

## Research Article

## The completeness of environmental literacy aspects studied in the articles published in several countries

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## ARTICLE INFO

## ABSTRACT

## Article history

Received January 06, 2020

Revised February 07, 2020

Accepted February 24, 2020

Published March 31, 2020

## Keywords

Environmental literacy

Research trends

Several countries

Environmental literacy is indicated as one element of learning that is able to solve environmental problems. However, the extent to which the environmental literacy component is embedded in various levels of education has not been revealed much. This study aims to determine the environmental literacy of students in several countries, starting from primary school to university level. Research of the content analysis model was carried out by analyzing 25 articles from international journals and proceedings during 2012-2018. Environmental literacy instruments in this study refer to the evaluation of environmental literacy developed by Liang. The data analysis was performed quantitatively and presented as a percentage. The results showed that the majority of environmental literacy components that were widely studied and developed included cognitive, affective, and psychomotor (48%). Furthermore, junior high school (30.77%) and senior high school (23.08%) were chosen as research subjects in an effort to form a literate generation of the environment. The results of this study can be followed up with the optimization of efforts to strengthen environmental literacy through an appropriate learning process.



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*How to cite:* Ulfah, M., Suyanto, S., & Aminatun, T. (2020). The completeness of environmental literacy aspects studied in the articles published in several countries. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 6(1), 75-82. doi: <https://doi.org/10.22219/jpbi.v6i1.10813>

## INTRODUCTION

Environmental literacy is widely believed to be the way out in solving global problems in society (Fidan & Ay, 2016; Igbokwe, 2012; Pe'er, Goldman, & Yavetz, 2007). Problems such as deforestation (Buitre, Zhang, & Lin, 2019; Kabir et al., 2014; Nagra, 2010) and pollution (Emeh & Igwe, 2018; Kurt, Zhang, & Pinkerton, 2016) cause loss of biodiversity and environmental degradation (Anderson, 2013; Sadhu, Garg, & Kumar, 2018). These various environmental problems are closely related to human activities (Tyagi, Garg, & Paudel, 2014). Thus, a good understanding of managing the environment is an important element that needs to be continually reviewed and acted upon (Igbokwe, 2012).

Nowadays, research on environmental literacy has been widely carried out in various parts of the world, such as Europe (Rechkemmer & Falkenhayn, 2009; Saltan & Divarci, 2017), North America (McBride, Brewer, Berkowitz, & Borrie, 2013), Africa (El-Batri, Alami, Zaki, & Nafidi, 2019), Australia (Kidman & Casinader, 2019), to Asia (Liang et al., 2018; Nunez & Clores, 2017). These studies raise the latest issues related to environmental literacy issues such as community literacy profiles and the efforts to increase the level of community literacy (Anggraini, Karyanto, & Sarwanto, 2018; Nastoulas, Marini, & Skanavis, 2017). The North American Association for Environmental Education (NAAEE) has outlined the main components that need to be considered when evaluating environmental literacy, and these include (1) cognitive (knowledge and skills), (2) affective, and (3) behavior (Hollweg et al., 2000).

Interestingly, not much research on environmental literacy has examined the three components holistically. Some studies only focus on cognitive and affective aspects (Anggraini et al., 2018; Pujianti, Munandar, & Surakusumah, 2018), others on behavior aspects (Nunez & Clores, 2017; Sachitra & Kaluarachchi, 2018). Karimzadegan and Meiboudia (2012) reported that not all components of environmental literacy received the same attention in Iran. Similar results were also observed in studies conducted relating to the environmental literacy component in Macedonia, Turkey, and Bulgaria. For example, little attention is paid to skills and very little attention to attitudes and behavior in Turkey (Srbinovski, Erdogan, & Ismaili, 2010).

The various research results raise big questions about the extent to which efforts to increase environmental literacy have been made so far. Even so, with the effectiveness of efforts that have been made. The most basic thing is, environmental problems are problems that need to be seen, understood, and resolved holistically so that there are many studies that can answer that question (McBride et al., 2013; Voulvoulis & Burgman, 2019).

However, not many studies have examined the extent of environmental literacy that has been done so far. Thus, the effectiveness of the efforts that have been made has not been widely revealed and has an impact on limited sustainability and better improvement efforts. This study aims to uncover the extent to which the component of environmental literacy is examined in research in various countries. The research results can be followed up with further research and efforts to maximize literacy improvement efforts and the creation of an environmentally conscious generation.

## METHOD

Content analysis research design is done by reviewing and analyzing research data that has been done before. The topic in this content analysis is about the environmental literacy of students in several countries ranging from elementary school to university level. The population in this study are all research documents regarding environmental literacy. The sample consisted of journal articles and proceedings of 25 articles from 2012-2018. Articles are obtained using the Google Scholar search engine with the keywords environmental literacy or environmental literacy profiles. The research sample was taken using purposive sampling technique. The scope of this research is research related to environmental literacy that has been carried out globally in various countries (Liang et al., 2018).

