Students Scientific Attitudes Analysis Based

by Adi Fadli

Submission date: 13-Apr-2023 09:08AM (UTC+0800)
Submission ID: 2063010190
File name: Students_Scientific_Attitudes.pdf (453.41K)
Word count: 2295
Character count: 13969

Journal of Xi'an Shiyou University, Natural Science Edition ISSN:1673-064X

Students Scientific Attitudes Analysis Based on Gender and Grade Level

M. Zaki

* Universitas Islam Negeri Mataram, West Nusa Tenggara, Indonesia

Abstract-This paper presents students' scientific attitudes based on gender and grade level. This survey study adopted a cross-sectional survey design. The respondents involved were 150 students (60 male and 90 female) and were selected through random cluster sampling. The instrument used to collect the data was the scientific attitude questionnaire, and the collected data were analyzed using the MANOVA test. The results showed no significant difference in students' scientific attitudes regarding gender and grade level perspectives.

Index Terms- scientific attitude, gender, grade level

I. INTRODUCTION

Learning objectives in higher education refer to the Indonesian National Qualifications Framework (KKNI), level 6, consisting of attitude, knowledge, and skills. The attitude domain as one of the learning objectives should be acquired in universities to generate graduates who are not only competent from the knowledge aspect but are also proficient in moral and social aspects, especially in their scientific attitudes (Fadli & Zaki, 2022). Enhancing students' scientific attitudes needs to be fostered to understand concepts, think critically and scientifically, and improve their thinking quality and problem-solving ability (Wahyudiati, 2022; Olasahinde & Olatoye, 2014). However, the learning practice in higher education is more focused on achieving cognitive aspects than the attitude aspect, which contributes to students" poor scientific attitude (Fadli & Irwanto, 2020).

The development of scientific attitudes is one solution to bring out students who are not only intelligent but also high in their social values . Yet, previous studies showed that students' scientific attitudes are still a supporting factor in higher education, both in science and Islamic studies (Fadli, 2022; Wahyudiati et al., 2020; Sumardi et al., 2020). The relevant studies revealed that the students" poor scientific attitude is influenced by learning practices that are still lecturer-centred. Meanwhile, the involvement of students in constructing knowledge, attitudes, and skills is still neglected. Therefore, these problems must be followed up immediately to optimize the students" scientific attitudes.

Scientific attitudes refer to individuals' expected attitudes or behavioral tendencies, such as patience, honesty, tolerance, commitment, rational thinking, responsibility, and critical thinking (Fadli, 2022; Fadli & Zaki, 2022; Hamilton & Swortzel, 2017). Attitude is defined not as behavior but as an individual's tendency to act and respond to situations and conditions that involve thought processes and problem-solving abilities, which also reflect the individual's intellectuality (Wahyudiati, 2021; Wheeler, Goodale & Deese, 1974). The indicators of scientific attitude include rational thinking, curiosity, honesty, objective thinking, tolerance, patience, and care about the environment (Fadli & Zaki, 2022). The components of scientific attitude should begin to be developed from the primary, secondary, and tertiary levels. Moreover, the practice in universities must be established at each grade level (semester).

The students' scientific attitudes development is not only influenced by the application of learning models and strategies, but a positive relationship exists between the scientific attitudes and student learning outcomes from the aspect of gender and grade level. Several studies showed differences in scientific attitudes based on gender and grade level (Sutrisno et al., 2020; Wahyudiati, 2022; Haciemnoglu, 2015). Interestingly, there are also findings which confirmed that there is no difference in scientific attitudes based on gender (Fadli & Zaki, 2022; Dhindsa & Chung, 2003). Thus, it is important to map the current state of student scientific attitudes from the gender and grade level perspective to be used as a reference for gender-responsive learning development at the tertiary level.

II. METHOD

The type of the current research was a survey with a cross-sectional design, which has the advantage of analyzing the factual conditions of research samples that include two or more variables (Creswell, 2020). The research sampling technique was random cluster sampling with a total sample of 150 students (60 male and 90 female). The scientific attitude questionnaire was adapted from Harlen (1999) and consisted of 8 indicators: curiosity, critical reflection, open-mindedness, perseverance, cooperation, responsibility, mutual respect, and sensitivity to the environment. The data from the questionnaire were analyzed using the Manova test. The Manova prerequisite test was supported by the results of Levene's test with a p-value of > 0.05, which means that the research data was homogeneous and met the assumptions to be analyzed by the Manova test (Bernard, 2000).

III. FINDINGS & DISCUSSIONS

Based on the data normality test results, the p-value was > 0.05 (normally distributed data). The multicollinearity test results obtained the VIF value = 0.45 (there is no multicollinearity in the research data), and the linearity test based on the scatter plot matrix showed that there was a positive correlation for each variable pair. Levene's test analysis also resulted in a p-value > 0.05 (Table 1), meaning that the data was homogeneous so that the Manova prerequisite test could be performed.

