proven the existence of a positive relationship between increasing scientific attitude and student learning outcomes, as well as the existence of differences in scientific attitude in terms of aspects of gender and grades. Prior research by Cheung (2007), George (2006), Zeidan and Jayosi (2015), and Hacieminoglu (2015) showed that there were differences in scientific attitude based on gender and grades. Interestingly however, gender was the most significant factor in influencing scientific attitude (Jones, Howe, & Rua, 2000; Oakes, 1990; Cheung, 2007). Furthermore, male students had more positive attitude towards women (Jones, Howe, & Rua 2000; Hacieminoglu, 2015; Piburn & Baker, 1993; Greenfield, 1996). However, there were different findings showing no differences in scientific attitude based on gender (Dhindsa, & Chung, 2003; Miller, Lietz, & Kotte, 2002).

In addition to gender and grades, there are other factors that influence scientific attitude namely learning environment and learning approach. This condition is proven by Simpson and Oliver (1990), Fraser (1978), and Adridge (2003), suggesting that the class environment has a positive correlation with attitude. This means that the monotonous learning process and the lack of activating students in constructing their own understanding will result in negative attitude of students towards scientific procedure, especially students in the field of Islamic studies. The negative attitude as a result of lack of habituation in conducting scientific procedure in the learning process. The condition is particularly relevant to the research that has been done by Ajidagba (2004) who conducted a study concerning the students in the field of Islamic studies and found that positive and negative attitudes shown in the learning process affected the student learning achievement. Furthermore, Schibeci and Riley (1986) point out that attitude influences achievement, rather than achievement influences attitude. Students with positive attitude tend to have higher scores on achievement measures (Weinburgh, 1995). However, in review of previous studies, the measurement of scientific attitude on Islamic studies students in Islamic higher education is very limited, even get paid less attention by researchers because they might only focus on students of science and technology.

The researcher, thus, strongly believe that this research provides a very important contribution to the factual condition of the scientific attitude of Islamic studies students. In addition, it provides benefits for mapping student performance before planning and improving scientific attitudes as a bridge to linking teaching and research in higher education. It is also expected that when students are assisted to improve their scientific attitude, they can lead to improving the quality of graduates, as well as improving the quality of education programs at tertiary level. Therefore, it is very urgent to conduct research related to the scientific attitude of Islamic studies students for the purpose of balancing information of scientific attitude research from both Islamic studies and science studies. The purpose of this study is to: 1) know the level of scientific attitude of the pre-service Islamic teachers in terms of gender and grades, 2) know the typical scientific attitude of the pre-service Islamic teachers, and 3) know whether there is a relationship between gender and grades of the pre-service Islamic teachers on scientific attitude.

Research Questions

The proposed research questions are:

1. What is the level of scientific attitude of the pre-service Islamic teachers based on gender and grades?
2. What is the typical scientific attitude of the pre-service Islamic teachers?
3. Is there a correlation between gender and grades towards the scientific attitude of the pre-service Islamic teachers?

Research Hypothesis

To guide the implementation and analysis of research data in answering the research problem, the hypothesis of this research is that there is a correlation between gender and grades on scientific attitude of the pre-service Islamic teachers. The null hypotheses are:

1. There is no correlation between gender and scientific attitude of the pre-service Islamic teachers.
2. There is no correlation between grades and scientific attitude of the pre-service Islamic teachers.

METHOD

Research Design

The research design was the mix method research design (Creswell, 2009; Iyankova, Creswell, & Stik, 2006). In the first stage of the research design was the correlational descriptive survey method. The reason for choosing a correlational design in the research was because it was very suitable to measure the pattern

of relationships between research variables, and this design was able to measure the relationship between two or more variables (Stangor, 2004; Adegboyega, 2018). In addition, survey method could describe, compare, analyze and interpret the situation of research objects both in the situation of individuals, institutions, and groups (Cohen, Manion, & Morrison, 2007). In the second stage, interview was conducted to strengthen and deepen the previous survey results data, thus the level of accuracy of the research data became stronger.

