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Trends in environmental education: A systematic review

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Abstract

The aim of this study is to review trends in environmental education studies in the electronic database. Moreover, journals published in the electronic database were searched using the same keyword. 28 studies trends in environmental education context were analyzed by means of standards obtained from the related literature. A qualitative thematic review was used in this study. All articles were downloaded and read by the researchers. Each researcher studied together to determine themes. The themes were decided as attitudes toward environmental awareness and education, relation between environmental education and other variables, effectiveness of environmental education and review studies. Results reviewed in terms of trends in environmental education studies. Some implications of these results were proposed for determining and developing trends in environmental education studies.

Keywords: environmental education, trends in environmental education

INTRODUCTION

Environmental education can be defined as the act or process of developing or increasing knowledge and understanding of natural, physical and human environments through the application of an interdisciplinary approach, with a focus on increasing public understanding and appreciation for nature and the environment (Smolyaninova et al., 2021; Sorakin et al., 2022). It is an educational tool for transforming student learners into environmental and civic leaders who can make informed choices about how we live on a sustainable footing (Oschepkov et al., 2022; Qarkaxhja et al., 2021). Environmental education can take place in a variety for ways, and in many communities, it is used to develop community resilience, increase individual and community voluntary engagement, and improve environmental quality. Environmental education is an important part of environmental management, environmental planning, and environmental health and safety. It can also be used to promote environmental literacy, protect natural resources and ecosystems, and raise awareness among people in the society.

Environmental education has become popular recently. People are becoming more and more curious about the natural world and how to preserve it. It is a positive development to give importance to our planet currently facing serious environmental issues. This trend is occurring for many different reasons. The fact that people are becoming more environmentally conscious is one factor. People are beginning to understand the importance of protecting our planet as a result of media coverage of issues like climate change. The desire of people to interact with nature is another factor. It's simple to feel cut off from nature in the busy modern world we live in. We can become more connected to

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Contribution to the literature

- This study can provide a comprehensive summary of the current research in the field including the main findings, key studies and important theories.
- This article can summarize the results of different studies to give a more complete picture of the current state of knowledge on environmental education.
- This study can highlight the most important findings and developments in environmental education showing what is already known and what needs further investigation.

nature and understand its beauty with the aid of environmental education. The global impact of this trend is positive. More and more people are taking action to preserve the environment. They are conserving energy, using less water, and recycling. The significance of environmental protection is also being communicated by them to others. Environmental protection can be realized as more people get involved.

There are numerous studies in the literature about environmental education. Some of these studies are related to environmental awareness and attitudes toward the environment. Many studies investigating attitudes towards the environment showed that most of the participants develop positive attitudes toward environment (Adanali & Mete, 2019; Dolenc Orbanic & Kovac, 2021; Durmus & Kinaci, 2021; Miyaji & Fukui, 2020; Molefe & Aubin, 2021; Ozonur, 2021; Shagiakhmetova et al., 2022; Zhdanov et al., 2022).

Some studies have investigated the relationship between environmental education and some variables that may be related to it. In these studies, the relationship between environmental education and factors such as gender (Kaya et al., 2021; Onal, 2020; Praimee et al., 2022), school years and departments (Ozonur, 2021), environmental literacy, environmental awareness (Dolenc Orbanic & Kovac, 2021; Khobotova et al., 2022) and attitudes towards environmental education are mostly questioned.

Some researchers have conducted some experimental studies to increase the effectiveness of environmental education and as a result, they have determined that these activities contribute to the development of environmental education (Aksut & Aydin, 2021; Ayaz et al., 2021; Bardecki & McCarthy, 2020; Corpuz et al., 2022; Fettahlioglu, 2018; Hamalosmanoglu et al., 2020; Nogales-Delgado & Encinar Martín, 2019; Sims et al., 2020; Sookngam et al., 2021; Wongchantra et al., 2022a, 2022b).

Finally, a small number of studies are at the level of review studies. The first part of these studies is a review of master's and doctoral theses on environmental education (Dasdemir, 2018; Tumer, 2021). In another study, (Ulfah et al., 2020) a valid and reliable scale related to environmental education was prepared and the effectiveness of this scale was tested.

METHOD

This study is a systematic review related to trends in environmental education in last five years. Environmental education and trends in environmental education were used as keywords through the ERIC electronic database. Keywords were searched and 116 articles were found by selecting full text and peer reviewed articles. Finally, 28 articles selected after reviewing all articles according to their contents. These 28 articles were reviewed one by one in detail. A qualitative systematic review was used in this study. All articles were downloaded and read by the researchers. Each researcher studied together to determine themes. The themes were decided as attitudes toward environmental awareness and education, relation between environmental education and other variables, effectiveness of environmental education and review studies. **Table 1** summarizes authors of the articles, profile of the participants and research design. **Table 1** shows that most of the data collection tools were quantitative tools such as Likert test, survey, questionnaire and scale. On the other hand, the interview was used extensively as a qualitative data collection tool. Both quantitative and qualitative tools were used in some of the studies. These studies were called "mixed" studies.

