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ENVIRONMENTAL LITERACY IN BIOLOGY CURRICULUM

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ABSTRACT

The aim of this research is to examine the 9th-12th grade biology textbooks that started to be used in secondary education in 2018 according to the dimensions of environmental literacy. The research was designed by document analysis method. In the research, 9th, 10th, 11th and 12th grade biology course curricula prepared by the Ministry of National Education, Board of Education in 2018 were used. The data were analysed by content analysis. When environmental education topics were examined in the secondary biology programme, it was seen that environmental topics were included in seven units of twelve units. When the attainment in the programme were examined, thirty-two of the ninety-one attainments in the 2018 programme were related to the environment. It seems that most of the gains are related to the cognitive domain. Among the five dimensions of environmental literacy, the knowledge dimension was included the most. Apart from the knowledge dimension, there are gains in the attitude and skill dimensions. In the knowledge dimension, ecology information was included the most. Ecological knowledge is followed by environmental problems and socio-economic-political knowledge. Among the other dimensions, affective and skill dimensions were included, but no attainment were found in the behavioral dimension.

Keywords: Biology education, curriculum, environmental literacy.

INTRODUCTION

Environmental education is an important element of our society that can help us build a sustainable future. It is the process of learning about the natural world and the impact of the natural world on people. Environmental education helps to raise awareness of environmental issues, teach individuals to make informed decisions and encourage them to take action to protect the environment. Environmental education is also important to help deal with the complex environmental challenges we face today. Climate change, pollution and habitat destruction are just some of the problems threatening our planet. By educating individuals on these issues, we can encourage them to take action and contribute to solutions.

Environmental education is a topic that has been widely researched and analysed for many years. Hungerford, Peyton and Wilke (1980) identified the goals of environmental education curriculum development, while McKeown-Ice and Tucker (2011) emphasised the role of teacher education in promoting environmental education as a catalyst for social action. Furthermore, Darling-Hammond and Bransford (2005) emphasised the importance of preparing for a changing world, which includes informing students about environmental issues. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2018) also emphasises the importance of environmental education to promote sustainability and achieve the United Nations' Sustainable Development Goals. Furthermore, environmental education can provide individuals with the skills and knowledge needed to make informed decisions about environmental issues. This knowledge can include the impact of human activities on the environment, the importance of biodiversity and the benefits of sustainable practices. Teaching individuals to make informed decisions can help us create a more environmentally friendly and sustainable society. Therewithal, raising environmentally literate individuals along with environmental education is important in the context of sustainability. Environmental literacy includes knowledge and understanding of the natural world, as well as people's relationships with the natural world. This includes being aware of environmental issues, understanding the scientific concepts underlying these issues, and the ability to make informed decisions on environmental issues. Environmental literacy is important because it enables individuals to better understand the complexities of the environment and its impact on people. This knowledge and understanding can help individuals make informed decisions about their own behavior and actions and advocate for environmental policies and practices that protect the natural world for future generations. Environmental literacy can also lead to a greater appreciation and respect for the environment, which can encourage people to take action to protect it. Definitions of environmental literacy consist of four basic domains including knowledge, skills, attitudes and behaviours. Simons (1995) defined environmental literacy in 7 categories. These are: affect, ecological knowledge, sociopolitical knowledge, knowledge of environmental issues, cognitive skills, additional determinants of environmentally responsible behaviours and environmentally responsible behaviours. Babulski, Gannet, Myers, Peppel and Williams (1999) defined the six categories defined by Simons (1995) with 36 sub-categories. Later, 41 sub-categories emerged with the studies of Erdoğan,

Marcinkowski and Ok (2009) on the content analysis of environmental education research and Erdoğan, Kostova and Marcinkowski (2009) on the analysis of curricula in terms of environmental education attainment.

