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Abstract

Changes in the world climate and population growth have brought along many problems. It is expected that resources such as water and energy will be used consciously, and individuals will be conscious about this issue. In this respect, the concept of sustainability, which means the careful use of existing resources and the protection of resources for the future, comes to the fore. Sustainability and sustainable development, while meeting the needs of today, necessitate taking into account the living conditions and environmental values of future generations, and creating healthy living environments for people in the environment-economy-technology relationship to be established to ensure this. Sustainability is one of the main policy issues at both national and international level today. Many international organizations invite states to take responsibility and cooperate for the development of sustainable development. Within the framework of these developments, the development of the way of thinking and behavior related to sustainable life in students has become one of the current aims of education. Taking these into consideration, this section provides information on both sustainability and sustainable education and practices.

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Review Article**Sustainability and its Reflection on Education***Gamze YAYLA ESKİCİ¹ **Abstract**

Changes in the world climate and population growth have brought along many problems. It is expected that resources such as water and energy will be used consciously, and individuals will be conscious about this issue. In this respect, the concept of sustainability, which means the careful use of existing resources and the protection of resources for the future, comes to the fore. Sustainability and sustainable development, while meeting the needs of today, necessitate taking into account the living conditions and environmental values of future generations, and creating healthy living environments for people in the environment-economy-technology relationship to be established to ensure this. Sustainability is one of the main policy issues at both national and international level today. Many international organizations invite states to take responsibility and cooperate for the development of sustainable development. Within the framework of these developments, the development of the way of thinking and behavior related to sustainable life in students has become one of the current aims of education. Taking these into consideration, this section provides information on both sustainability and sustainable education and practices.

Keywords: Sustainability, education, sustain in curriculum**1. INTRODUCTION**

“... From time to time, the darkness of a strange disaster surrounds the region and everything starts to change. An ominous spell descends upon society. Mysterious diseases ravage chicken flocks, cattle and sheep get sick and die. There is the shadow of death everywhere... Where might the birds have gone, for example? The bird feeders in the garden have been abandoned. This is a quiet spring (1962, Rachel Carson, *Silent Spring*)”

The fact that the world's resources are finite requires the conscious use of resources (Özerdinç, Kızılay & Hamalosmanoğlu, 2022). The food shortage, which increased with the rapid increase in the population in the 1940s, was the beginning of the path to the emergence of the concept of sustainable development (Yalçın, 2022; Yazıcı-Demir & Hayta, 2023). The “Green Revolution”, which is seen as an important invention to meet the food shortage, has been one of the reasons why human beings encounter environmental problems. When the evaluations about the book “Silent Spring” written by Carson in 1962 are examined, the view that it was the most effective publication in the beginning of the environmental movement still maintains its validity (Teksöz, 2014). Combining his deep knowledge of biology, field experience and his ability to tell with his observations, Carson has succeeded in bringing events to the attention of people in a very effective way.

Sustainability comes from the Latin word “sustinere” and means to keep in balance (Palmer, et. al., 2004). Sustainability: It is the protection of the resources necessary for the future while meeting the needs necessary for the present (Somuncu, 2018). Development is defined as “growth in an economy that leads to transformation in the social and institutional structure, including changes in

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people's value judgments, worldview, consumption and behavior patterns” (Kılıç, 2012). Sustainable development is “meeting the needs of the present without compromising the ability of future generations to meet their needs” (Karahan-Aydın, 2019). According to the Environmental Law, sustainable development refers to “development based on the principle of establishing a balance between environmental, economic and social objectives that ensure that present and future generations live in a healthy environment” (Karahan-Aydın, 2019).



