ATLANTIS PRESS
Advances in Social Science, Education and Humanities Research, volume 253
3rd Asian Education Symposium (AES 2018)

Perceptions, Attitudes and Lifestyles of Chemistry Teacher Candidates towards Education for Sustainable Development

Burhanudin Milama, Mohammad Ali, Rusman Rusman
Curriculum Development Study Program, School of Postgraduates
Universitas Pendidikan Indonesia
Bandung, Indonesia
burhanudin.milama@uinjkt.ac.id

***Abstract*—Higher education institutions have a responsibility to produce scholars who have good perceptions, attitudes and lifestyles in line with the concept of education for sustainable development (ESD). This study aimed to investigate the relationship between perceptions and attitudes with the lifestyle of prospective chemistry teachers. Questionnaires were given to 158 students consisting of 56 first year students, 47 middle year students and 55 final year students. The results showed that prospective chemistry teachers' perception and attitude were quite uniform compared to lifestyle. The correlation between perceptions and attitudes towards the lifestyles of students in the first, middle and final year was significant (p value <0.05). However, the influence of perceptions and attitudes of students on their lifestyle was low. Thus, it can be concluded that there was a low correlation between perceptions, attitudes towards the students' lifestyles of different grades.**

Keywords—education for sustainable development; perception; attitude; lifestyle; prospective chemistry teacher students

I. INTRODUCTION

Sustainable development has become a challenge in the 21st century. The concept of sustainable development has been used as a reference for development programs since the definition was formulated by the Brundtland Commission formed by the United Nations (UN) World Commission on Environment and Development in 1987. Sustainable development can be defined as an effort to regulate the primary, secondary and tertiary needs of humans in utilizing various existing natural resources, but still pay attention to environmental aspects for the needs of future generations to remain sustainable [1-6]

The development pays attention not only to aspects of economic growth and social welfare, but also to the sustainability aspects for the future generations. So far, the development that has taken place in the world only focuses on economic growth and has less attention to environmental aspects. Every country should pay attention to the principle of sustainable development concept as stated in the 1987 Brundtland Commission Report and Agenda 21 of the United Nations Conference on Environment and Development. The conference concluded that there was a strong link between economic and environmental development along with environmental problems they caused [7,8].

UNESCO at the Johannesburg World Summit on Sustainable Development in 2002 highlighted the importance of education as the heart of sustainable development [9]. Likewise, a report from the United Nations Conference on Sustainable Development highlighted the importance of education in preparing people to implement sustainable development [10]. Education for sustainable development (ESD) must be part of all subjects at all levels of education, ranging from kindergartens to universities [11].

The implementation of ESD at the level of higher education requires the commitment of various roles such as lecturers, students, and staffs. All of these components should work together to have the same perception regarding the concept of ESD. However, previous study results revealed that lecturers held different understandings regarding ESD as an implication of the difficulty of gaining access to the related information [12]. Similar evidence was also identified in different students' understandings of ESD indicators [13], according to grade levels. The higher grade students in teacher education programs showed an increase in self-efficacy, interest, and knowledge on the concept of ESD [14], particularly in the dimensions of cultural diversity, renewable energy and justice [15].

The research showed that there were some students lacked understandings related to ESD. The prospective teachers' understanding on sustainable development is a key role in integrating the curriculum of ESD in the subject curriculum. In addition, prospective teachers should possess a positive attitude and lifestyle that reflects the values of ESD. This could be a role-model to the majority of their future students improving the awareness of the impact of their daily activities to the environment [16]. Relevant to the idea, this study aimed to determine whether the grade level of prospective chemistry teacher students contributed to the relationship between perceptions and attitudes with their lifestyle.

II. METHOD

The survey was conducted by distributing a questionnaire to measure prospective chemistry teacher students' perceptions, attitudes, and lifestyles related with the three dimensions of ESD: social, environmental and economic derived from seven aspects of ESD. These seven aspects included health and hygiene, HIV/AIDS, energy, waste, poverty reduction, sustainable production and consumption. The questionnaire was developed into Likert Scale items.