Samples

The samples were 171 students who were the pre-service Islamic teachers at Islamic State University of Mataram in 2018/2019 academic year consisting of semester 1 students or freshmen (26.90%), semester 3 students or sophomores (33.92%), and semester 5 students or juniors (39.18 %) as shown in table 1. The sampling technique applied was cluster random sampling (Fowler, 2002), whilst a snowball random sampling technique was used for the interview phase (Creswell, 2009).

Table 1
Demographic Characteristics of the Samples

Grade Level	Female	Male	Total
Freshmen	33	13	46
Sophomores	39	19	58
Juniors	42	25	67
Total	114	57	171

Data Collection Instrument

The instrument of this research was a scientific attitude questionnaire compiled by the researcher by synthesizing the scientific attitude indicators. This referred to the scientific attitude indicators that have been developed by Harlen (1999). Thus, there were 8 scientific attitude indicators synthesized consisting of curiosity, critical reflection, open-mindedness, perseverance, collaboration, responsibility, appreciative, and sensitivity to the environment. These 8 indicators were then developed into 50 statements. The statement categories were in the forms of positive and negative statements and referred to the Likert scale (5 scales). Before the instrument was used for retrieval of the research data, it was first validated by the instructional experts and senior lecturers from 2 universities namely Islamic State University of Mataram and IKIP (Institute of Teachers Training and Education) of Mataram. Furthermore, the questionnaire instrument was validated and tested empirically, as well as tested its reliability level. Cronbach's alpha coefficient from the scientific attitude instrument was $\alpha = .83$. The reliability of the coefficient of the test was above the acceptance limit, namely .70 (Hair, Black, Babin, & Anderson, 2010), therefore the instrument was considered reliable.

Data Collection and Data Analysis

Collecting research data was done using sequential mixed methods (Teddlie, & Tashakkori, 2009). This was done through the provision of scientific attitude questionnaire and followed by data collection through interviews. In specific, data collection in Phase 1 was conducted by filling out the questionnaire by the pre-service Islamic teachers, who were students in semester 1, 3, and 5. Furthermore, Phase 2 was carried out through interview with the samples who were chosen through the purposive sampling. Determination of the samples for the interview was on the basis of the students' scientific attitude scores taken from 3 categories, namely low, medium, and high.

The research data analysis was divided into two phases, and thus two types of data were obtained, namely quantitative data obtained from the questionnaire results and the qualitative data obtained from the interview. The quantitative data were analyzed using parametric statistics, namely inferential descriptive, since the data fulfilled the homogeneous criteria with a p value of .57 (Bernard, 2000; Green, & Salkind,

2008) to see the data characteristics including mean, standard of deviation, and percentage technique. Furthermore, the data were analyzed using regression analysis to see the causal relationship between the variables. After that, One-way ANOVA was conducted to identify whether there were significant differences between the average scores obtained by more than two independent groups. Pearson Correlation was then used to calculate the significance of the correlation between scientific attitude from gender and grades. In the mean time, analyzing the data gained from the interviews was implemented through qualitative descriptive technique to strengthen results of the quantitative data analysis which were previously obtained.

FINDINGS

Research Question 1: *What is the level of scientific attitude of the pre-service Islamic teachers based on gender and grades?*

The results of this research indicate that in general the levels of scientific attitude of the pre-service Islamic teachers by gender are different. The results of data analysis (Table 2) obtain a higher average score of the females' scientific attitude ($M = 4.015$, $SD = 0.302$) compared to the male one ($M = 3.99$, $SD = 0.319$), though the difference is not significant based on the dimensions (Table 3). The t test results show that the p value of each dimension > 0.05 which indicates that there is no difference in scientific attitude of the pre-service Islamic teachers based on gender.