Figure 1. Sustainable development historical development (Golemen, 2014)

Sustainability and sustainable development, while meeting the needs of today, necessitate taking into account the living conditions and environmental values of future generations, and creating healthy living environments for people in the environment-economy-technology relationship to be established to ensure this (McDonough, 1992). UNDP (United Nations Development Programme), the leading development agency of the United Nations, is working in more than 170 countries and regions to ensure that the goals targeted in line with the Sustainable Development Goals are achieved by 2030 (Özerdinç et. al., 2022). The Sustainable Development Goals, which entered into force in January 2016, consist of 17 interrelated main objectives (Figure 2):



Figure 2. Sustainable development goals (United Nations, 2016)

Sustainable development is addressed in three pillars. These are economic, social and environmental dimensions. In order for sustainable development to be effective, these three dimensions must be taken into account in the process (Ergün & Çobanoğlu, 2012).

Environmental Dimension: It means that the environmentally harmful activities are taken under control and natural resources are not consumed in a way that cannot meet the future needs (Engin, 2010). Controlling resource consumption is an indispensable condition, and the environmental dimension includes the protection of the cultural environment as well as atmospheric balance, biodiversity and other ecosystem elements (Ergün & Çobanoğlu, 2012).

Economic Dimension: In the understanding of sustainable development, the first economically expected need is to meet individual and social needs effectively. Economic conditions should be determined in a way that takes into account the benefit of present and future generations (Ergün & Çobanoğlu, 2012).

Social Dimension: The social dimension in the understanding of sustainable development: providing social services such as education and health equally and adequately to everyone and ensuring gender equality with political responsibility and participation (Engin, 2010)

When these three basic elements are considered independently from each other in the development process, environmental problems are experienced and continue to increase, especially since the environment is ignored (Yıldız, 2011).

1.1. Sustainability and Education

“If you think education is expensive, consider the price of ignorance (Socrates).”

Sustainable development was first defined in the report of the World Commission on Environment and Development in 1987, as people being intertwined with nature but not consuming the natural resources necessary for future generations before their time (Kaypak, 2011). For the solution of global environmental problems that concern the world, the successful search for a solution by all circles depends on educated individuals. In other words, education for today's children and future adults is an investment in the future (Atasoy & Ertürk, 2008).

The UN emphasized that the concept of sustainable development should be taught together with education and determined the period between 2005 and 2014 as the "Decade of Education for Sustainable Development" so that the vision of "Education for Sustainable Development (ESD)" should be included in all education programs (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2005). The contribution of the education system, which enables the individual to take responsibility for his/her environment and is the process of realizing behavioral change, is great in understanding the sustainable development goals fully and accurately (Özerdinç et. al., 2022).

Sustainability is one of the main policy issues at both national and international level today. Many international organizations invite states to take responsibility and cooperate for the development of sustainable development. Within the framework of these developments, the development of the way of thinking and behavior related to sustainable life in students has become one of the current aims of education.

Sustainability is not just about conserving physical resources of water and nutrients (Yalçın, 2022). At the same time, the technology of the future aims to find a way to meet these needs and to ensure that future generations have the necessary knowledge base to solve the problems we cannot predict, that is, to educate them (Çayak, 2021). Sustainable education, "What kind of education?" Instead of defining it superficially like the answer to the question; We need to focus on education

itself, its aims, educational practices, education models, principles, and the level of competence for the time we live in, and to focus on the actual questions needed in accordance with the needs of the current century (Marim, 2021).

Considering the importance of sustainable development, educators should make more efforts to create sustainable development awareness in individuals (Erdoğan & Tuncer, 2009). It is possible to raise generations with high environmental awareness and sustainable consumption behaviors through teachers (Arslan & Yağmur, 2022). As in every field, the subject knowledge of teachers who will guide students in this process is important. However, many teacher education programs still do not address ESD education (Karrow & DiGiuseppe, 2019). The point that needs to be considered in education is only “What kind of education?” It is not only the answer to the question but also the necessity of following a program and method that will allow this awareness to be formed in new generations (Yazıcı-Demir & Hayta, 2023). In this sense, sustainable education; It refers to the guiding paradigms that enable understanding the existing order of the world in its various dimensions such as social, economic and ecological, and in acquiring the equipment that will help transfer all these aspects to life (Belen, 2020).