Questions related to perception, attitude and lifestyle were given to every single aspect. Subjects were 158 students consisted of 56 first year students, 47 middle year students and 55 final year students of chemistry education program in Syarif Hidayatullah State Islamic University Jakarta. The questionnaire had been tested for its validity and reliability.

The questionnaire data obtained were then grouped into the aspects of perception, attitudes, and lifestyles. Each data was then qualitatively analyzed to describe mean and standard deviation. Further data processing included inferential statistic analysis using multiple linear correlations technique by the use of SPSS program.

III. RESULTS

To determine the correlation of different grade levels of students' perceptions, attitude, and lifestyles, data related with each dimension of ESD was analyzed using descriptive technique. The mean and standard deviation of perceptions, attitudes and lifestyle of prospective chemistry teacher students based on their academic level can be seen in table 1.

TABLE I. MEAN AND STANDARD DEVIATION OF PERCEPTION, ATTITUDE AND LIFESTYLE RELATED WITH ESD

	First year			Middle year			Final year		
	∑	SD	N	∑	SD	N	∑	SD	N
Perception	64.20	3.142	56	64.36	2.816	47	63.65	4.155	55
Attitude	58.71	3.457	56	58.45	3.537	47	58.40	4.130	55
Lifestyle	82.84	7.188	56	80.89	9.827	47	80.25	10.39	55

According to the data, the highest level of perceptions of ESD was held by the middle year prospective chemistry teacher students. In addition, this group of students had a more uniform perception of ESD compared to the other groups. Yet, the mean score of this group result was not significantly different from the first year students. The most varied perceptions were showed in the final year students, with the highest standard deviation. Surprisingly, final year students showed the lowest understandings of ESD.

The second finding regarding relevant attitudes with the concept of ESD was unsatisfying. The mean score of the aspect was at the bottom of the three for all target group, which described no significant different value (∑max = 58.71 of the first year students and ∑min = 58.40 of the final year students). Similarity was found in the diversity of attitudes of the final year student as in how they perceived ESD differently. So, further research is needed to study factor(s) contributed to this empirical evidence.

Analysis results of the third aspect of sustainable lifestyle in students' daily life revealed an interesting fact. Although their ESD-related attitudes were low, their responses about daily lifestyle was indicated as highly sustainable for all group of students. This contradicting evidences needs to be further explained according to the next analysis results showed in table 2.

Table 1 also shows that the average score of perception, attitude and lifestyle related to ESD is quite good in the first year and the middle year students. The lowest score was identified in the final year students, although the difference is slight. However, it was quite different when it is viewed from the standard deviation. This showed that the final semester students had more diverse lifestyles than students in the early and middle year. Students of all grades had a greater diversity of lifestyle that contributed to sustainable development compared to perceptions and ESD-related attitudes as described earlier.

To study whether the diversity of students' lifestyles was influenced by perceptions and attitudes, a multiple linear correlation test and multiple regression analysis were carried out. The results of the significance test of the multiple regression analysis are presented in table 2.

TABLE II. TEST OF SIGNIFICANCE OF CORRELATION BETWEEN STUDENTS' PERCEPTIONS, ATTITUDES, AND LIFESTYLE

	F-test	Pv_{alue}	R^2
First Year	4.743	0.013	0.152
Middle Year	10.156	0.000	0.316
Final Year	6.463	0.003	0.199

Table 2 shows that the first, middle and final year students' P_{values} were significant (<0.05). This means that there was a linear correlation of perceptions and attitudes variables along with lifestyle of students in the first, middle and final year. This also means that there were joint relationship of students' attitudes and perception towards their lifestyle. Yet, the coefficient of determination score, R2, showed a different finding among the three groups, consecutively from the lowest to the highest were students in the first year, the final year and the middle year. Thus, the influence of perceptions and attitudes towards lifestyle was found relatively low. Moreover, it can be said that students' lifestyles was more influenced by external factors which needed to be investigated further, including curriculum contents.