Table 2
Descriptive statistics of scientific attitude of the pre-service teachers based on gender

Gender	N	Mean	SD
Male	57	3.999	0.319
Female	114	4.0148	0.302
Total	171		

Table 3
The results of the t-test for Equality of Means for each indicator based on gender

Indicator	No of Item	t	Sig. (2-tailed)
Curiosity	1-6	-0.321	.748
Critical Reflection	7-12	-0.374	.709
Open-mindedness	13-17	-1.229	.221
Perseverance	18-25	0.34	.973
Collaboration	26-31	-0.81	.936
Responsibility	32-39	-1.749	.082
Appreciative	40-45	1.817	.071
Sensitivity to the environment	46-50	0.157	.876
Overall		-0.314	.754

Meanwhile, the results of scientific attitude measurement based on grades show that the mean score of the sophomores' scientific attitude is higher than the freshmen and the juniors had (Table 4). Like wise, the dimensions of scientific attitude based on grades obtained $p > 0.05$ (Table 5). However, the sensitivity to the environment dimension show a significant difference by $0.038 < 0.05$.

Table 4
Descriptive statistics of scientific attitude of the pre-service teachers based on grades

Gender	N	Mean	SD
Freshmen	46	3.989	0.297
Sophomores	58	4.060	0.298
Juniors	67	3.980	0.321

Total	171	4.009	0.307
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Table 5
Significance of the scientific attitude indicator scores based on grades

Indicator	No of Item	F	Sig.
Curiosity	1-6	2.332	.100
Critical Reflection	7-12	0.189	.828
Open-mindedness	13-17	0.585	.558
Perseverance	18-25	0.042	.958
Collaboration	26-31	1,163	.315
Responsibility	32-39	0.752	.473
Appreciative	40-45	0.441	.644
Sensitivity to the environment	46-50	3.338	.038
Overall		1204	.303

Research Question 2: What is the typical scientific attitude of the pre-service Islamic teachers?

The answer of this research question is determined based on the mean score and standard of deviation from each dimension (Table 6). The results of data analysis show that the highest mean score obtained is responsibility (4.251) and open-mindedness (4.146), while the lowest mean score found is critical reflection (3.689). These indicate that the real condition of scientific attitude of the pre-service Islamic teachers is related to the specificity of the scientific attitude they have when compared to other major students. This means the typical scientific attitude that the pre-service Islamic teachers have is positive attitude towards responsibility and open-mindedness. However, they have negative tendency towards the aspect of critical reflection.

Table 6
The mean scores of scientific attitude indicators based on grades and gender

Indicator	No of items	Mean	SD
Curiosity (C)	1-6	3.946	0.392
Critical Reflection (CR)	7-12	3.689	0.409
Open-mindedness (OM)	13-17	4.146	0.440
Perseverance (P)	18-25	4.066	0.394
Collaboration (CO)	26-31	4.056	0.445
Responsibility (R)	32-39	4.251	0.416
Appreciative (A)	40-45	3.973	0.404
Sensitivity to the Environment (SE)	46-50	3.946	0.482

In addition, identifying the typical scientific attitude possessed by the pre-service Islamic teachers is not only based on the highest mean score, but also continued with Post Hoc test for each dimension based on the grades (Table 9). The results of data analysis show that 7 dimensions have significance values among grades with $p > 0.05$ (see Table 9), namely; curiosity, critical reflection, open-mindedness, perseverance, collaboration, responsibility, and appreciative. However for sensitivity to the environment dimension, the results show a significant difference between the freshmen and the sophomores ($0.047 < 0.05$).

Research Question 3: Is there a correlation between gender and grades on scientific attitude of the pre-service Islamic teachers?

Null Hypotheses:

1. There is no correlation between gender and scientific attitude of the pre-service Islamic teachers.
2. There is no correlation between grades and scientific attitude of the pre-service Islamic teachers.

To answer the formulation of the problem and the null hypothesis, the data were tested by measuring the value of the Pearson correlation between gender and grades. On the basis of the data analysis results, the value of r for the grades aspect obtained = -0.024; p = 0.759 (Table 7), meaning that there is no correlation between grades and scientific attitude. The same results are found for the gender aspect with a value of r = 0.027; p = 0.722, also show that there is no correlation between gender and scientific attitude. This means that the null hypotheses are accepted.

