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Exploring Students' Scientific Attitudes Based on Gender Perspective

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Abstract

In this paper, the authors report on a quantitative study of students' scientific attitudes based on gender perspective. This study was a cross-sectional survey design in which the data were collected from 200 university students (50 men and 150 women) through cluster random sampling. The questionnaire and interview data of students' scientific attitudes based on gender were examined using a difference t-test. The results indicate that students' scientific attitudes did not significantly differ in terms of gender perspective.

INTRODUCTION

Learning outcomes in Higher Education based on the Indonesian national qualification framework (KKNI Level 6) require learning objectives, including attitudes, knowledge, as well as general and specific skills so that the scientific attitudes aspects become the main indicators of achieving learning goals at the Higher Education level. Developing students' scientific attitudes is essential to train them to deal with conflicts, social problems, and competing in the globalization era (Lawson, 1982). The results of previous studies indicate that the development of scientific attitudes has a positive effect on increasing students' ability to understand concepts and develop problem solving and critical thinking skills (Zaidan & Jayosi, 2014). However, previous research results proved that the development of scientific attitudes, character building and social skills development in learning tends to be neglected, especially in higher education learning practice (Fadli & Irwanto, 2020).

The development of scientific attitudes in higher education is crucial in generating a young generation who is not only intellectually intelligent but also emotionally, socially, morally, and spiritually. However, empirical studies in

Indonesia revealed that the scientific attitude aspect is only an accompaniment impact in the process and the achievement of learning objectives, where the learning process is more focused on mastering cognitive elements both in the field of science and in the majors of Islamic studies (Mukhtar, 2017; Wahyudiati et al., 2020; Sumardi et al., 2020). The learning problems are caused by the learning process that does not activate students in constructing knowledge and skills independently through scientific activities. Therefore, this problem needs to be addressed immediately by finding alternative solutions to maximize the development of students' scientific attitudes in higher education.

Scientific attitudes can be interpreted as traits possessed by individuals which are reflected in individual actions, such as tolerance, prioritizing aspects of truth and justice, and critical thinking (Fadli, 2022, Zeidan & Jayosi, 2014). Scientific attitude reflects reflected thoughts which can be reflected in actions or not in response to certain objects. Likewise, scientific attitudes can be in the form of mental processes that are part of a person's expression that reflects the level of knowledge he has (Dhindsa & Cheung, 2003; Wahyudiati, 2022). Indicators of scientific attitude consist of rational thinking, objectivity, critical thinking, curiosity, and caring attitude towards the environment and society. Thus, the components of students' scientific attitudes must be developed in learning activities to achieve the expected learning objectives.Hence, it is vital to research to measure the ability of students' scientific attitudes to be a reference in designing, implementing, and evaluating learning practices at the university level.

Students' scientific attitudes are not only influenced by the application of learning approaches and methods, but there is a relationship between scientific attitudes and students' cognitive learning outcomes based on gender. The results of previous relevant studies show that there are differences in scientific attitudes based on gender (Wahyudiati, 2022; Haciemnoglu, 2015). However, the results of research conducted by Dhindsa & Chung (2003) showed different findings, namely there was no difference in scientific attitudes between men and women. Therefore, it is very important to examine the current state of the scientific attitude of Mataram State Islamic University students.

RESEARCH METHODS

Using the cross-sectional survey design, this quantitative study aims to describe the situation of the research object with two or more variables (Creswell, 2014). The total number of 200 students of Mataram State Islamic

University (50 male and 150 female) were selected through cluster random sampling as the population samples.

The utilized instruments in this study were a student scientific attitude questionnaire which refers to the eight scientific attitude indicators that Harlen has developed (1999), including; curiosity, critical reflection, open-mindedness, perseverance, cooperation, responsibility, mutual respect, and sensitivity to the environment and interview. The data were analyzed using a difference t-test to determine differences in the students' scientific attitudes from a gender perspective.