IV. DISCUSSION

The data analysis results showed that, generally, prospective chemistry teachers held a moderate level of perceptions of and attitudes towards ESD. This level of both perceptions and students' attitudes were in accordance with the prior study results indicated that university students of teacher education program showed a positive attitudes regarding ESD [17], including those who enrolled in Chemistry Teacher Education Program [18]. Yet, evidence suggested that first and middle year students represented a better perceptions and attitudes towards ESD, which argued prior study result that the

higher grade the students were in, the higher level of understandings about ESD they held [14].

Results related with sustainability lifestyle of prospective chemistry teachers showed different findings from perceptions and attitudes. The students' lifestyles were more diverse in terms of the individual health aspects, waste management (included recycling garbage), and wise consumption campaigns. The students mentioned that they did not realize that what they did had an impact on sustainable development. This opinion was relevant with previous research showed that respondents were not aware of the impact of their lifestyles on the environment [16].

In this study, students' perceptions and attitudes showed a positive influence towards students' lifestyle, yet the correlation factor was low. This issue needs a special consideration towards the potential and effort of integrating ESD in the curriculum of the study program of chemistry education particularly in the State Islamic University Syarif Hidayatullah Jakarta, as an interdisciplinary approach. Content study of the curriculum revealed that only few aspects of ESD integrated, e.g. pollution. This proposed the ideas of Agenda 21 of Chapter 36 which described the role of education in instilling knowledge that could help develop students' behavior which led to sustainable daily lifestyles [19]. Prospective chemistry teachers in the study program should acquire adequate knowledge and understandings on ESD to become wise and qualified human resources who are responsible for the implementation of sustainable development in the next generation era [20].

Integration of ESD contents and values in chemistry teacher education program in the curriculum design and implementation should be holistics and interdisciplinary [18]. The course contents the students learn should provide space for them in planning relevant lessons and activities to assist their secondary chemistry students in understanding the concepts of ESD in their contextual life. This idea is in accordance with earlier research results mentioned that studies on sustainable development for prospective science teacher students would enrich their understandings of ESD [13].

Furthermore, instead of only developing ESD contents and values in intra-curricular and inter-curricular activities, ESD studies in chemistry teacher education study program should be emphasized in extra-curricular activities programs. This could be done through students' active participation as individuals and community members in environmental movement [19], interactive learning in the field trips, dialogue with environment practitioners, colleagues and lecturers [21], which provided an ample opportunity for them to participate in social activities in order to improve their environmental awareness and attitudes towards sustainable development actions [22], [23]. Other possible ways are through workshops, seminars, or training so that prospective teacher students are expected to hold better understandings about sustainable development and are able to practice it in their daily life.

V. Conclusion

Based on data analysis, it can be concluded that students' perceptions and attitudes had a weak correlation with their lifestyles. The diverse lifestyles of prospective chemistry teacher students were not always influenced by their perception and attitude, but also by some other factor(s) that need further studies. This study recommends the research on how the current curriculum in the study program of chemistry education did not strongly accommodated the integration of ESD and how it is interrelated with students' perceptions, attitudes, as well as lifestyles.

Acknowledgment

The research was funded by Ministry of Religion, Republic of Indonesia.

References

[1] F. Azmat, "Sustainable Development in Developing Countries: The Role of Social Entrepreneurs," Int. J. Public Adm., vol. 36, no. 5, pp. 293–304, 2013.

[2] J. Schneider, J.A. Leydens, and J. Lucena, "Where is 'Community'?: Engineering education and sustainable community development," Eur. J. Eng. Educ., vol. 33, no. 3, pp. 307–319, 2008.

[3] D.C. Duran, L.M. Gogan, A. Artene, and V. Duran, "The Components of Sustainable Development - A Possible Approach," Procedia Econ. Financ., vol. 26, no. 15, pp. 806–811, 2015.

[4] P. Vare and W. A. H. Scott, "Learning for a Change: exploring the relationship between education and sustainable development," J. Educ. Sustain. Dev., vol. 1, no. 2, pp. 191–198, 2007.

