Green Consumerism in Environmental Learning: 7th-grade Students Pro-Environmental Behavior in Science Subject

Ilmi Zajuli Ichsan[1], Diana Vivanti Sigit[2], Mieke Miarsyah[2], Md. Mehadi Rahman[3], R. Ahmad Zaky El Islami[4], Husamah[5]

[1]Department of Environmental Education, Universitas Negeri Jakarta, Indonesia
[2]Department of Biology Education, Universitas Negeri Jakarta, Indonesia
[3]Institute of Education and Research, University of Dhaka, Bangladesh
[4]Department of Science Education, Universitas Sultan AgengTirtayasa, Indonesia
[5]Department of Biology Education, Universitas Muhammadiyah Malang, Indonesia

Email: ilmizajuli95@gmail.com

Abstract

Science education in the 21st century including biology learning at the level of Junior High School requires a more contextual implementation. Environmental learning topics such as green consumerism is a contextual topic in biology learning. Students must have high Pro-Environmental Behavior (PEB) to participate in protecting the environment. The purpose of this study was to measure the PEB of students at the 7th-grade level. The research method used descriptive with survey data collection techniques. The study was conducted in November-December 2018 at State Junior High School 1 South Tambun, West Java, Indonesia. A total sample of 135 students in 7th grade was selected by simple random sampling. The results showed there were six PEB indicators based on Green Consumerism that were Energy Conservation (86.37), Transportation (56.67), Waste Avoidance (53.04), Daily Consumption (64.44), Recycling (58.89), Social Behavior (60.54). Among the six indicators, only energy conservation was categorized as very high, while the others are categorized as moderate. This study concluded that PEB students must be improved by various models, methods, and media in biology learning.

Keywords: Environmental learning, green consumerism, pro-environmental behavior

INTRODUCTION

Environmental education became a prime concern in science education since the purpose of contemporary education is to promote sustainable development among students. Environmental learning combines concepts and principles of the sciences and social sciences under a single approach. Therefore, students can understand that all human environments, societies, and cultures are deeply connected, they must save the environment for their development and survival. Environmental

learning has continued in science classrooms in many forms over the past years (Zandvliet & Ormond, 2014).

Damage to the environment causes bad impacts on people's lives. The urban environment is one of the polluted areas. Pollution that occurs in big cities starting from air and water pollution caused by industry. Besides, there is also much pollution caused by household waste and motorized vehicle pollution (Chander & Muthukrishnan, 2015; Olsson & Kjällstrand, 2006; Yedla & Park, 2017). This has an impact on the health and

quality of life of the people in the city. One of them is felt by students. In this context, students have a role in participating in protecting the environment to avoid pollution.

To protect the environment, students must have environmentally friendly behavior. This behavior is often called pro-environmental behavior (PEB), which is a behavior that supports the balance of ecosystems and the environment (Lavelle, Rau, & Fahy, 2015; Schmitt, Aknin, Axsen, & Shwom, 2018; Vicente-Molina, Fernández-Sainz, & Izagirre-Olaizola, 2018). PEB drive students to pay close concentration to environmental issues, inspire them to take the initiative to take accountability for environmental protection, and promote their positive practice of green consumption behavior (Yue, Sheng, She, & Xu, 2020). PEB in students has an important role because students are one of the parties who have a role in the survival of life in the future. Students who have a high PEB will usually choose to bring their drinking bottles instead of having to buy their bottles that cannot be recycled. Also, students who have high PEB will prefer to use bicycles or walk rather than private vehicles like a car to get to school at a short distance from their homes.