RESULTS AND DISCUSSION

The different t-test was used to measure the scientific attitude of students based on gender. Furthermore, to find out the difference in scientific attitudes based on gender by referring to the average value as shown in Table 1. Based on the results of data analysis, it shows that the average score of female students is higher than that of male students. However, the results of the t-test hypothesis showed p-value > 0.05 which means that the null hypothesis is accepted (there is no difference in students' scientific attitudes from a gender perspective).

Table 1
The average value of students' scientific attitudes based on gender

Gender	N	Mean	SD
Male	50	186.35	16.89
Female	150	188.34	15.81
Total	200		

Based on the results of the analysis of research data, it shows that the scientific attitude of female students is slightly higher based on the average value than male students. These results are supported by previous research which shows that gender factors affect scientific attitudes (Zeidan & Jayosi, 2014). The results of relevant research are also shown by Villafane and Lewis (2016) who prove that there are differences in scientific attitudes between women and men, where women have a high scientific attitude compared to men (Villafane & Lewis, 2016). Several reasons support the research findings, where women have a higher tendency to scientific attitudes than men because they have a higher curiosity and persistence in completing tasks and solving problems during learning activities. In addition, several facts show that women have

more positive responsibility and self-confidence than men to be actively involved in learning activities (Dhindsa & Cheung, 2003). Other findings are related to students' scientific attitude in terms of 8 indicators: curiosity, critical reflection, open-mindedness, perseverance, cooperation, responsibility, mutual respect, and sensitivity to the environment. The study discovered interesting results where curiosity, mutual respect, and open-mindedness occupy the highest position. In contrast, the attitude of being sensitive to the environment of critical reflection occupies the lowest position.

Table 2
Indicators of students' scientific attitudes

Indicator	No of Item
Curiosity	1-6
Critical reflection	7-12
Open-mindedness	13-17
Perseverance	18-25
Cooperation	26-31
Responsibility	32-39
Mutual respect	40-45
Sensitivity to the environment	46-50
Overall	

The results of the questionnaire are relevant to the results of the interviews. Several significant findings were recorded, including; (1) low environmental sensitivity and critical reflection are caused by a monotonous learning process and dominated by the application of models or learning methods that are more centred on lecturers, (2) lack of learning media that supports the implementation of practical learning, (3) the implementation of scientific approach in the classroom is rarely done makes students' critical thinking skills, and scientific attitudes are not developed. This condition impacts the students' scientific attitudes, critical thinking skills, and concept understanding. This finding is supported by previous research, which revealed that the learning environment significantly influences students' scientific attitudes (Aldridge, 2000). Thus, a conducive and student-centred learning environment must be designed to improve students' scientific attitudes (Sutrisno, Wahyudiati, & Louise, 2021).

The different t-test resulted in a p-value > 0.05, which is 0.457, which means that there is no difference in students' scientific attitudes based on gender. This finding is in line with the results of previous research, which proved that

scientific attitudes are not influenced by gender (Dhindsa & Chung, 20003), meaning that there is no difference in the scientific attitudes of men and women. In addition, scientific attitudes can be influenced by several factors, such as educators' attitudes toward concepts and learning methodologies (Sumardi & Wahyudiati, 2022, Wahyudiati, 2022). The absence of differences in scientific attitudes is caused by learning approaches and methods implementation that tend to be monotonous and the students' passiveness in solving problems through the scientific methods (Adegboyega, 2016). Further research is needed to develop students' scientific attitudes at the higher education level to measure the ability of a more comprehensive scientific attitude from the primary, secondary, and tertiary levels.

CONCLUSION

Based on the research findings, the conclusions are: 1) There is no difference in the scientific attitude of prospective teachers from a gender perspective; and 2) The students' scientific attitude based on gender was found to be more positive in the aspects of curiosity, mutual respect, and open-mindedness, while a sensitive attitude to the environment of critical reflection occupies the lowest position. Thus, it is recommended for lecturers and related parties to develop positive attitudes by creating a problem-solving and collaborative-based learning environment to develop students' scientific attitudes. The development of students' scientific attitudes in the learning process will positively impact the achievement of learning objectives, including attitudes, knowledge, and skills.

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