All of the articles reviewed in this study are indexed in ERIC and Google Scholar Index. On the other hand, 25 percent of the journals in which the articles in this review published are indexed in the Scopus Database, while 10 percent are indexed in the ERIH PLUS Index.

THEME 1. ENVIRONMENTAL AWARENESS AND ATTITUDES TOWARD ENVIRONMENTAL EDUCATION

Most of the studies showed that environmental awareness and attitudes toward environmental education were positive. For example, Dolenc Orbanic and Kovac (2021) showed that students have a high degree of environmental awareness and most of them showed a positive attitude towards nature and its protection. The students emphasized the importance of environmental education in early childhood. The study showed that overall, there was no significant difference in student responses between the two courses, suggesting that course content has less impact on

Table 1. Article authors, country, profile of the participants, and data collection tools

Authors	Country	Profile of the participants	Research design
Adanali and Alim (2019)	Turkey	19 prospective teachers	Mixed
Afacan (2020)	Turkey	206 pre-service teachers	Quantitative
Aksut and Aydin (2021)	Turkey	4th grade preservice teachers	Quantitative
Ayaz et al. (2021)	Turkey	46 pre-service teachers	Mixed
Bardecki and McCarthy (2020)	Canada	Pre-service teachers	Quantitative
Chen et al. (2020)	Taiwan	221 students	Quantitative
Corpuz et al. (2022)	Philippines	10 deans, 10 chairs, 171 teachers, & 344 students	Quantitative
Dasdemir (2018)	Turkey	124 MA & PhD theses	Qualitative
Demirkaya et al. (2020)	Turkey	26 prospective teachers	Mixed
Doleac Orbanic and Kovac (2021)	Slovenia	152 undergraduate students	Quantitative
Durmus and Kinaci (2021)	Turkey	15 student teachers	Qualitative
Fettahlioglu (2018)	Turkey	26 prospective teachers	Quantitative
Hamalosmanoglu et al. (2020)	Turkey	130 prospective teachers	Quantitative
Junkaew et al. (2021)	Thailand	99 students	Quantitative
Kaya et al. (2021)	Turkey	172 prospective teachers	Quantitative
Kilicoglu (2021)	Turkey	155 teacher candidates	Quantitative
Miyaji and Fukui (2020)	Japan	22 elementary school teachers	Quantitative
Nogales and Martín (2019)	Spain	10 people	Quantitative
Onal (2020)	Turkey	114 pre-school teacher candidates	Mixed
Ongon et al. (2021)	Thailand	89 students	Quantitative
Ozonur (2021)	Turkey	470 prospective teachers	Quantitative
Praimee et al. (2022)	Thailand	329 undergraduate students	Quantitative
Sims et al. (2020)	Turkey	17 former students	Mixed
Sookngam et al. (2021)	Thailand	161 students	Quantitative
Tumer (2021)	Turkey	12 postgraduate theses	Quantitative
Ulfah et al. (2020)	Indonesia	25 articles	Quantitative
Wongchantra et al. (2022a)	Thailand	50 3rd year undergraduate students	Quantitative
Wongchantra et al. (2022b)	Thailand	72 2nd year students	Quantitative

student understanding, behavior and attitudes. Similarly, Ozonur (2021) stated that the general awareness of environmental issues among prospective teachers was higher than average. Also, when analyzing the data by school years and departments, the results showed significant differences in the level of awareness of student teachers about environmental issues.

On the other hand, environmental awareness and positive attitudes toward environmental education has positive impact on cognitive, affective and behavioral dimensions of environmental education. As an example, Durmus and Kinaci (2021) stated that student-teachers in the social sciences have a globally correct perception of the concepts of environmental education and ecological education. It can also be seen that students in social science teacher education indicated that environmental education promotes development in its cognitive, affective and behavioral dimensions such as information and increased awareness of resource use, self-awareness and environmental sensitivity, problem solving, understanding of sustainability, positive attitudes and behavioral developments and changes that have a positive effect on an individual's level of environmental literacy. In addition, Miyaji and Fukui (2020) concluded that the average score for all subjects on trust and willingness to participate in environmental education increased. In terms of skill awareness, students feel that their skills have improved significantly in all subjects. Moreover, Adanali and Mete (2019) revealed that students' problem-solving abilities improved, and they learned how to use GPS technology; instructional geocaching game (IGG) helped students become more motivated and helped them become more aware of environmental issues and natural disasters. Additionally, a few tactics for practicing the game came into play. Students evaluated IGG as a geography game and it supported their problem-based learning (PBL) process. Likewise, Molefe and Aubin (2021) found that the statistical analysis of the teachers' responses highlighted the value of lifelong learning, community involvement in environmental education, and the growth of analytical and problem-solving abilities.