PEB is a behavior that is general in nature. If this PEB is seen in terms of green consumerism, it only focuses on certain aspects. Consumption behavior that minimizes the negative impact of consumptioiiin on the environment in the case of purchasing environmentally friendly products is known as Green consumption behavior (Pagiaslis & Krontalis, 2014; Sheng, Xie, Gong & Pan, 2019). Green consumerism is an understanding of a person in consuming goods and services that still holds the principle of environmentally friendly(Matthes & Wonneberger, 2014; McCarthy & Liu, 2017). Consumers' strong environmental awareness significantly affects green consumption intention, which means they will be more likely to buy environmentally friendly products (Yue, Sheng, She, & Xu, 2020). PEB, which is based on green consumerism, is characterized by six indicators, start from energy conservation, transportation, waste avoidance, daily consumption, recycling, and vicarious social behavior(Kaiser & Wilson, 2004). These six aspects are characteristic of someone who has a high PEB.

Science in school can encourage environmental learning, so the teaching goal of science must focus on developing environmental awareness among students (Hadzigeorgiou & Skoumios, 2013). Implementation at school, the learning environment is in the subject of biology, especially in science learning. Environmental learning in schools provides an important role in PEB. That is because, in environmental learning, a lot is explained about environmental concepts. The concept of water and air pollution, for example, can be explained in environmental learning. Students who can master a variety of environmental concepts will affect students' environmental knowledge(Baytar & Ashdown, 2013; Esa, 2010; Kim & Stepchenkova, 2019; Otto, Neaman, Richards, & Marió, 2016; Shin, Im, Jung, & Severt, 2017). According to various studies show that environmental knowledge can affect behavior change, one of which is PEB(Krettenauer, 2017; Wen & Lu, 2013; Yusof, Rahman, & Iranmanesh, 2016).

Research that has been done by researchers in the world usually describes the profile of PEB in the community. Besides that, PEB is usually also described following the general environmentally friendly category (Ahmad & Nordin, 2014; Buzov, 2014; Lee, Sung, Wu, Ho, & Chiou, 2018; Seebauer, Fleiß, & Schweighart, 2017; Tang, Geng, Schultz, Zhou, & Xiang, 2017). While the PEB profile of students based on green consumerism has not been done much. This study has a novelty that is a description of the PEB profile of students based on green consumerism in 7th-grade junior high school students. Based on the description, this research was urgent because there was no profile of 7th-gradestudentsPEB based on green consumerism. Therefore, this study aimed to describe the profile of 7th-grade students PEB based on green consumerism.

METHOD

This research used a descriptive method with survey data collection techniques. The study was conducted in November-December 2018 at State Junior High School 1 South Tambun, West Java, Indonesia. In this study, samples used were 135 students in the 7th grade of junior high school who were taken by simple random sampling. The instrument used in this study was the PEB instrument based on six aspects of green consumerism, start from energy conservation, transportation, waste

avoidance, daily consumption, recycling, and vicarious social behavior (Kaiser & Wilson, 2004). The instrument used has been declared valid and reliable. The score given on each item from 0-5 with a total of 15 items can be seen in Table 1.

After measuring PEB for 7th-grade students, the next step was to categorize PEB students based on their scores. There were five PEB student scores, starting from very high, high, medium, low, and very low. More details can be seen in Table 2.

Table 1. Aspects of PEB based on Green Consumerism

No	Aspect	Item
1	Energy Conservation	1,2
2	Transportation	3,4
3	Waste Avoidance	5,6
4	Consumerism	7,8,9,10
5	Recycling	11,12
6	Vicarious, Social Behavior	13,14,15

Table 2. Categories of PEB students

Category	Interval Score
Very High	X > 81,28
High	70,64 < X ≤ 81,28
Moderate	49,36 < X ≤ 70,64
Low	38,72 < X ≤ 49,36
Very low	X ≤ 38,72

RESULTS AND DISCUSSION

The results showed that the overall average score showed a score of 63.28 (moderate categories). Meanwhile, if seen on each item, the lowest score in item 4 with a low category. In contrast, the highest score was in item 2 with a very high category. As for the other items, many received a moderate category. More details can be seen in the Table 3.