Table 1. The result ofLevene's test (Homogeneity test)

	F	df1	df2	Sig.
Scientific attitudes SA)	.517	4	284	.656
Overall	.585	4	284	.637

The data analysis was continued by testing the research hypothesis. The Manova test showed no difference in students' scientific attitudes regarding gender and grade level because p>0.05 (see Table 2) means that the null hypothesis is accepted and the alternative hypothesis is rejected.

Table 2. The result of the Manova test of students' scientific attitudes based on gender and grade level

Effect		Sig.
Gender and Grade Level	Pillai's Trace	.074
	Wilks" Lambda	.074
	Hotelling's Trace	.074
	Roy's Largest Root	.074

The Manova test results showed no difference in students' scientific attitudes based on gender and grade level. It is in line with the previous studies, which showed no differences in students' scientific attitudes based on gender (Fadli & Zaki, 2022) and grade level (Wahyudiati, 2021). These findings confirmed that scientific attitudes are not influenced by gender (Dhindsa & Chung, 2003). The following interview transcript also strengthened this study's results:

Za (Lecturer) stated, "the development of scientific attitudes of male and female students is being intensely worked on, and they are given similar treatment that the learning outcomes could be evenly distributed."

Ki (Male/Grade 2) said, "The learning experience that refers to the development of scientific attitudes has begun to be applied, and we have the same opportunity to be involved in the learning process so that it has a positive impact on improving my scientific attitude".

Furthermore, Vi (Female/Grade 4) confirmed, "During the learning activities since the first year to the second year or semester 4, the learning model applied by the lecturers is almost the same as involving us to actively participate in the learning process so that it affects the improvement of scientific attitudes."

Some of the findings proved male and female students' scientific attitudes have no difference, as well as based on their grade level. It is influenced by several factors, such as the learning process by applying a constructivism-based, culturally responsive, and gender-free learning model that allows the development of scientific attitudes of male and female students (Masnun & Fadli, 2022; Wahyudiati, 2022). The absence of differences in scientific attitudes based on grade level is also caused by the application of relatively the same course's approaches and learning models in the first, second, or next year that makes no difference in students' scientific attitudes (Sumardi & Wahyudiati, 2022; Adegboyega, 2016). Therefore, it is important to implement learning models that could develop critical thinking skills, rational and objective thinking, and problem-solving skills in students' scientific attitudes.

Scientific attitudes and student learning experiences also affect the achievement of utmost student learning outcomes. The development of scientific attitudes is also supported by a learning environment that could optimize the student's potential such as the models or learning media application(Wahyudiati & Fitriani, 2021; Aldridge, 2000; Sumardi, Rohman, & Wahyudiati, 2020; Sumardi & Wahyudiati, 2021). Thus, a conducive and non-teacher-centred learning environment must be designed to improve students' scientific attitudes at all grade levels (Sutrisno, Wahyudiati, & Louise, 2021). This factual condition is reinforced by various research results, which unveiled that not gender-biased constructivism-based learning positively affects scientific attitudes and student learning outcomes (Masnun & Fadli, 2022; Patonah et al., 2021; Wahyudiati, 2022).

Hence, the development of not gender-biased scientific attitudes and learning experiences is one of the solutions to develop other 21st-century skills (critical thinking skills, communication and collaboration skills, and problem-solving skills) from primary, secondary and tertiary education levels of universities to face the 5.0 industrial revolution. Likewise, institutions and higher education leaders play a significant role in supporting the implementation of active and innovative learning that is not gender-biased. These could attain the learning objectives in higher education (KKNI level 6), which strongly supports the graduates' career development to compete in the job market.

IV. CONCLUSION

The current research concludes that there is no difference in students' scientific attitudes based on gender and grade level. Accordingly, it is recommended that lecturers and parties involved in educational institutions develop learning models, media, or strategies oriented towards increasing critical thinking skills, rational thinking and objective thinking, and problem-solving. In the end, students could develop scientific attitudes as one indicator of achieving learning objectives that refer to 21st-century skills.

REFERENCES

[1] Çalik, M., Ültay, N., Kolomuç, A., & Aytar, A. (2015). A cross-age study of science student teachers' chemistry attitudes. Chemistry Education Research and Practice, 16(2), 228–236. https://doi.org/10.1039/c4rp00133h

[2] Adegboyega, L. O. (2016). *Relationship between emotional intelligence and attitude towards examination of undergraduates at University of Ilorin*. Unpublished seminar paper, Department of Counsellor Education, University of Ilorin, Ilorin, Nigeria.

[3] Creswell, J. W. (2020). Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, CA: Sage.

[4] Dhindsa, H. S. & Chung, G. (2003). Attitudes and Achievement of Bruneian Science Students" *Internalational Journal of Science Education 25*, 907-922.

[5] Fadli, A., & Zaki, M. (2022). Exploring Students Scientific Attitudes Based on Gender Perspective.*Journal of Xi'an Shiyou University, Natural Science Edition*, 18(6), 742-744.