**Table 1.** Categories of each aspect examined in this study

No	Aspects	Categories
1	Location	1) Europe; 2) North America; 3) South America; 4) Africa; 5) Australia and Oceania; 6) Asia; 7) others
2	Environmental literacy components	1) cognitive; 2) affective; 3) behavior; 4) cognitive and affective; 5) cognitive and behavior; 6) affective and behavior; 7) cognitive, affective, and behavior; 8) others
3	Methods, models, or programmes are developed	1) instructional method; 2) developing instructional media; 3) developing programmes; 4) others
4	Research samples	1) primary school; 2) junior high school; 3) senior high school; 4) university; 5) others

Data analysis was performed quantitatively with percentages to describe data from the research found. There were three aspects analyzed in this study. Based on Table 1, the three aspects, i.e. location where the environmental literacy was conducted (seven categories), environmental literacy components (eight categories), methods, models, or programmes are developed (four categories), and research samples (five categories). Each article will be coded according to the categories presented in Table 1. Next, the number of occurrences of each label was calculated.

## RESULTS AND DISCUSSION

The results showed that research on environmental literacy was mostly carried out in European and Asian countries, respectively 48% and 52% (Figure 1). Furthermore, 48% of studies have measured or developed all three aspects of environmental literacy (Figure 2). The researchers measured or observed all components of environmental literacy to see the relationship between cognitive, affective, and behavioral components. Someone is considered to have environmental literacy if that person has knowledge and attitudes about the environment and issues related to the environment, and through the skills acquired to help minimize or solve environmental problems and continue to participate in contributing to society actively. Behavior and attitudes to care for the environment are the responsibility of every individual, which is generally strongly influenced by knowledge factors. People who have a high level of environmental knowledge will influence environmental attitudes and behavior, which will also be better.