Table 7
The correlation between gender and grades on scientific attitude

Variable	N	Pearson Correlation	Sig.
Gender		0.024	0.754
Males	57		
Females	114		
Grades		-0.024	0.759
Freshmen	46		
Sophomores	58		
Juniors	67		
Total	171		

To obtain more comprehensive findings, Pearson correlation test was carried out among the dimensions of scientific attitude. Based on the statistical test results, the correlation coefficient of p value <0.05 (there is a significant correlation among each dimension). As shown in Table 8, for the dimension "curiosity/C" there is a positive and significant correlation with the dimension of critical reflection (r = 0.436; p = 0.000), open-mindedness (r = 0.423; p = 0.000). The further details are presented in Table 8.

Table 8
The Pearson correlation coefficient among scientific attitude indicators

Variable		C	CR	OM	D	CO	R	MR	SE
C	Pearson (r)		0.43	0.42	0.44	0.41	0.51	0.41	0.46
	Sig.		.000	.000	.000	.000	.000	.000	.000
CR	Pearson (r)	0.43		0.44	0.45	0.414	0.38	0.32	0.36
	Sig.	.000		.000	.000	.000	.000	.000	.000
OM	Pearson (r)	0.42	0.44		0.52	0.45	0.54	0.42	0.41
	Sig.	.000	.000		.000	.000	.000	.000	.000
P	Pearson (r)	0.44	0.45	0.52		0.59	0.70	0.451	0.45
	Sig.	.000	.000	.000		.000	.000	.000	.000
CO	Pearson (r)	0.41	0.41	0.45	0.59		0.52	0.44	0.36
	Sig.	.000	.000	.000	.000		.000	.000	.000
R	Pearson (r)	0.51	0.38	0.54	0.70	0.52		0.50	0.49
	Sig.	.000	.000	.000	.000	.000		.000	.000
A	Pearson (r)	0.41	0.32	0.42	0.51	0.44	0.50		0.48
	Sig.	.000	.000	.000	.000	.000	.000		.000
SE	Pearson (r)	0.46	0.36	0.41	0.45	0.36	0.49	0.48	
	Sig.	.000	.000	.000	.000	.000	.000	.000	

After the Pearson correlation test, a post hoc test was done for each dimension based on grades. The results of the analysis show that there are 7 dimensions having significance values among grades > 0.05 (Table 9). These seven dimensions are: curiosity, critical reflection, open-mindedness, perseverance, collaboration, responsibility, and appreciative. Meanwhile, for the sensitivity to the environment dimension between "freshmen" and "sophomores", the significant difference is 0.047 < 0.05.

Table 9
 Post Hoc Test of the scientific attitude indicators based on grades

Dependent Variables	Grades	Grades	Sig.
Curiosity	Freshmen	Sophomores Juniors	0.122 1.000
	Sophomores	Freshmen Juniors	0.122 0.362
	Juniors	Freshmen Sophomores	1,000 1,000
Critical Reflection	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 1.000
	Juniors	Freshmen Sophomores	1.000 1.000
Open-mindedness	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 0.844
	Juniors	Freshmen Sophomores	1.000 0.844
Perseverance	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 1.000
	Juniors	Freshmen Sophomores	1.000 1.000
Collaboration	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 0.467
	Juniors	Freshmen Sophomores	0.808 0.467
Responsibility	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 0.690
	Juniors	Freshmen Sophomores	1.000 0.690
Appreciative	Freshmen	Sophomores Juniors	1.000 1.000
	Sophomores	Freshmen Juniors	1.000 1.000
	Juniors	Freshmen Sophomores	1.000 1.000
Sensitivity to the environment	Freshmen	Sophomores Juniors	0.047 1.000
	Sophomores	Freshmen	0.047