[6] Fadli, A., & Irwanto. (2020). The effect of local wisdom-based ELSII learning model on the problem solving and communication skills of pre-service islamic teachers. *International Journal of Instruction*, *13*(1), 731–746. https://doi.org/10.29333/iji.2020.13147a

[7] Fadli, A., & Masnun. (2020). The Earthquake Risk Management Model based on Sasak' Local Wisdom. Disaster Advances, 13(3), 54-61.

[8] Hamilton, R. L., & Swortzel, K. A. (2007). Assessing mississippi aestteachers' capacity for teaching science integrated process skills. *Journal of Southern Agricultural Education Research*, *57(1),* 1-22. Retrieved from http://www.jsaer.org/.

[9] Harlen, W. (1999). Purposes and procedures for assessing science process skills. *Assessment in Education, 6*(1), 129-144.

[10] Irwanto, Rohaeti, E., & Prodjosantoso, A. K. (2018b). Undergraduate students' science process skills in terms of some variables: A perspective from Indonesia. *Journal of Baltic Science Education*, *17(5)*, 751-772.

[11] Masnun & Fadli, A. (2022). Students' Cultural Expertise and Scientific Attitudes in Higher Education Learning. *Journal of Xi'an Shiyou University, Natural Science Edition*, 18(6), 637-639.

[12] Olasahinde, J.K., & Olatoye, A.R. (2014). Scientific attitude, attitude to science and science achievement of senior secondary school students in katsina state, nigeria. *Journal of Educational and Social Research*, *4(1)*.

[13] Sumardi, L., Rohman, A., & Wahyudiati, D. (2020). Does the Teaching and Learning Process in Primary Schools Correspond to the Characteristics of the 21st Century Learning? *International Journal of Instruction*, 13(3), 357-370. https://doi.org/10.29333/iji.2020.13325a

[14] Sumardi, L., & Wahyudiati, D. (2021). Using Local Wisdom to Foster Community Resilience During the Covid-19 Pandemic: A Study in the Sasak Community, Indonesia. *Proceedings of the 2nd Annual Conference on Education and Social Science (ACCESS 2020)*, *556*(Access 2020), 122–127. https://doi.org/10.2991/assehr.k.210 525.059

[15] Villafane, S. M., & Lewis, J. E. (2016). Exploring a measure of science attitude for different groups of students enrolled in introductory college chemistry. *Chemistry Education Research and Practice 4(17),* 731-742.

[16] Wahyudiati, D (2022). Implementation of Islamic Education Concept in Ethnochemistry. *Jurnal Tarbiyatuna*. 13 (1), 19-28. https://doi.org/10.31603/tarbiyatuna.v13i1.5310

[17] Wahyudiati, D., Sutrisno, H., & Supiah, I. (2019). self-efficacy and attitudes toward chemistry of pre-service chemistry teachers: gender and grades level perspective. *International Journal of Scientific & Technology Research*, *8(9)*.

[18] Wahyudiati, D. (2022). Exploring Chemistry Education Students' Critical Thinking Skills and Ethnochemistry-Based Learning Experiences based on Gender. *Journal of Xi'an Shiyou University, Natural Science Edition*, 18(4), 109-113.

[19] Wahyudiati, D. (2021). Investigating Problem Solving Skills and Chemistry Learning Experiences of Higher Education Base on Gender and Grade Level Differences. Journal of Science and Science Education. 2(2). 62-67.doi:https://doi.org/10.29303/jossed

[20] Wahyudiati, D., Sutrisno, H., & Louise, I.S. Y. (2019). Investigation of attitudes towards chemistry and learning experiences of pre-srvice chemistry teachers. *MIER Journal of Educational Studies Trends & Practices*, vol. 9. no. 2,pp. 191-211.http://www.mierjs.in/ojs/index .php/mjestp.

[21] Wahyudiati, D., Irwanto, I. & Ningrat, H. K., (2022). Improving pre-service chemistry teachers' critical thinking and problem-solving skills using project-based learning. *World Journal on Educational Technology: Current Issues*. *14*(5), 1291-1304. https://doi.org/10.18844/wjet.v14i5.7268

[22] Weinburgh, M. (1995). Gender differences in student attitudes toward science: a meta analysis 18. of the literature from 1970 to 1991, *Journal of Research in Science Teaching*, 32, 387-398.

[23] Wheeler, L., Goodale, R., & Deese, J. (1974). *General psychology*. Oxford, UK: Allyn & Bacon.

[24] Zeidan, H.A., & Jayosi, R. M. (2014). Science process skills and attitudes toward science among palestinian secondary school students. *Journal of Education, 1*(5), 13-24.

AUTHORS

First Author – **M. Zaki**, Prof., Universitas Islam Negeri Mataram, West Nusa Tenggara, Indonesia.
zaki71@uinmataram.ac.id

Correspondence Author – **M. Zaki**, Prof., Universitas Islam Negeri Mataram, West Nusa Tenggara, Indonesia.
zaki71@uinmataram.ac.id +6281907996061

Students Scientific Attitudes Analysis Based

ORIGINALITY REPORT

2%	4%	7%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universitas Mataram Student Paper	2%

Exclude quotes	On	Exclude matches	< 2%
Exclude bibliography	Off		