Table 3. PEB students for each item

No	Item	Score	Score (0-100)	Category
1	I turn off the lights when going to sleep.	3.96	79.11	High
2	I use the sunlight to dry my clothes	4.68	93.63	Very High
3	I go to campus using public transportation, bicycle, or walking	3.30	66.07	Moderate
4	I use public transportation for traveling	2.36	47.26	Low
5	I reused paper	2.72	54.37	Moderate
6	I use a private bag for shopping	2.59	51.70	Moderate
7	I bought a product that was marked as environmentally friendly	3.49	69.78	Moderate
8	I consume organic food products because it is more environmentally friendly	3.52	70.37	Moderate
9	I do not like buying food in Styrofoam	3.07	61.48	Moderate
10	I avoid using mosquito spray	2.81	56.15	Moderate
11	I separate organic waste from plastic waste	3.10	62.07	Moderate
12	I bought recycled things because it supports go green	2.79	55.70	Moderate
13	I contribute financially to environmental organizations	3.13	62.67	Moderate
14	I attend community service in the surrounding environment	3.49	69.78	Moderate
15	I invite people through social media to be more concerned about the environment (for example, by choosing environmentally friendly products)	2.46	49.19	Low
	Average		63.28	moderate

As for the six aspects of green consumerism, the first aspect of energy conservation has a very high category. Meanwhile, the lowest score is in the aspect of waste avoidance. It can be seen that, in general, PEB obtained from the six aspects has a moderate category. More details can be seen in Table 4.

Table 4. PEB students for each aspect

No	Aspect	Score	Scale (0-100)	Category
1	Energy Conservation	4.32	86.37	very high
2	Transportation	2.83	56.67	moderate
3	Waste Avoidance	2.65	53.04	moderate
4	Daily Consumption	3.22	64.44	moderate
5	Recycling	2.94	58.89	moderate
6	Vicarious, Social Behavior	3.03	60.54	moderate

Based on this study's results, overall PEB students based on green consumerism still need to be improved. This is because students who are sampled in this study live in big cities. This makes them less aware of the importance of protecting the environment(Song, Li, Duan, Yu, & Wang, 2017; Yedla & Park, 2017). Therefore education has an important role so that students can understand the importance of protecting the environment. The teacher has to explain to students about the importance of green consumerism. Teachers need to provide explicit teaching so that students get opportunities to make connections among environmental knowledge, socio-scientific issues, and their life, and increase the level of environmental awareness among them (Hadzigeorgiou & Skoumios, 2013). Besides explaining, the teacher can also give a project to students related to environmental problems.

In this study, it was found that students' habits in traveling still often use private transportation. This indicates that public transportation still does not reach various tourist objects. Also, there has not yet arisen the awareness of students to get used to using public transportation. Indeed, there is no prohibition on using private transportation in the context of an excursion, but it would be better to use public transportation if the location is still relatively close(Chander & Muthukrishnan, 2015; Nwankwoala, 2015).

In addition to the lowest items, there are items with the highest score related to the habit of drying clothes using sunlight. This can be explained because, indeed, the use of sunlight is a common habit that people do to dry their clothes. That is because the use of

technology to dry clothes is still small and not too familiar. This is certainly very good because it will save energy (José Vinagre Díaz, Richard Wilby, & Belén Rodríguez González, 2013; Lane et al., 2015; Lavelle et al., 2015). People with a high economic capacity might be easy to buy equipment to dry clothes, but usually for the general public still uses traditional methods.

Then if we look at the green consumerism aspect, it can be seen that the energy conservation aspect is the aspect with the highest score. This indicates that students have realized the importance of saving energy. It means that learning about the importance of saving energy has been done well. However, it still needs to be given a deeper explanation by the teacher to students so that they also continue to increase their behavior in saving energy(McGuire, 2015; Okur Berberoglu, Ozdilek, & Yalcin Ozdilek, 2014).