Environmental education and environmental literacy are explicitly and implicitly included in different curricula. Environmental education is a multidisciplinary field covering a variety of subjects such as biology. Biology courses play an important role in environmental education as they provide a basic understanding of living organisms and ecosystems in the natural world. Through biology courses, students can learn about the interactions between organisms and their environment and how they are affected by environmental changes. In addition, biology lessons can help students understand the importance of biodiversity and the role each organism plays in ecosystems (CBD, 2005). Learning about different species, their habitats and their interactions with each other gives students a respect for the complexity and diversity of life on Earth. This knowledge is important for understanding environmental issues and making informed decisions about the management and conservation of natural resources. Biology lessons can also help them understand the impact of human activities on the environment. Having students study the impacts of human activities such as pollution, deforestation and climate change on different ecosystems and species allows them to better understand the consequences of our actions and how we can minimise negative impacts and promote sustainability (UNESCO, 2017). In summary, biology lessons are an integral part of environmental education by providing students with a basic understanding of living organisms and ecosystems in the natural world, the importance of biodiversity and the impact of human activities on the environment. By educating students about these topics, we can develop their ability to respect the natural world and to act consciously for the responsible protection of the environment. Undoubtedly, the most effective materials used in education today are the books prepared by the Ministry of National Education (MoNE) for use in schools. As mentioned, the books used in biology courses, which conceptually give the most place to environmental education, are important.

There are studies examining programmes and textbooks in the context of environmental education (Erdoğan & Bahar, Uşak, 2012; Erdoğan, Bahar, Erdaş, & Uşak, 2012). Erdoğan and Bahar, Uşak (2012) evaluated the biology textbooks that started to be used in 2007 and Erdoğan, Bahar, Özer, Erdaş and Uşak (2012) and Gülay and Ekici (2010) evaluated the preschool programme in the context of environment. Akınoğlu and Sarı (2009) conducted a study to determine the topics related to environmental education in primary education programmes. It is thought that examining the updated programmes in terms of evaluating the changes in the programmes on environmental education and environmental literacy will contribute to the literature. Within the scope of the research; the distribution of the subjects/concepts related to the environment in the 9th, 10th, 11th and 12th grade biology course curriculum according to the units and the gains related to the environment in the 9th, 10th, 11th and 12th grade biology course will be examined according to the units and environmental literacy dimensions.

METHOD

The research was designed with document analysis method, one of the qualitative research methods. Document analysis is a qualitative research method used to analyse the content of written documents and documents meticulously and systematically (Wach & Ward, 2013). Since the high school 9-12 grade biology course curriculum will be examined within the scope of this research, it is the most appropriate method for the research.

Sources

In order to analyse the environmental issues, concepts and attainment in secondary biology courses within the scope of environmental literacy, the 9th, 10th, 11th and 12th grade biology curricula prepared by the Board of Education of the Ministry of National Education in 2018 were used. These programmes were accessed from the web page of the Ministry of National Education.

Conceptual Framework for Analysis

For the analysis of the biology curriculum, the categories and subcategories of environmental literacy used in Erdoğan, Bahar and Uşak's (2012) research were used. These categories were formed by combining the studies of Erdoğan, Kostova and Marcinkowski (2009) and Erdoğan, Marcinkowski and Ok (2009) in Erdoğan, Bahar and Uşak (2012). The translation of the categories and subcategories into Turkish was done by Erdoğan, Bahar and Uşak (2012).

Analysis Resources

Content analysis of secondary biology curricula in terms of environmental literacy dimensions was carried out in 4 steps. In the first step, 4 dimensions (knowledge, skills, affect and behaviour) (Erdoğan, Bahar and Uşak (2007) were selected. In the second step, a separate file was prepared by determining the subjects, concepts and attainments related to environmental education in the secondary education biology curriculum. In the third step, the attainment were analysed and grouped in terms of the dimensions of environmental literacy. In addition, these acquisitions were matched with 41 subcategories. The mappings were made by a field expert other than the researcher. After the grouping consistency of the two experts was ensured, the outcomes were brought together in tables in the fourth step. In the analysis of each curriculum, firstly, the distribution of the subjects according to the units was indicated and then it was shown in a table which dimension of environmental literacy is related to the outcomes in each unit. In order to show which sub-dimension of environmental literacy each outcome in the "attainment - environmental literacy" matching table is related to, the sub-category with which it is related is written in parentheses at the end of the outcome statement. An example analysis flow is below:

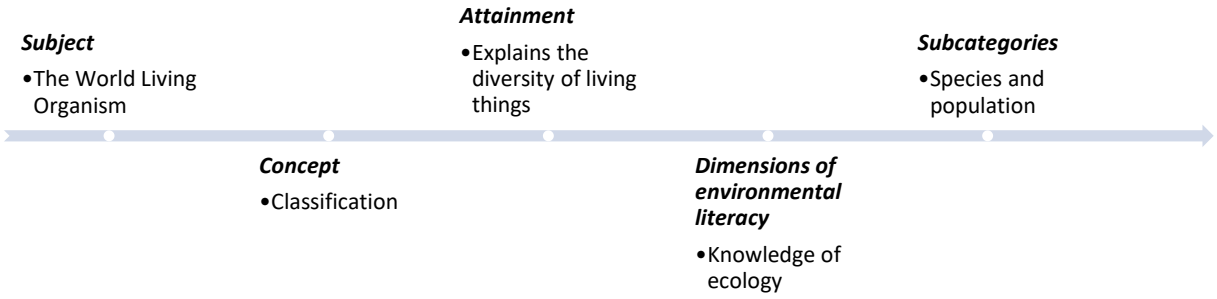

Table1. Categories, Components and Sub-components of Environmental Literacy

Categories	Components	Sub-components
A.Knowledge	Knowledge of Ecology	Species and Population Environments and Habitats Communities and Interaction Abiotic Factors and Matter Cycles Ecosystem and Biomes Natural and Social System Physical and Biological History
	Knowledge of Environmental Problems and Issues	Risk, Toxicology and health Bio-Physical Problems Causes of Problems Socio-Political Issues Causes of Issues Effects of Problems and Issues Natural Disaster Alternatives Solutions and Actions
	Socio-Political-Economic Knowledge	Cultural Values and Activities Economic Values and Activities Societal and Social System Governmental and Political System Geographic Pattern Citizenship Participation
B.Skill	Cognitive Skills	Problems and Issue Investigation Skills Issue Analysis Skills Variable and Research Question Skills Data Collection Skills Data Analysis Skills Action Skills
C.Affect	Affect and Additional Determinants of Behavior	Intention to Learn / Eagerness to Learn / Curiosity Environmental Appreciation and Sensitivity Environmental Attitudes Environmental Values Ethical and Moral Reasoning Efficacy / Locus of Control Personal Responsibility Willingness/Motivation/Intention to Act
D.Behavior	Responsible of Environmental Behavior	Conservation and Eco-management Consumer and Economic Action Interpersonal and Public Persuasion Governmental and Political Action Legal Action and Law Enforcement Other forms of Citizen Action

FINDINGS

9th Grade Biology Curriculum Environmental Education

There are three units in the 9th grade biology curriculum. There are a total of 11 learning outcomes, 3 in the first unit, 3 in the second unit and 5 in the last unit. Subjects, concepts and acquisitions related to the environment are explicitly included in the 3rd unit. Table 2 shows the distribution of environmental issues and concepts according to the units.

Table 2. Distribution of Subjects/Concepts Related to Environment in the 9th Grade Biology Curriculum According to the Units

Units		Number of Attainment	Environmental issues and concepts
1.	Unit 1: Life Science Biology	3	…..
2.	Unit 2: Cell	3	…….
3.	Unit 3: The World of Living Things	5	Diversity and Classification of Living Things (classification, species, extinct species) Living Worlds and Properties

In the first and second units, there were no topics and concepts related to the environment, and in the third unit, concepts related to the diversity and classification of living things and living kingdoms were included. In the first two units, since there were no topics and concepts related to the environment, there were no attainments related to them, and in the third unit, there were five attainments. It was seen that the distribution of the subjects and concepts in the units was proportional to the gains. The attainments in the 9th grade biology curriculum were classified under the sub-dimensions of ecological knowledge and socio-political and economic knowledge of environmental literacy. The attainments and attainment explanations in the third unit, 'The World of Living Things' unit, are knowledge level attainments that include the diversity of living things, extinct living things and the relationship between living things.