Dependent Variables	Grades	Grades	Sig.
		Juniors	0.164
	Juniors	Freshmen	1.000
		Sophomores	0.164
Overall	Freshmen	Sophomores	0.715
		Juniors	1.000
	Sophomores	Freshmen	0.715
		Juniors	0.445
	Juniors	Freshmen	1.000
		Sophomores	0.445

DISCUSSION

The first research objective is to find out the level of scientific attitude of the pre-service Islamic teachers based on gender and grades. Based on the research findings, in general the scientific attitude of the females is higher than that of the males. Similarly, there is no difference found in the tendency of every dimension. This means there is no big difference in curiosity, critical reflection, open-mindedness, perseverance, collaboration, responsibility, appreciation, and sensitivity to the environment. These present research findings are supported by the results of previous studies by Zeidan and Jayosi (2015), Hacıeminoğlu (2015), and Jones, Howe and Rua (2000) who revealed that gender differences as a very influential factor on scientific attitude. Although there are various research findings about the tendency of positive scientific attitude between men and women. Several studies have shown that women had a more positive scientific attitude (Menis, 1989; Villafane, & Lewis; 2016). On the contrary, research conducted by Jones, Howe, and Rua (2000), and Hacıeminoğlu (2015) found out that male students had a more positive attitude. Besides, other studies also reported no differences in scientific attitude based on sex (Miller, Lietz, & Kotte, 2002; Dhindsa, & Chung, 2003). The tendency of females' scientific attitudes is higher than that of the males because they have a stronger commitment to solve problems scientifically. Furthermore, Wahyudiati (2016) also states that women have a more positive attitude and motivation tendency than men.

The levels of scientific attitude based on the grades in this study show some differences. The finding is in line with the results of Cheung (2007), George (2006), Zeidan and Jayosi (2015), and Hacıeminoğlu (2015) who proved the existence of scientific attitude differences based on grades. The results of this research also revealed that the sophomores' scientific attitude is higher than freshmen and juniors have. This phenomenon occurs because second-year students have carried out more problem-oriented problem-solving activities that makes them have better attitudes and experiences, though in general they have not shown satisfactory results. Moreover, the findings from the questionnaire have been strengthened by the results of interview such as a statement from Student M (sophomore) saying that "In the second year, the experiment are conducted more intense than the first year, for all the work skill courses in that year are demanded experiment as a requirement for accomplishing the courses. Meanwhile, in the first year proportion of work skill courses that require experiment activities is fewer than in the second year". Student W (freshman) further stated that "the intensity of experiment activities still needs to be improved again while problem-oriented learning methods are only applied to certain courses". On the other hand, the Student H (junior) pointed out that "the intensity of experiment activities in this grade decreases in the work skill courses because of focusing on only the courses that support the completion of thesis as a graduation requirement in the college". Therefore, according to Cheung (2009), a positive attitude towards scientific attitudes must be developed from the beginning of education in school and becomes the main task of the lecturers to instill scientific attitudes from the first year.

The next findings in this research is the typical scientific attitudes from the pre-service Islamic teachers. In this case, responsibility and open-mindedness get the highest position. Meanwhile, critical reflection is in the lowest position. The results of the questionnaire are also supported by the results of interview conducted. From the interview, several important findings are gained. First, according to L, "the low attitude of critical reflection is caused by the monotonous classroom learning environment and dominated by the lecture methods". The L statement is reinforced by R's opinion stating that "the lecture system applied to almost all courses tends to be teacher centered whilst the scientific methods are very rarely applied in the learning process". This condition has made the students become passive and are not accustomed to applying scientific methods in the process of understanding scientific concepts and skills, thus impact the low ability of scientific attitude. These findings are very relevant to various research results that show the fact that the learning environment greatly influence scientific attitudes (Aldigre, & Fraser, 2000; Puachaream, & Fisher, 2004; Shinta, & Khumaedi, 2015). In addition, Ismiani, Syukri, and Wahyudiati (2017) states that negative attitude held by students are caused by traditional learning and ignoring the application of constructivist approach in the learning process. Therefore, the learning environment must be designed to develop students' scientific attitude (Hacieminoglu, 2015).