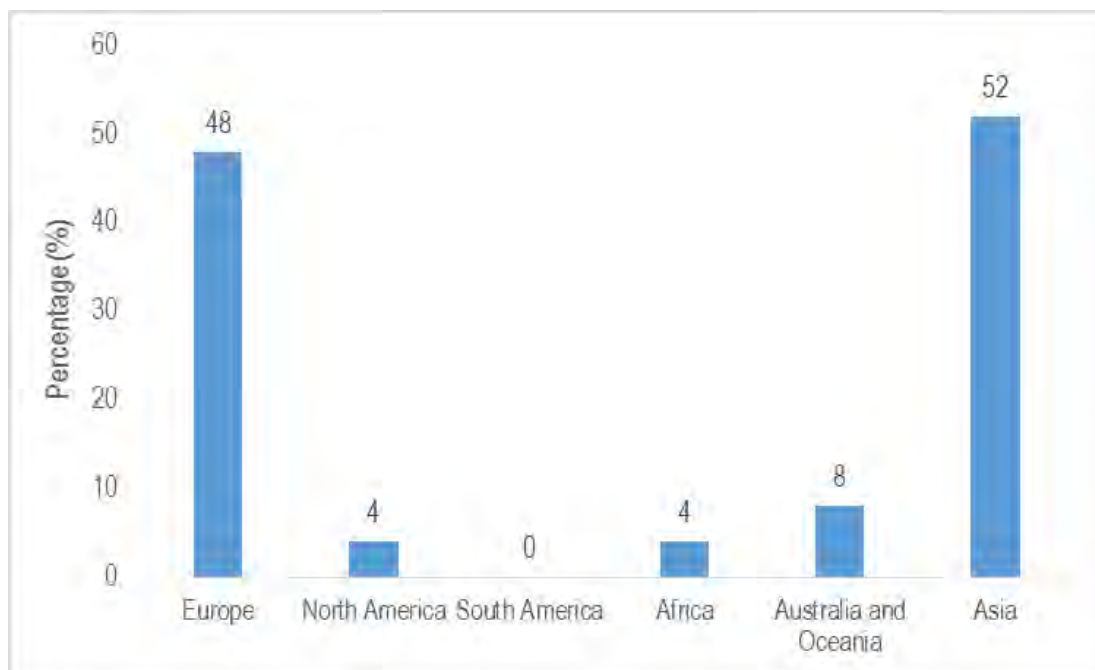


Figure 1. Distribution of environmental literacy research

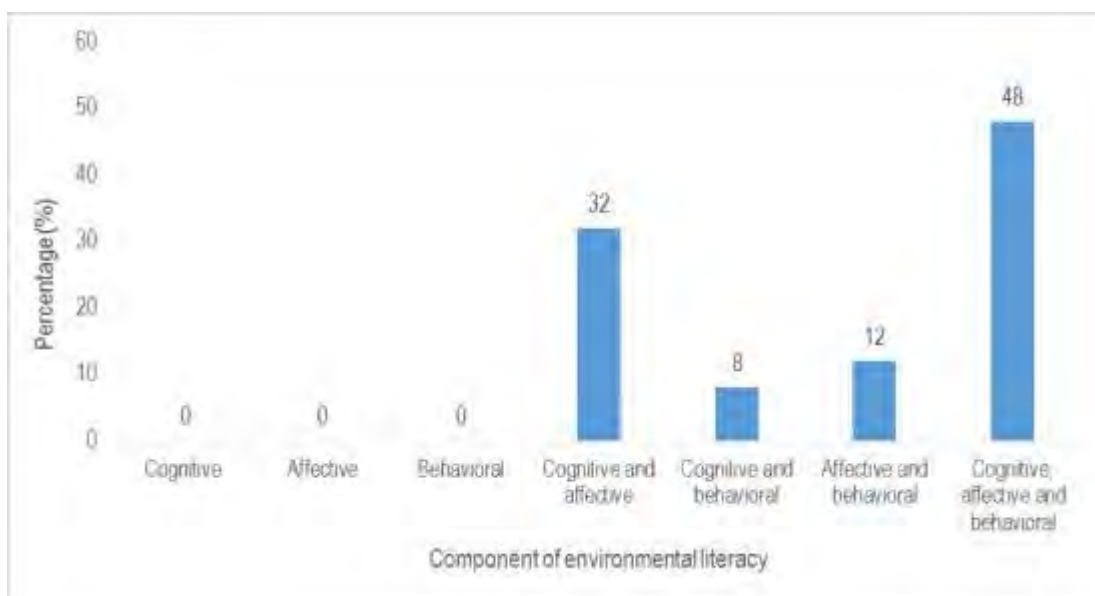


Figure 2. Environmental literacy components that observed or developed

Hollweg et al. (2000) defines a person who is environmentally literate as someone who is able, both individually and with others, to make informed decisions about the environment, willing to act in the interests of many people. The consequences of iteration literacy require a comprehensive measurement because the components in environmental literacy are closely related. Taff, Aziz, Haron, Rasyid, and Yasim (2010) said that environmental knowledge influences attitudes, which will ultimately increase behavioral intentions. Furthermore, other researchers believe that the motivation for caring about the environment, as a literal manifestation of society, is the result of the interaction between knowledge, attitudes, and concern for the environment (Igbokwe, 2012; Maulidya, Mudzakir, & Sanjaya, 2014).

In addition to the three components of environmental literacy, the increase in literacy is also determined by the method, model, or program were carried out. However, there is not too much research on developing methods, models, or programs to improve student environmental literacy (Goldman, Yavetz, & Pe'er, 2014; Jannah, Halim, Meerah, & Fairuz, 2013; Taff et al., 2010). The most widely used method is the development of representative media to increase student literacy (Suryanti, Sinaga, & Surakusumah, 2018). Some of these include the development of integrated teaching materials (Febriasari & Supriatna, 2017), the development of environmental education modules (Jannah et al., 2013), and the use of information technology-based media such as blogs (Saltan & Divarci, 2017). Issues related to environmental problems, such as pollution (Kurt et al., 2016), open space availability (Miharja, Husamah, & Muttaqin, 2018), and changes in environmental functions (Hanjra & Qureshi, 2010) form the basis of development. The choice of issues is associated with phenomena and events that are close to students' lives, making it easier for students to understand environmental concepts in depth. Furthermore, media development is also carried out by considering student learning activities so that learning outcomes that are designed include cognitive, functional, and behavioral components with the aim of training students in environmental literacy.

Besides, the development of environmental management campaign programs, both within the scope of schools or larger scopes such as the state, is also widely practiced. Implementation of the program can progressively have a significant impact on the cognitive and affective components (Goldman et al., 2014; Spinola, 2015). Significant contributions in the cognitive realm, especially in developing a systemic understanding of the environment, place ecological concepts and processes in a holistic environmental context. On the other hand, the implementation of learning models based on higher-order thinking skills such as problem-based learning (Febriasari & Supriatna, 2017) and environmental-based learning (McComas et al., 2018; Pujianti et al., 2018) is also reported to increase environmental literacy. Students' thinking skills are optimized through a systematic group process so students can empower, sharpen, test, and develop their thinking skills continuously (Frisk & Larson, 2011; Lewinsohn et al., 2014).

As stated earlier, the school-level analysis used in environmental literacy research needs to be done. The results of the study (Figure 3) indicate that junior high schools and senior high schools are widely used as research sample units as high as 30.77% and 23.08%, respectively.