Table 3. Distribution of 9th Grade Biology Course Attainments Related to Environment According to Units and Environmental Literacy Dimensions

Dimensions of environmental literacy	Unit: The World of Living Things
A.Knowledge 1. Knowledge of ecology 2.Knowledge of environmental problems and issues 3.Socio-economic-political knowledge	3.1.1. Explains the importance of classification in understanding the diversity of living things (species and population). 3.1.1.b.Changes in living diversity are discussed through the example of extinct species. (Causes of problems; Results of problems and problems) 3.1.2. Explains the categories used in the classification of living things and the hierarchy between these categories with examples. (Species and population) 3.2.2. Explains the contributions of living things to biological processes, economy and technology with examples. (Economic values and activities)

10th Grade Biology Curriculum Environmental Education

There are three units in the 10th grade biology curriculum. There are a total of 17 learning attainment, 5 in the first unit, 2 in the second unit and 10 in the last unit. The subjects, concepts and learning attainment related to

the environment are mainly in the 3rd unit. Table 4 shows the distribution of environmental issues and concepts according to the units.

Table 4. Distribution of 10th Grade Biology Curriculum Subjects/Concepts Related to Environment According to Units

Units	Number of Attainment	Environmental issues and concepts
1. Cell Divisions	5	……
2. General Principles of Heredity	2	Heredity and Biodiversity
3. Ecosystem Ecology and Current Environmental Problems	10	Ecosystem Ecology (decomposer, food web, food pyramid, food chain, bioaccumulation, ecosystem, energy pyramid, matter cycle) Current Environmental Problems and Human (environmental problem, ecological footprint, carbon footprint, water footprint) Conservation of Natural Resources and Biodiversity (biotrafficking, endemic species, natural resources, gene bank, sustainability)

In the second unit, the relationship between heredity and biodiversity was explained in relation to the concept of variation. In the third unit, ecosystem ecology and current environmental problems and human sub-headings completely included concepts related to the environment. In all secondary education 9-12th grade programmes, the highest number of achievements related to the environment is in the 10th grade. In the second unit 'General Principles of Heredity', there is one acquisition in the knowledge dimension for environmental literacy. In the third unit, there are 8 learning outcomes for environmental literacy. In the third unit, ecosystem ecology, human relationship with current environmental problems, natural resources and biodiversity issues and related concepts are included.

When the attainments in the 10th grade curriculum were examined, it was seen that the attainments related to the environment were mostly at the knowledge level (knowledge of ecology and knowledge of environmental problems and issues). In the third unit, the affective tendencies subdimension of environmental literacy was included with three attainments and the skills subdimension was included with one attainment.

Table 5. Distribution of 10th Grade Biology Course Attainments Related to Environment According to Units and Environmental Literacy Dimensions

Dimensions of environmental literacy	Unit 2. General Principles of Heredity	Unit 3. Ecosystem Ecology and Current Environmental Problems
A.Knowledge 1. Knowledge of ecology 2.Knowledge of environmental problems and issues 3.Socio-economic-political knowledge	2.1.2. Questions the role of genetic variation in explaining biodiversity (Species and population)	3.1.1. Explains the relationship between living and non-living components of the ecosystem. (Ecosystems and biomes; abiotic factors and matter cycles) 3.1.3. Analyses the flow of matter and energy in ecosystems (Ecosystems and biomes; Risk, toxicology and health) 3.1.4. Establishes a relationship between material cycles and sustainability of life (Ecosystems and biomes). 3.2.1. Evaluates the causes and possible consequences of current environmental problems. (Natural disasters; Risk toxicology and health; Causes of problems; Evaluation of problems and consequences) 3.3.1. Explains the importance of sustainability of natural resources (Alternative solutions and actions)

	3.3.3. Suggests solutions for the protection of biological diversity (Alternative solutions and actions)
2. B. Skill 1. Cognitive skills	3.2.1. Evaluates the causes and possible consequences of current environmental problems. (Problems and Issue Investigation Skills)
C. Affect 1.Affect and Additional Determinants of Behavior	3.2.2. As an individual, questions his/her role in the emergence of environmental problems (Individual responsibility). 3.2.3. Suggests solutions for the prevention of environmental pollution in the local and global context. (Environmental values; Environmental attitude) 3.3.2. Questions the importance of biodiversity for life (Ethical and moral reasoning)

11th Grade Biology Curriculum Environmental Education

11th grade biology curriculum includes two units. There are a total of 34 learning attainment, 29 in the first unit and 5 in the second unit. Subjects, concepts and attainments related to the environment are included in the 2nd unit. Table 6 shows the distribution of environmental issues and concepts according to the units.