In the aspect of waste avoidance, students still have the lowest score compared to other aspects. Students are not accustomed to making a habit of processing waste. One of them relates to the behavior of saving paper and using a personal bag for shopping. This habit needs to be instilled early on, for example, by moving to save paper made by the school through instructions from the school principal. Students are required to bring their drinking bottles from home and make students improve their behavior, especially in the aspect of waste avoidance(Avan, Aydinli, Bakar, & Alboga, 2011; Mahmud & Osman, 2010; Sudibyo, Pradana, Budiman, & Budhijanto, 2017).

Overall, in this context, environmental learning has an important role in improving

students' PEB. It is necessary for parents' participation in providing education to students to protect their environment, at least to protect the environment around their own homes. Environmental learning at the junior high school level becomes important because, at this level, students are experiencing significant growth and development to understand the concept of environment. This makes it easier for the teacher to direct students in changing their behavior. The teacher could have provided a project for students related to environmental care activities, for example, by asking students to make work-related to environmentally friendly aspects (Amaral & Santos, 2018; Derevenskaia, 2014; Jewpanich & Piriyasurawong, 2015; Musyaddad & Suyanto, 2019). For example, by asking students to make a work-related to making environmentally friendly bags. Science teaching-learning mainly depends on students' direct experience, which involves observation, critical reflection, and negotiation skills to learn. Students can have a deeper understanding of the environment and the impact of human behaviors on the environment through direct experience. Therefore, students can challenge different cultural perspectives concerning environmental problems and study them critically (Zandvliet & Ormond, 2014).

Science teachers need to use multiple teaching methods and teaching aids in their teaching-learning activities to make students learning more effective. Moreover, teachers should explore students' prior knowledge, misconception and connect them with new scientific knowledge in the science classroom (Rahman, 2018). In addition to providing a project, the teacher must also be able to provide a learning media that stimulates students to think critically in learning and have the creativity to solve environmental problems that surround them. Learning media such as videos, android applications, e-books will make students active and interested in the environment so that it will be easier for teachers to convey various concepts related to the environment. In this context, the teacher must develop their learning to be more interesting to students(Fitriani, Adisyahputra, & Komala, 2018; Hyun, Ediger, & Lee, 2017; Suhendar

& Wahyuni, 2018; Uzun, 2012; Weninger, 2018). Students can learn science more efficiently when they can look for information about science and ask questions based on their environment. There are many materials in the environment such as plastic, glass, bottles, iron scraps, textiles, woods, wires, and ceramic, etc. which are regarded as a pollutant. These materials can be used in classroom teaching as improvised instructional materials, which will increase students' creativity as they are involved in the improvisation and recycling process (Aina & Philip, 2013). Also, teachers must be able to give examples to students about environmentally-friendly behavior so that teachers can be an example for their students. This will facilitate the teacher in inviting students to behave in an environmentally friendly manner. This will later have an impact on the rise in PEB students.

CONCLUSION

Based on the results of this study concluded that the PEB score of students in 7th-grade is still in the moderate category. The teacher, as a facilitator in environmental learning, has an important role. Efforts that can be made by teachers to improve PEB 7th grade students are to provide project-based learning. Besides, environmental learning can be done with the help of learning media. This media will make students active and interested in environmental learning.

REFERENCES

Ahmad, T. B. T., & Nordin, M. S. (2014). University students' subjective knowledge of green computing and pro-environmental behavior. *International Education Studies*, *7*(2), 64–74. https://doi.org/10.5539/ies.v7n2p64

Aina, J. K., & Philip, Y. J. (2013). Imperative of Environment in Science Learning. *Open Science Journal of Education, 1*(1), 1-6.

Amaral, J. A. A. D., & Santos, R. J. R. L. D. (2018). Combining project-based learning and community-based research in a research methodology course: The lessons learned. *International Journal of Instruction*, *11*(1), 47–60.