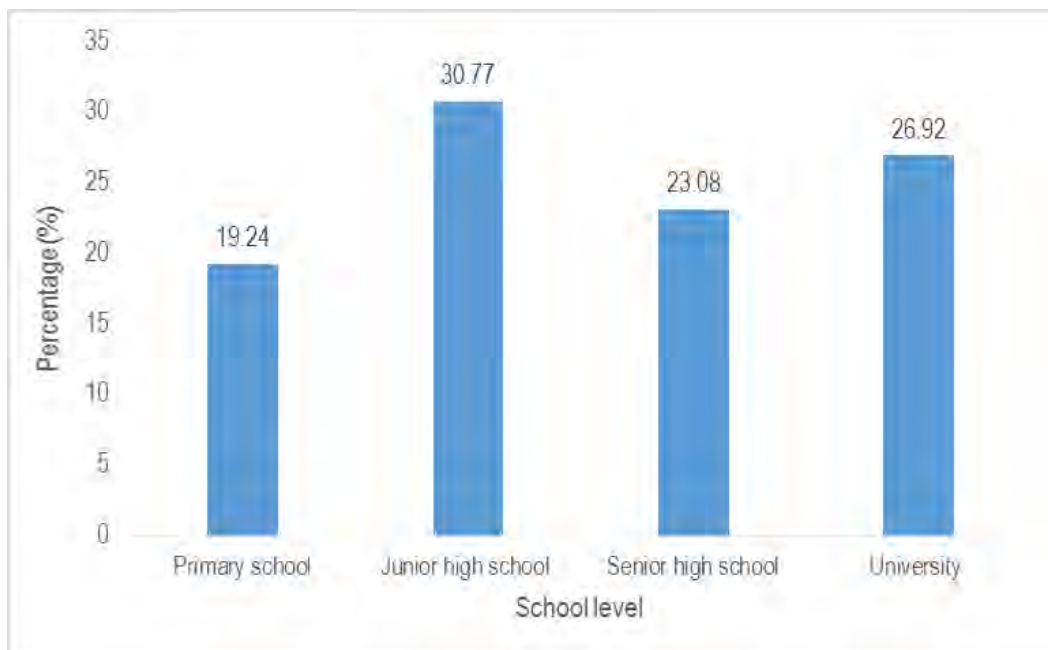


Figure 3. Distribution of environmental literacy at the school level

Middle school students, according to some experts, are more representative of social groups who are at the stage of cognitive development and describe groups who seek identity as part of society and environmental decision-makers (Alkather & Goldman, 2018; Nastoulas et al., 2017; Stevenson, Peterson, Bondell, Mertig, & Moore, 2013). Although environmental education needs to be instilled as early as possible as, at the elementary school level, secondary school students are indicated to have gained a longer learning experience, especially in subjects that contain environmental education so that students are accustomed to finding and solving environmental problems (Srbnovski et al., 2010). It is indicated to assist students in making decisions and taking positions to be able to act and provide solutions to environmental problems (Igbokwe, 2012; Karimzadegan & Meiboudia, 2012). So, environmental literacy research is mostly done at the secondary school level.

However, efforts made at school do not always show positive results (Febriasari & Supriatna, 2017; Liang et al., 2018). As a whole, the cognitive component, including knowledge and skills, of students are at low to moderate levels, the affective component of students is at low to high levels, while student behavior is at low to medium levels (Anggraini et al., 2018; Liang et al., 2018; Rahman & Nasri, 2018). Therefore, it can be said that overall the environmental literacy of students ranging from elementary school to university level is at the secondary level (Liang et al., 2018; Mogias et al., 2019; Sadik & Sadik, 2014). Students' knowledge about the environment is still considered insufficient, especially for students at the primary and secondary school level, they are not accustomed to doing the learning process related to environmental problems and looking for solutions related to these problems (Longsiri, Vanitchung, Boonprakob, & Dahsah, 2017; Suryanti et al., 2018).

There results indicate that environmental knowledge needs to be taken more seriously, both in formal and informal environmental education, especially about environmental issues, and it is claimed to be one of the topics or knowledge students must learn in the 21st Century. Students' attitudes and concerns are indicated as the capital caring for the environment but have not been able to do many things, and sometimes there is still a feeling of being reluctant to act. In other words, their caring attitude has not been accompanied by concrete actions.

## CONCLUSION

The results showed that 53% of environmental literacy studies had integrated the three components in literacy measurement. Furthermore, secondary schools are considered as the right group to develop environmental literacy that will produce a generation that is environmentally aware. This study recommends strengthening environmental literacy from the level of basic education and optimizing implementation in the learning process using relevant models and methods.

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