THEME 2. RELATION BETWEEN ENVIRONMENTAL EDUCATION AND OTHER VARIABLES

Some of the studies investigated the relation between environmental education and other variables such as gender, learning outcomes, environmental literacy, self-efficacy beliefs etc. Particularly, Chen et al. (2020) revealed that there are positive correlations between environmental education and learning outcomes, learning outcomes and environmental literacy, and environmental education and environmental literacy.

Furthermore, Demirkaya et al. (2020) showed that "ecology-based environmental education in national park" positively influenced student teachers' attitude towards national parks and positively influenced their understanding of ecological environmental education.

On the other hand, Onal (2020) discovered that pre-school teacher candidates had moderate self-efficacy beliefs and attitudes. While there is no gender difference in these factors, there is a significant difference between them and the variables of self-efficacy in taking prior environmental education courses and in future environmental education courses. Additionally, it has been discovered that attitudes toward environmental issues and self-efficacy beliefs in environmental education are positively correlated. The results from the interviews are in line with these findings. In addition, the results of the analysis conducted by Kaya et al. (2021) concluded that prospective teachers' self-efficacy in environmental education was moderate, and the perceived self-efficacy level of prospective teachers did not show significant differences with respect to gender and grade variables. In a similar way, Praimee et al. (2022) carried out a study in northeast Thailand and found that there were no differences in knowledge scores and attitudes toward wetland management between students of different genders. There are statistically significant differences in environmental ethics among students of different genders. Men score higher than women on environmental ethics in wetland management in northeastern Thailand. Besides this, Afacan (2020) showed that the behavioral outcomes of preschool teachers for sustainable environmental education did not differ significantly by gender. In addition, second and third grade preschool teachers had significantly different mean scores on the eco-friendly and recyclable products scale subfactors in favor of the second grade. However, as a result of the Kilicoglu's (2021) study, significant differences were found in the evaluations of social studies teacher candidates according to the following criteria: class level in the "perceived academic competence dimension", gender in the "perceived responsibility dimension" and affiliation in the "perceived responsibility dimension" and "pedagogical competence dimension" in environmental organization. Finally, the results of Ongon et al.'s (2021) study showed that students had mean environmental knowledge, environmental ethics, and environmental volunteer scores in the post-test greater than the pre-test statistical significance. There was no significant difference between the mean environmental literacy, environmental ethics, and environmental volunteering scores of undergraduate students of different genders. There was a statistically significant difference between the mean environmental knowledge, environmental ethics, and environmental volunteering scores of college students.

THEME 3. EFFECTIVENESS OF ENVIRONMENTAL EDUCATION

Effectiveness of environmental education was investigated in some studies in the literature. For instance, Ayaz et al. (2021) revealed that activity-based environmental education has been shown to have positive effects on pre-service teachers' cognitive, emotional and behavioral levels. Preschool teachers stated that they preferred activity-based courses to make learning subjects more solid, to increase awareness of environmental protection, and to practice many environmental protection actions in daily life.

Moreover, the results of the study conducted by Sims et al. (2020) showed that these environmental and sustainability education (ESE) instructional strategies are effective. This study contributed to calls for empirical research on the effectiveness of ESE pedagogy and for researchers to critically reflect on such research. Similarly, Aksut and Aydin (2021) carried out a study showing that creating and implementing digital stories in preschool programs can improve student learning outcomes. Digital stories can also be used as a teaching method in preschool education. Thus, the integration of technology in environmental education in early childhood education has demonstrated the importance of technological pedagogical content knowledge. Besides this, Nogales-Delgado and Encinar Martín (2019) presented a concrete example of environmental education in a laboratory dedicated to the production of biodiesel and bio lubricants, covering a wide range of academic levels and choosing the right content (theoretical and practical) according to the audience.

Based on research conducted by Bardecki and McCarthy (2020) it was summarized the latest developments in electrical engineering programs in Ontario schools. It was also identified key institutional elements that contribute to and influence the environmental education implementation process and focuses on their role in provincial environmental curriculum development. Significantly, Corpuz et al. (2022) concluded that environmental education is integrated into teacher education programs, but the results of students' knowledge and skills acquisition still need to be strengthened.