1.2. Sustainable Environmental Education

Sustainable development education has a very broad meaning in which environmental education is at its center (Kaya & Tomal, 2011). In the related literature (Davis, 1998) stated that one of the most important duties of societies for a sustainable life is to equip children with knowledge, skills, attitudes and values related to environmental protection. Sustainable development is to improve the quality of life in such a way that it remains within the carrying capacity of the natural systems that support life in the environment. Sustainability of the environment means that natural resources should not be consumed faster than their capacity to renew themselves and that activities harmful to the environment should be controlled (Engin, 2010). Environmental education aims to raise sensitive people who are interested in people’s natural problems, offer alternatives to solve these problems, and do their best to solve them (Akçay, 2006). The understanding of environmental education, which primarily focuses on the solution of environmental problems, has over time transformed into the concept of “Education for Sustainable Development” (ESD) with the idea of sustainable development (Arslan & Yağmur, 2022).

According to Demirkaya (2006), three approaches to environmental education are mentioned. These;

1. Education for environmental management and control: In this approach, environmental education promotes the understanding and learning of physical and human systems and their interactions.

2. Environmental awareness and interpretation education: In this approach, environmental education enables students to acquire various skills and supports interests and pursuits that consider education as a resource for learning through field trips.

3. Education for sustainability: According to this approach, environmental education builds on two other approaches that include an environmental ethic that encourages students to take responsibility for their own behavior, and knowledge-based issues that foster courage. The main factor that distinguishes this approach from others is the adoption of sustainable development by the new generation (Özdemir, 2007).

One of the most important responsibilities of societies for sustainability is to provide children with attitudes, values, knowledge and necessary skills for the protection of their environment (Güler, 2009). In the Gothenburg report prepared by the Council of Europe, the environmental factor was added as a third dimension to the Lisbon process, which considers sustainable development as social and economic development (Somuncu-Demir, 2012). Climate change, public health, sustainable

transportation and natural resources management are the four key priorities in this report. The common point in both the UNESCO program and the Gothenburg report is that sustainable development can be achieved with a sustainable environment. According to the Sustainable Development Goals, cheaper, affordable and clean energy is needed (Zakari, Khan, Tan, Alvarado & Dagar, 2022). In other words, ensuring energy efficiency and reducing carbon dioxide emissions will become mandatory by 2030 (Haroszowski, 2015).

The aim of environmental education is to raise students who question, research, transfer what they have learned to daily life and look at events from a different perspective. In this way, students will be individuals who can discuss, think, and actively participate in the learning environment, and who can learn meaningfully and permanently. It is not to memorize scientific findings, but to raise people with attitudes and skills who can question environmental problems (Çakıcı, 2010). There is no special course on environmental education and sustainable education in our country. Environmental issues are included in different units in the compulsory Life Science, Social Studies and Science and Technology courses (Tanrıverdi, 2009). Sustainable environmental education has taken its place in the programs of the Ministry of National Education, including primary and secondary school programs. The main purpose is to give individuals the necessary value to themselves and the environment they live in, to use the natural resources in the world correctly and equally and to know how to protect these resources. Sustainable environmental education has an important place for the protection and continuation of the world we live in.

Developing science and technology in our country has affected the education system as well as the living conditions of people. The education system has been re-adapted to reflect contemporary learning approaches to all education levels by the Ministry of National Education. In this context, it is seen that many curricula that were last renewed in 2017, especially science education curriculum, take the concept of sustainable environment into their goals (Tanrıverdi, 2009; MoNE, 2018).