Avan, C., Aydinli, B., Bakar, F., & Alboga, Y. (2011). Preparing Attitude Scale to Define Students' Attitudes about Environment, Recycling, Plastic and Plastic Waste. *International Electronic Journal of Environmental Education*, *1*(3), 179–191. Retrieved from https://search.proquest.com/docview/1697487841?accountid=130632

Baytar, F., & Ashdown, S. P. (2013). Using video as a storytelling medium to influence textile and clothing students environmental knowledge and attitudes. *International Journal of Fashion Design, Technology and Education*, *7*(1), 31–41. https://doi.org/10.1080/17543266.2013.864339

Buzov, I. (2014). Social Network Sites as Area for Students' Pro-environmental Activities. *Procedia - Social and Behavioral Sciences*, *152*, 1233–1236. https://doi.org/10.1016/j.sbspro.2014.09.304

Chander, P., & Muthukrishnan, S. (2015). Green consumerism and pollution control. *Journal of Economic Behavior and Organization*, *114*, 27–35. https://doi.org/10.1016/j.jebo.2015.02.013

Derevenskaia, O. (2014). Active Learning Methods in Environmental Education of Students. *Procedia - Social and Behavioral Sciences*, *131*, 101–104. https://doi.org/10.1016/j.sbspro.2014.04.086

Esa, N. (2010). Environmental knowledge, attitude and practices of student teachers. *International Research in Geographical and Environmental Education*, *19*(1), 39–50. https://doi.org/10.1080/10382040903545534

Fitriani, U., Adisyahputra, A., & Komala, R. (2018). Eco-friendly website development in biology learning based on project activities on environmental pollution. *Biosfer: Jurnal Pendidikan Biologi*, *11*(1), 32–46. https://doi.org/10.21009/biosferjpb.11-1.4

Hadzigeorgiou, Y. & Skoumios, M. (2013). The development of environmental awareness through school science: Problems and possibilities. *International Journal of Environmental and Science Education, 8*(3), 405-426. https://doi.org/10.12973/ijese.2013.212a

Hyun, J., Ediger, R., & Lee, D. (2017). Students' Satisfaction on Their Learning Process in Active Learning and Traditional Classrooms. *International Journal of Teaching*, *29*(1), 108–118. Retrieved from http://www.isetl.org/ijtlhe/

Jewpanich, C., & Piriyasurawong, P. (2015). Project-Based Learning Using Discussion and Lesson-Learned Methods via Social Media Model for Enhancing Problem Solving Skills. *International Education Studies*, *8*(6), 24–31. https://doi.org/10.5539/ies.v8n6p24

José Vinagre Díaz, J., Richard Wilby, M., & Belén Rodríguez González, A. (2013). Setting up GHG-based energy efficiency targets in buildings: The Ecolabel. *Energy Policy*, *59*(2013), 633–642. https://doi.org/10.1016/j.enpol.2013.04.021

Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behavior: The specific composition of a general performance. *Personality and Individual Differences*, *36*(7), 1531–1544. https://doi.org/10.1016/j.paid.2003.06.003

Kim, M. S., & Stepchenkova, S. (2019). Altruistic values and environmental knowledge as triggers of pro-environmental behavior among tourists. *Current Issues in Tourism*, 1–6. https://doi.org/10.1080/13683500.2019.1628188

Krettenauer, T. (2017). Pro-Environmental Behavior and Adolescent Moral Development. *Journal of Research on Adolescence*, *27*(3), 581–593. https://doi.org/10.1111/jora.12300

Lane, D., Jones, R., Mills, D., Wobus, C., Ready, R. C., Buddemeier, R. W., … Hosterman, H. (2015). Climate change impacts on freshwater fish, coral reefs, and related ecosystem services in the United States. *Climatic Change*, *131*(1), 143–157. https://doi.org/10.1007/s10584-014-1107-2