[5] D. Apelian, "Sustainable Development for the 21st Century : MSE Opportunities," no. December, 2008.

[6] M. Ali, Education for national Development, A Case Study Indonesia. Bandung: UPI Press, 2014.

[7] I.O. Adelekan, "The Nigerian press and environmental information for sustainable development," Local Environ. Int. J. Justice Sustain., vol. 14, no. 4, pp. 297–312, 2009.

[8] M. Ali,"Curriculum Development for Sustainable Education".

[9] F. Amador, A.P. Martinho, P. Bacelar-Nicolau, S. Caeiro, and C.P. Oliveira, "Education for sustainable development in higher education: evaluating coherence between theory and praxis," Assess. Eval. High. Educ., vol. 40, no. 6, pp. 867–882, 2015.

[10] L. Colucci-Gray, A. Perazzone, M. Dodman, and E. Camino, "Science education for sustainability, epistemological reflections and educational practices: From natural sciences to trans-disciplinarity," Cult. Stud. Sci. Educ., vol. 8, no. 1, pp. 127–183, 2013.

[11] M. Åhlberg, P. Äänismaa, and P. Dillon, "Education for Sustainable Living: Integrating theory, practice, design, and development," Scand. J. Educ. Res., vol. 49, no. 2, pp. 167–185, 2005.

[12] D. Cotton, M. F. Warren, O. Maiboroda, and I. Bailey, "Sustainable development, higher education and pedagogy: a study of lecturers' beliefs and attitudes," Environ. Educ. Res., vol. 13, no. March, pp. 579–597, 2007.

[13] A. Saka and A. Ş. Uysal, "Science and Technology Teacher Candidates' Awareness of Sustainable Development," Procedia - Soc. Behav. Sci., vol. 152, pp. 534–539, 2014.

[14] L. Tomas, S. Girgenti, and C. Jackson, "Pre-service teachers' attitudes toward education for sustainability and its relevance to their learning: implications for pedagogical practice," Environ. Educ. Res., vol. 4622, no. January, pp. 1–24, 2015.

[15] A. Ambusaidi and M.A.L. Washahi, "Prospective Teachers ' Perceptions Issues in Oman," 2016.

[16] M.P. Martínez Agut, M.A. Ull, and P.A. Minguet, "Education for sustainable development in early childhood education in Spain. Evolution, trends and proposals," Eur. Early Child. Educ. Res. J., vol. 15, no. October, pp. 1–16, 2013.

[17] S. Ju, and S. Lee, "Elementary school student teachers' perceptions of sustainable development and education for sustainable development". The Environment Education, vol. 24, no. 1, pp. 102–113, 2011.

[18] M. Burmeister, S. Schmidt-Jacob, and I. Eilks, "German chemistry teachers' understanding of sustainability and education for sustainable development - An interview case study," Chem. Educ. Res. Pract., vol. 14, no. 2, pp. 169–176, 2013.

[19] M. Karpudean, Z.H. Ismail, N. Mohamed, "Green Chemistry: Educating prospective science teachers in education for sustainable development at school of educational studies, USM". Journal of Social Sciences, vol. 7, no. 1, pp. 42 – 50, 2011.

[20] M. Ali. "Sustainable development: role of education. 1st international conference of educational sciences organised in Bandung, pp. 891-900, 2017.

[21] F. Kagawa, D. Selby, and C. Trier, "Exploring students' perceptions of interactive pedagogies in education for sustainable development". Planet, no. 17, December, pp. 53-56, 2006.

[22] H. Choi, K. Shim, K. So and S. Yeau, "A survey of pre-service elementary teachers' perceptions, attitudes and practical intention toward sustainable development". The Environment Education, vol. 23, no. 2, 129–144, 2010.

[23] F. Kagawa, "Dissonance in students' perceptions of sustainable development and sustainability". International Journal of Sustainability in Higher Education, vol. 8, no. 3, 317–338, 2007.