1.3. What is Sustainable Education?

Maintaining a healthy environmental climate is very important for the future of humanity. Tomorrow's leaders will be tasked with tackling social, economic and environmental sustainability in creative ways. Science, technology, engineering, and mathematics (STEM) education is key to making today's students the solution-focused workforce of tomorrow (Southern Oregon University, 2023). The number of "green" jobs or jobs in sustainability-oriented sectors is expected to increase significantly in the coming years. In this regard, STEM education (K-16) will play a vital role in developing this growing workforce.

"Sustainability Education" or education for sustainable development is an exciting new field that blends a range of pedagogical techniques to promote understanding of the links between the environment, economy and society. Still an emerging field, the primary goal of sustainability education is to harness the power of education to develop environmental literacy and civic engagement that prepares students for jobs that contribute to a more equitable and sustainable future.

According to the U.S. Education Partnership for Sustainable Development, education for sustainability is defined as "a combination of content, learning methods, and outcomes that assist students as well as help students develop a knowledge base about the environment, economy, and society." They learn the skills, perspectives and values that guide and motivate them to seek sustainable livelihoods, participate in a democratic society, and live sustainably." The report summarizes three key standards that shape sustainability education:

1. Students understand and can apply the key concepts and principles of sustainability (ie: meeting current needs without compromising the ability of future generations to meet their needs). For sustainability education to be effective, educators must provide students with a basic understanding of

sustainability. In 1998, the Brundtland Commission published the World Commission on Environment and Development Report, which defines sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs". Although environmental science has evolved greatly since 1998, this definition is still used by national and international commissions to understand the driving idea behind sustainability. Humanity needs clean air, clean water, efficient farming systems and other life-sustaining resources to survive, but humans must ensure that the same resources are available to future generations. Sustainability education aims to help students understand the importance and ultimate purpose of sustainability.

2. Students recognize the concept of sustainability as a dynamic situation characterized by the interdependence between ecological, economic, and social systems and how these interconnected systems affect individual and societal well-being. They develop an understanding of human connection and interdependence with the natural world. Students must understand the relationship between economic, environmental, and social factors in order to be able to make informed decisions later in life. Multidisciplinary STEM education is uniquely positioned to support these relationships and improve student engagement and understanding. Educators can use STEM education techniques to help students understand systems interconnectedness. Students can discuss energy conservation and the science behind it while learning how light bulbs work in the classroom. Outside of the classroom, students discuss the importance of plants to humans and animals while simultaneously learning about how plants grow. Or students can learn through digital spaces such as naturalist, which encourages students to become "citizen scientists" by documenting their experiences with wildlife, learning about these species, and connecting with other "citizen scientists".

3. Students develop a multidisciplinary approach to learning the knowledge, skills and attitudes necessary to continually improve the health and well-being of present and future generations through both personal and collective decisions and actions. To achieve this, they can envision a sustainable world with primary changes that need to be made by individuals, local communities, and countries. Education for Sustainability or Sustainability Education is an emerging field. Education for Sustainability is the combination that helps students learn skills, perspectives, as well as develop a knowledge base about the environment, economy, and society, enabling them to seek sustainable livelihoods and participate in a democratic society (McMillan & Higgs, 2003). Sustainable education refers to a paradigm that provides an understanding of the social, economic, and ecological system of the world order and reveals behaviors that will help transfer these systems to life (Köybaşı-Şemin, 2022). In the book "Education for Sustainable Development" prepared by UNESCO (2012) for teachers, it is stated that "Sustainability can be handled by every discipline and can be positioned in education as interdisciplinary".

In order to integrate the concept of sustainability into preschool, primary and secondary education, some themes have been determined based on the USP (U.S. Partnership for Education for Sustainable Development) standards. The USP consists of individuals, organizations, and institutions dedicated to education for sustainable development in the USA. The U.S. Education Partnership for Sustainable Development [USPESD] designed an "Open Space" meeting in Washington, DC, in November 2003, attended by nearly 100 participants from a variety of industries, including K-12 and higher education, science, and research organizations. In this regard, the USP act as a regulator, catalyst and communicator working in all sectors of society (USPESD, 2009).