Table 6. Distribution of 11th Grade Biology Curriculum Subjects/Concepts Related to Environment According to Units

Units	Number of Attainment	Environmental issues and concepts
1. Human Physiology	29	…..
2. Community and Population Ecology	5	Community Ecology (biodiversity, ecosystem, community, competition, symbiotic relationship, succession) Population Ecology (population dynamics, carrying capacity, age pyramid)

In the first unit, information and practices related to human physiology (nervous system, circulatory system, respiratory system, urinary system, reproductive system and embryonic development) are included, but there is no association with the environment. The second unit includes the subjects of community and population ecology, and all concepts and attainments are directly related to the environment.

In the 11th grade biology programme, it is seen that 5 of the 34 objectives (Table 6) are aimed at realising the aims of environmental education. When the content and scope of the attainments are analysed, it is seen that the majority of the attainments are at the level of knowledge (ecology knowledge) and one attainment is at the level of skill (cognitive skill). The second unit 'Community and Population Ecology' includes the concepts of biodiversity, ecosystem, community, competition, symbiotic relationship, succession, population dynamics, carrying capacity and age pyramid. Along with the concepts, they are expected to learn the factors affecting the structure of the community, the relationship between the biodiversity contained in the communities and environmental pollution, intraspecific and interspecific competition in the community, predator-prey relationship, symbiotic relationship between species and explain what they have learned with examples. In addition, there are attainments for problem analysis skills including analysing the factors affecting population

dynamics, drawing different growth curves (S and J) related to population growth, analysing the population change in the world and in our country through graphs and discussing the possible consequences.

Table 7. Distribution of 11th Grade Biology Course Attainments Related to Environment According to Units and Environmental Literacy Dimensions

Dimensions of environmental literacy	Unit 2. Community and Population Ecology
A.Knowledge 1. Knowledge of ecology	2.1.1. Explains the factors affecting the structure of the community (Communities and interaction) 2.1.2. Explains the competition within and between species in a community with examples (Communities and interaction) 2.1.3. Explains symbiotic relationships between species in a community with examples. (Communities and interaction) 2.1.4. Explains succession in communities with examples. (Communities and interaction)
B. Skill 1. Cognitive skills	2.2.1. Analyses the factors affecting population dynamics (Problems and Issue Investigation Skills)

12th Grade Biology Curriculum Environmental Education

There are four units in the 12th grade biology curriculum. There are a total of 29 learning attainment, 8 in the first unit, 8 in the second unit, 11 in the third unit and 2 in the last unit. Subjects, concepts and learning attainment related to the environment are included in the 2nd, 3rd and 4th units. Table 8 shows the distribution of environmental issues and concepts according to the units.

Table 8. Distribution of 12th Grade Biology Curriculum Subjects/Concepts Related to Environment According to Units

Units	Number of Attainment	Environmental issues and concepts
1. From Gene to Protein	8	…..
2. Energy transformations in living organisms	8	Vitality and Energy (energy, energy conversion, cellular respiration) Photosynthesis Chemosynthesis
3. Plant Biology	11	Substance transport in plants (adhesion, pressure flow theory, phloem, gutation, fertiliser, root pressure, xylem, stomata, transpiration) Sexual reproduction in plants (flower, germination, dormancy, fruit, seed, pollination)
4. Living organisms and environment	2	Living organisms and environment (adaptation, natural selection, mutation, variation, artificial selection)

In the first unit, information and applications related to gene to protein are included and there is no association with the environment. The second unit includes energy transformations in living organisms, the third unit includes plant biology and the fourth unit includes living organisms and environment, and most of the concepts are related to the environment, while some of the attainments of living organisms and energy transformations and the attainments of living organisms and environment are directly related to the environment.