Lavelle, M. J., Rau, H., & Fahy, F. (2015). Different shades of green? Unpacking habitual and occasional pro-environmental behavior. *Global Environmental Change*, *35*, 368–378. https://doi.org/10.1016/j.gloenvcha2015.09.021

Lee, P.-S., Sung, Y.-H., Wu, C.-C., Ho, L.-C., & Chiou, W.-B. (2018). Using Episodic Future Thinking to Pre-Experience Climate Change Increases Pro-Environmental Behavior. *Environment and Behavior*, 1391651879059.

https://doi.org/10.1177/00139165187905
90

Mahmud, S. N. D., & Osman, K. (2010). The determinants of recycling intention behavior among the Malaysian school students: An application of Theory of Planned Behaviour. *Procedia - Social and Behavioral Sciences*, *9*, 119–124. https://doi.org/10.1016/j.sbspro.2010.12.123

Matthes, J., & Wonneberger, A. (2014). The skeptical green consumer revisited: Testing the relationship between green consumerism and skepticism toward advertising. *Journal of Advertising*, *43*(2), 115–127. https://doi.org/10.1080/00913367.2013.834804

McCarthy, B., & Liu, H. B. (2017). Food waste and the "green" consumer. *Australasian Marketing Journal*, *25*(2), 126–132. https://doi.org/10.1016/j.ausmj.2017.04.007

McGuire, N. M. (2015). Environmental education and behavioral change: An identity-based environmental education model. *International Journal of Environmental and Science Education*, *10*(5), 695–715. https://doi.org/10.12973/ijese.2015.261a

Musyaddad, A., & Suyanto, S. (2019). Evoking the four dimensions of student knowledge in ecosystem: effectiveness of real object, web, and blended learning. *Biosfer: Jurnal Pendidikan Biologi*, *12*(2).

Nwankwoala, H. N. L. (2015). Causes of Climate and Environmental Changes: The Need for Environmental-Friendly Education Policy in Nigeria. *Journal of Education and Practice*, *6*(30), 224–234.

Okur Berberoglu, E., Ozdilek, H. G., & Yalcin Ozdilek, S. (2014). The Short Term Effectiveness of an Outdoor Environmental Education on Environmental Awareness and Sensitivity of In-service. *International Electronic Journal of Environmental Education*, *5*(1), 1–20. https://doi.org/10.18497/iejee-green.03640

Olsson, M., & Kjällstrand, J. (2006). Low emissions from wood burning in an ecolabelled residential boiler. *Atmospheric Environment*, *40*(6), 1148–1158. https://doi.org/10.1016/j.atmosenv.2005.11.008

Otto, S., Neaman, A., Richards, B., & Marió, A. (2016). Explaining the Ambiguous Relations Between Income, Environmental Knowledge, and Environmentally Significant Behavior. *Society and Natural Resources*, *29*(5), 628–632. https://doi.org/10.1080/08941920.2015.1037410

Pagiaslis, A., & Krontalis, A. K. (2014). Green Consumption Behavior Antecedents: Environmental Concern, Knowledge, and Beliefs. *Psychology & Marketing, 31*(5), 335–348. https://doi.org/10.1002/mar.20698

Rahman, M. M. (2018). Exploring science teachers' perception of classroom assessment in secondary schools of Bangladesh. *European Journal of Education Studies, 4*(9), 139-160. https://www.doi.org/10.5281/zenodo.1296835

Schmitt, M. T., Aknin, L. B., Axsen, J., & Shwom, R. L. (2018). Unpacking the Relationships Between Pro-environmental Behavior, Life Satisfaction, and Perceived Ecological Threat. *Ecological Economics*, *143*, 130–140. https://doi.org/10.1016/j.ecolecon.2017.07.007

Seebauer, S., Fleiß, J., & Schweighart, M. (2017). A Household Is Not a Person: Consistency of Pro-Environmental Behavior in Adult Couples and the Accuracy of Proxy-Reports. *Environment and Behavior*, *49*(6), 603–637. https://doi.org/10.1177/0013916516663796