The findings regarding the typical scientific attitude from the pre-service Islamic teachers explicate some interesting facts. First, only the aspect of sensitivity to the environment show significant differences based on grades, specifically between the grades "freshmen" and "sophomores". In the mean time, curiosity, critical reflection, open-mindedness, perseverance, collaboration, responsibility, and appreciative do not show any significant differences. These finding are in accordance with the results of previous studies by Zeidan and Jayosi (2015), and Hacieminoglu (2015) that there are differences in the scientific attitude of men and women based on their grades. However, there is a tendency for the decline in scientific attitude to higher grades (Cheung, 2007). In addition, the other factors such as teaching and motivational approach may affect the scientific attitude (Debacker & Nelson, 2000, Zhang, 2000). This factual condition is also strengthened by the statement from F (freshman), "In the learning process in the classroom, the lecturers only explain them selves in front of the class without any discussion activities so that I and my friends feel bored and not interested in attending the lecture". A1 (sophomore) further stated that "the application of the scientific methods in learning does experience an increase in the second year, but only in certain courses because the lecturers are very comfortable with the lecture methods that make our motivation in learning does not increase quite meaningfully". According to H (junior), "the application of learning methods and strategies is not much different when in the first, second, and third years, they are still dominated by lecture methods and lack of activation of students in the classroom so learning become unattractive and we are not motivated in understanding the concept taught by the lecturers."

The other results of this research answer the third research question and research hypothesis. The research findings show that there is no correlation between gender and grades on scientific attitude (null hypotheses are accepted). However, there is a significant correlation among the dimensions. For instance, the indicator of "curiosity / C" has a positive and significant correlation with the indicators of critical reflection, perseverance, collaboration, responsibility, appreciative, and sensitivity to the environment. In other words, the higher the curiosity one has, the higher are the critical thinking, responsibility, collaboration, open-mindedness, or other aspects of attitude. These findings are particularly relevant to the research that has been done by Cheung (2009), Zedan and Jayosi (2014) and Ismiani, Syukri, and Wahyudiati (2017) that declared that critical thinking, collaboration, curiosity, and open-mindedness affected the ability of scientific attitude. In addition, according to Ajidagba (2004), Xu, Villafane, and Lewis (2013), and Hacieminoglu, Yilmaz, and Ertepinar (2011), attitude is influenced by a number of factors including the characteristics of the concept, the attitude of the educator to the concept, and the learning methodology applied by educators. In line with this statement, the application of collaborative-based learning can improve critical thinking skills and student problem solving skills (Freedman, 1997, Wahyudiati, 2016, George, 2006; Irwanto, Rohaeti, & Prodjosantoso, 2018b). Therefore, further research is very important for the field of social science in measuring a more comprehensive scientific attitude

from the primary, secondary, and tertiary levels. Moreover, there is limitation of research on Islamic studies field since so far the investigation merely concerned the natural science field.

CONCLUSIONS AND SUGGESTIONS

Based on the findings, it can be concluded that: 1) there is significant difference in scientific attitude based on gender in favor of females, 2) there are significant differences in scientific attitude among the pre-service teachers based on grades in favor of sophomores, that is for the dimension of sensitivity to the environment, 3) the typical scientific attitude of the pre-service Islamic teachers based on grades and gender is more positive on the dimensions of responsibility and open-mindedness, but have a negative response to critical reflection, 4) there is no significant correlation between gender and grades on scientific attitude, but there is a positive and significant correlation among the dimensions. All in all, it is suggested that lecturers develop positive attitude through problem-oriented and collaborative learning environment. Further research is necessary to be more comprehensive especially in the field of social sciences and Islamic studies. It is hoped that factual condition and completed information regarding the condition and needs of prospective Islamic teachers and prospective sciences teachers can be gained.

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