Wongchantra et al. (2022b) showed that the efficiency of the environmental education program. Students improved their knowledge and as a result, students progressed academically and the average score of students' knowledge, environmental attitude and environmental morality is significantly higher than before learning. On the other hand, students of different genders have no difference in knowledge, attitude towards the environment and environmental ethics. Accordingly, Wongchantra et al. (2022a) showed that the environmental education learning plans to improve river management in northeast Thailand with

community learning were highly effective. It was shown that the knowledge of the students increased and led the students to progress during their studies. Students had mean posttest environmental knowledge, attitude, and ethics scores above the pretest statistical significance. There was a statistically significant difference between knowledge, attitudes and environmental ethics score of gender diverse students. In a similar way, Sookngam et al. (2021) revealed that the average score of students on knowledge of soil, water and forest conservation, the concept of King Rama IX of Thailand, environmental ethics and environmental volunteers in the post-test was higher than the statistical significance of the pre-test. Likewise, at the end of the study conducted by Fettahlioglu (2018), it was noted that the prospective science teachers' self-efficacy according to environmental education differed statistically in favor of the post-test. Furthermore, it was also found that, prospective science teachers' perceptions of environmental issues differed based on their self-efficacy beliefs at the end of the study. Furthermore, Junkaew et al. (2021) discovered that students' average knowledge scores on Khok Hin Lad community forests, environmental ethics, and environmental volunteers were higher after learning activities than before the learning activities' statistical significance; and students of different genders did not differ in their knowledge of Khok Hin Lad community forests, environmental ethics, and environmental volunteers. The knowledge of the Khok Hin Lad community forest, environmental ethics, and environmental volunteers was the same for all students, regardless of GPA. According to Hamalosmanoglu et al. (2020), it was discovered that after watching the movie, the audience members' behavior toward environmental issues and their attitudes toward recycling and solid waste both improved. The results also showed that behavior of the prospective teachers toward environmental issues was significantly predicted by attitude toward recycling and solid waste.

THEME 4. REVIEW STUDIES

There are a small number of review studies about environmental education and trends in the literature in last five years. Firstly, Tumer (2021) established that the number of master's theses (n=8) is much higher than the number of doctoral theses (n=4), and in 2015 the number of theses has increased greatly. The number of theses are doctoral theses (n=3) and postgraduate theses are mainly about children within the specified dates. In addition, Dasdemir (2018) showed that the University of Gazi has published the largest number of articles, and the faculty of science has the most articles, these articles mainly used mixed methods, the framework of environmental education and the importance of environmental education were studied. Most of them are university students and high school students. The environmental attitude scale is primarily used as a data collection tool, and there are many parametric tests. Finally, Ulfah et al. (2020) revealed that cognitive, affective, and psychomotor skills accounted for most environmental literacy components that had been extensively researched and developed (48%). Junior high school (30.77%) and senior high school (23.08%) were selected as research subjects to create an environmentally conscious generation of readers.

CONCLUSION, DISCUSSION, AND RECOMMANDATIONS

This review study examined previous research on the trends in environmental education. These studies generally aimed to determine participants' environmental awareness and attitudes toward environmental education (Adanali & Mete, 2019; Dolenc Orbanic & Kovac, 2021; Durmus & Kinaci, 2021; Miyaji & Fukui, 2020; Molefe & Aubin, 2021; Ozonur, 2021).

Some studies in the literature aimed to emphasize the effectiveness of specific environmental education program (Aksut & Aydin, 2021; Ayaz et al., 2021; Bardecki & McCarthy, 2020; Corpuz et al., 2022; Fettahlioglu, 2018; Hamalosmanoglu et al., 2020; Junkaew et al., 2021; Nogales-Delgado & Encinar Martín, 2019; Sims et al., 2020; Sookngam et al., 2021; Wongchantra et al., 2022a, 2022b). While others tried to show a relation between environmental education and other variables (Afacan, 2020; Chen et al., 2020; Demirkaya et al., 2020; Kaya et al., 2021; Kilicoglu, 2021; Onal, 2020; Ongon et al., 2021; Praimee et al., 2022). Finally, a small number of studies were about review studies (Dasdemir, 2018; Tumer, 2021; Ulfah et al., 2020) related to environmental education and trends.

Overall, the environmental awareness and attitudes toward environmental education looks positive in the studies in literature. This is encouraging because environmental education can help to learn how to protect the planet. It can also provide an understanding how environment works and what it needs in order to stay healthy. In addition, it can help you to appreciate the natural resources and to get involved in conservation activities. The results showed that environmental education and new trends in environmental education can be used as an important tool in all disciplines.

Most of the studies revealed that there was an increase environmental awareness and positive attitudes toward environmental education after applying a specific program. In general, it was founded that there was no significant difference in male and female attitudes toward environmental education.

Some recommendations can be concluded in the light of studies in the literature as follows. It is necessary to improve the teaching content in teacher education programs, especially to introduce more innovative teaching methods and activities to improve students'

environmental skills. The findings showed that PBL and IGG methodology can be used in courses on geography and environmental issues. Based on the results of research, it can be concluded that activity-based environmental education can be used to improve environmental characteristics. As a result, environmental education should also be integrated in professional education courses, not only in general education and compulsory courses.

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