Sheng, G., Xie, F., Gong, S., & Pan, H. (2019). The role of cultural values in green purchasing intention: Empirical evidence from Chinese consumers. *International Journal of Consumer Studies*, *43*(3), 315–326. https://doi.org/10.1111/ijcs.12513

Shin, Y. H., Im, J., Jung, S. E., & Severt, K. (2017). Consumers ' Willingness to Patronize Locally Sourced Restaurants : the Impact of Environmental Concern , Environmental Knowledge , and Ecological Behavior. *Journal of Hospitality Marketing & Management*, 1–15. https://doi.org/10.1080/19368623.2017.1263821

Song, Q., Li, J., Duan, H., Yu, D., & Wang, Z. (2017). Towards to sustainable energy-efficient city: A case study of Macau. *Renewable and Sustainable Energy Reviews*, *75*(August), 504–514.

https://doi.org/10.1016/j.rser.2016.11.01
8

Sudibyo, H., Pradana, Y. S., Budiman, A., & Budhijanto, W. (2017). Municipal Solid Waste Management in Indonesia - A Study about Selection of Proper Solid Waste Reduction Method in D.I. Yogyakarta Province. *Energy Procedia*, *143*, 494–499. https://doi.org/10.1016/j.egypro.2017.12.716

Suhendar, S., & Wahyuni, A. (2018). Achievement and response of students at favorite junior high schools in sukabumi on trends in international mathematics and science study (timss) questions. *Biosfer: Jurnal Pendidikan Biologi*, *11*(2), 126–133. https://doi.org/10.21009/biosferjpb.v11n2.126-133

Tang, Y., Geng, L., Schultz, P. W., Zhou, K., & Xiang, P. (2017). The effects of mindful learning on pro-environmental behavior: A self-expansion perspective. *Consciousness and Cognition*, *51*, 140–148. https://doi.org/10.1016/j.concog.2017.03.005

Uzun, N. (2012). A Sample of Active Learning Application in Science Education: The Thema "Cell" with Educational Games. *Procedia - Social and Behavioral Sciences*, *46*, 2932–2936. https://doi.org/10.1016/j.sbspro.2012.05.592

Vicente-Molina, M. A., Fernández-Sainz, A., & Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *Journal of Cleaner Production*, *176*, 89–98. https://doi.org/10.1016/j.jclepro.2017.12.079

Wen, W. cheng, & Lu, S. yun. (2013). Marine environmental protection knowledge, attitudes, behaviors, and curricular involvement of Taiwanese primary school students in senior grades. *Environmental Education Research*, *19*(5), 600–619. https://doi.org/10.1080/13504622.2012.717219

Weninger, C. (2018). Problematising the notion of "authentic school learning": insights from student perspectives on media/literacy education. *Research Papers in Education*, *33*(2), 239–254. https://doi.org/10.1080/02671522.2017.1286683

Yedla, S., & Park, H. S. (2017). Eco-industrial networking for sustainable development: review of issues and development strategies. *Clean Technologies and Environmental Policy*, *19*(2), 391–402. https://doi.org/10.1007/s10098-016-1224-x

Yue, B., Sheng, G., She, S., & Xu, J. (2020). Impact of Consumer Environmental Responsibility on Green Consumption Behavior in China: The Role of Environmental Concern and Price Sensitivity. *Sustainability*, *12* (5), 2074. https://doi.org/10.3390/su12052074

Yusof, N., Rahman, S., & Iranmanesh, M. (2016). The environmental practice of resorts and tourist loyalty: the role of environmental knowledge, concern, and behaviour. *Anatolia*, *27*(2), 214–226. https://doi.org/10.1080/13032917.2015.1090463

Zandvliet, D. B., & Ormond, C. G. (2014). Environmental Learning as a Unique Context for Science Education. *Brazilian Journal of Research in Science Education*, *14*(2), 279-292.