In the 12th grade biology programme, it is found that 13 of the 29 objectives (Table 9) are aimed at realising the aims of environmental education. When the content and scope of the attainments related to the environment are analysed, it is observed that all of the attainments are at the knowledge level (ecology knowledge). In the second unit, the concepts of ATP, energy, energy transformation, photosynthesis, chemosynthesis, photolysis, light are included within the scope of 'Energy Transformations in Living Things'. Students are expected to be able to explain the necessity of energy for the continuation of life and the factors affecting the rate of photosynthesis such as light intensity, wavelength of light, temperature, amount of chlorophyll and carbon dioxide concentration. In the third unit 'Plant Biology', the concepts of adhesion, pressure flow theory, phloem, gutation, fertiliser, root pressure, xylem, stomata, transpiration, germination, flower, germination, dormancy, fruit, seed, pollination are included. Water and mineral absorption in roots, water and mineral transport mechanism in plants, transport mechanism of photosynthesis products in plants, substance transport in plants, parts of the flower and the functions of these parts and the importance of water and minerals for plants are emphasised. In the fourth unit, the concepts of adaptation, natural selection, mutation, variation, variation, artificial selection are involved within the scope of 'Living Things and Environment'. Students are expected to be able to explain the effect of environmental conditions on the continuity of genetic changes and artificial selection applications in agriculture and animal breeding.

Table 9. Distribution of 12th Grade Biology Course Attainments Related to Environment According to Units and Environmental Literacy Dimensions

Dimensions of environmental literacy	Unit 2. Energy transformations in living organisms	Unit 3. Plant Biology	Unit 4. Living organisms and environment
A.Knowledge 1. Knowledge of ecology	.1.1.Explains the necessity of energy for the continuation of life (Ecosystem and biomes) 2.2.3. Evaluates the factors affecting the rate of photosynthesis. (Abiotic factors and matter cycles)	3.1.1.Explains the structure and functions of the basic parts of a flowering plant (Species and Population) 3.2.1. Explains water and mineral absorption in roots (Abiotic Factors and Matter Cycles) 3.2.2. Explains the mechanism of water and mineral transport in plants (Abiotic Factors and Matter Cycles) 3.2.3. Explains the mechanism of transport of photosynthesis products in plants (Abiotic Factors and Matter Cycles) 3.2.4. Designs an experiment on water and matter transport in plants (Abiotic Factors and Matter Cycles) 3.3.1. Explains the parts of the flower and the functions of these parts (Species and Population 3.3.2. Explains fertilisation, seed and fruit formation in flowering plants (Species and Population) 3.3.3. Designs an experiment to observe seed germination (Abiotic Factors and Matter Cycles) 3.3.4. Establishes a relationship between dormancy and germination (Abiotic Factors and Matter Cycles)	4.1.1 Explains the effect of environmental conditions on the continuity of genetic changes (species and population). 4.1.2.Gives examples of artificial selection practices in agriculture and animal husbandry (species and population)

CONCLUSION and DISCUSSION

When environmental education topics were examined in the secondary biology curriculum, environmental topics were included in seven units of twelve units. It was found to be less than the 2013 and 2007 curriculum. (Erdoğan, Bahar and Uşak, 2007; MEB, 2007). In 2007 and 2013 programmes, nine units were included. In the post-2007 programmes, environmental issues were generally included more. At the grade level, it was observed that the distribution according to years was balanced in the current programme. Similar case is also present in 2007 and 2013 programmes. Environmental issues are taken place in secondary education biology and geography courses and are not included in the programme as a separate course as in the previous programmes. Environmental issues are similarly included in different disciplines in many European countries (Erdoğan, Bahar and Uşak, 2007). Environmental issues and environmental literacy are included in high schools around the world through various courses. Some of the common courses that cover these topics include: Environmental Science, Biology, Geography, Earth Science and Social Studies. It's important to note that the inclusion of environmental issues and environmental literacy in high school curricula can vary from country to country and even between regions within a country. Therefore, specific courses and their content may differ. It is advisable to refer to the curriculum guidelines of individual high schools or educational authorities in the respective regions for more detailed information (UNESCO,2017; AP,2020).

When the attainments in the programme are analysed, thirty-two of the ninety-one attainments in the 2018 programme are related to the environment. It is noted that most of the gains are related to the cognitive domain. Similar situation is also present in 2007 and 2013 programmes. Among the five dimensions of environmental literacy, the most knowledge dimension is included. Öz Aydın, Ekersoy and Özkan (2022) stated that sixteen of the objectives of the biology programme are in the knowledge dimension. The findings are in parallel with the research. Similarly, Erdoğan, Kostova et al. (2009) reported that environmental literacy is at the knowledge dimension in science and technology curricula. In general, in the analyses of the programmes related to environmental literacy, the knowledge dimension is the highest. The knowledge dimension of environmental literacy is given the utmost emphasis due to its crucial role in shaping individuals' understanding of environmental issues and challenges. It serves as the very foundation upon which a comprehensive comprehension of the environment is built. Without a solid knowledge base, individuals may struggle to grasp the intricacies and complexities of environmental problems, hindering their ability to identify and implement effective solutions. By prioritizing the acquisition of knowledge about the environment, individuals can develop a deep and holistic understanding of ecological systems, natural resources, environmental policies, and the impact of human activities on the planet. This extensive knowledge serves as a basis for informed decision-making, responsible behavior, and active participation in environmental conservation efforts (Johnson, & Mappin, 2015). Moreover, the knowledge dimension of environmental literacy enables individuals to critically evaluate information and distinguish between reliable sources and misinformation. In an era where environmental issues are often politicized and debated, having a strong knowledge foundation is crucial for

making sound judgments and forming well-informed opinions (Samson, Pittman, & Pittman, 2017). Furthermore, the knowledge dimension plays a vital role in fostering a sense of connection and empathy towards the natural world. By acquiring knowledge about the environment, individuals can develop a deep appreciation for the intricate relationships between living organisms and their ecosystems. This appreciation can inspire a sense of responsibility and motivate individuals to take actions that protect and preserve the environment for future generations (Hungerford, & Volk, (1990). In summary, the emphasis placed on the knowledge dimension of environmental literacy is justified by its pivotal role in shaping individuals' understanding, decision-making, behavior, and participation in environmental conservation efforts. It is the bedrock upon which informed and responsible environmental stewardship is built.

Apart from the knowledge dimension, it was observed that attitudes and skills were included in the programmes. Although different classifications are used in the research, the findings are similar. In the knowledge dimension, ecology knowledge was included the most. Ecological knowledge is followed by environmental problems and socio-economic-political knowledge. Among the other dimensions, affect and skill dimensions were included, but no attainment was found for the behaviour dimension. Öz Aydın, Ekersoy and Özkan (2022) reported that the participation dimension was not included. When compared with the 2007 programme, the results in the knowledge dimension are similar. Erdoğan, Bahar and Uşak (2007) emphasised in their study that the sub-dimension of ecological knowledge was given the most place, followed by environmental problems and socio-economic-political knowledge. It was noted that a small number of attitudinal and skill-oriented learning outcomes were added to the 2008 programme. There is no study analysing the 20013 curriculum according to environmental literacy variables. In studies in which environmental literacy was examined in terms of different variables, it was seen that the environmental knowledge levels of secondary school students differed according to gender in favour of female students and environmental knowledge increased as the grade level increased (Can, Üner, & Akkuş, 2006). Also

It is reported that students with high levels of environmental knowledge have high attitudes towards the environment. It can be considered as a deficiency that environmental literacy is included more at the knowledge level and other dimensions are not included in the programme. However, the results of the research show that the high level of knowledge has a positive effect on the attitude towards the environment, which reveals the necessity of conducting different studies on the effectiveness of the programme.

RECOMMENDATIONS

It is suggested that longitudinal studies examining the environmental issues included in education programmes and the contribution of environmental literacy to students will contribute to a holistic evaluation. At the end of the research, it was determined that the skills, affective and behavioural dimensions of environmental literacy were included very little in the curriculum. Application-based experimental studies can be conducted in which the attainments in skill, affective and behavioural dimensions are written and their effectiveness is examined.

Today, individuals use the internet as their primary source of information. Interactive applications to increase environmental literacy can be designed in the light of scientific knowledge. Designed materials can be recommended as teaching materials in classroom environments.

ETHICAL TEXT

In this article, the journal writing rules, publication principles, research and publication ethics, and journal ethical rules were followed. The responsibility belongs to the author for any violations that may arise regarding the article.

Since the research consists of registered and ready-made documents open to public access, it is a study that does not require the permission of the Ethics Committee.

Author(s) Contribution Rate: The author's contribution rate in this study is 100%

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