Education for Sustainability is interdisciplinary in nature and therefore can be easily integrated into core content teaching and learning. Education for Sustainability uses a variety of pedagogical techniques that promote participatory learning and higher-order thinking skills. Sustainability education focuses not only on imparting knowledge, but also on empowering students to become real-world problem solvers. Fortunately, educators can use a variety of STEM (Science, Technology, Engineering and Mathematics) techniques to connect sustainability knowledge to inquiry and action.

For example, project-based education encourages students to participate in long-term, real-life projects that challenge complex questions using knowledge from a variety of disciplines. Place-based learning is another promising example of an educational technique that can help students develop knowledge, attitudes and skills to address sustainability issues. Place-based learning leverages local assets such as parks, public spaces, museums and businesses to immerse students in the world and understand how places shape environmental, social and economic systems (and vice versa).

1.4. Themes and Contents for Sustainable Education

In connection with the above-mentioned three basic standards for sustainable education, basic concepts for sustainable education have been determined. An evaluation has also been made on what the concepts can be at which teaching level. Related to this, summary tables were created at primary, secondary and high school levels. Thanks to Figure 3, an idea can be obtained about the themes that should be given for a sustainable education in international standards.

Component	K-4	5-8 (Building on topics and areas of study in K-4)	9-12 (Building on topics and areas of study in 5-8)
1.1 Intergenerational Responsibility	<ul style="list-style-type: none"> Family Generations (grandparents, parents, children) 	<ul style="list-style-type: none"> Responsibility to Future Generations 	<ul style="list-style-type: none"> Intergenerational Equity
2.1 Interconnectedness	<ul style="list-style-type: none"> Relationships Historical Connections Sense of Place 	<ul style="list-style-type: none"> Systems Interdependency 	<ul style="list-style-type: none"> Systems Thinking Cradle-to-Cradle Design
2.2 Ecological Systems	<ul style="list-style-type: none"> Connection to Nature Plants, Animals, Habitats 	<ul style="list-style-type: none"> Natural Resources (renewable & non-renewable) Biodiversity Ecosystems Ecological Footprint (including Carbon Footprint) Carrying Capacity Environmental Stewardship Nature as Model and Teacher 	<ul style="list-style-type: none"> Respect for Limits Respect for Nature Tragedy of the Commons Environmental Justice Biomimicry Urban Design/Land Management Natural Capital
2.3 Economic Systems	<ul style="list-style-type: none"> Human Needs and Wants (food, water, energy, shelter) 	<ul style="list-style-type: none"> Equity Resource Scarcity Energy Economics Ecological Economics Food Systems 	<ul style="list-style-type: none"> Poverty Ecosystem Services Alternative Indicators and Indexes of Progress Globalization True (or Full) Cost Accounting Triple Bottom Line Micro Credit
2.4 Social and Cultural Systems	<ul style="list-style-type: none"> Family and Friends Personal Identity Happiness Fairness Collaborative Learning 	<ul style="list-style-type: none"> Cultural Diversity Multiple Perspectives Citizenship Resource Distribution Population Growth Quality of Life Indicators Education 	<ul style="list-style-type: none"> Human Rights Social Justice Peace and Conflict Multilateral Organizations International Summits, Conferences, Conventions, and Treaties Global Health Appropriate Technology Governance
3.1 Personal Action	<ul style="list-style-type: none"> Setting Goals Communicating Ideas Making a Difference 	<ul style="list-style-type: none"> Personal Responsibility Personal Footprint Calculation Critical Thinking Problem Solving Project Planning and Action 	<ul style="list-style-type: none"> Accountability Lifelong Learning and Action Personal Change Skills and Strategies
3.2 Collective Action	<ul style="list-style-type: none"> Setting Goals Working Together 	<ul style="list-style-type: none"> Designing a Sustainable System Structural vs. Personal Solutions Democracy Societal Footprint Calculation Local, State, and National Sustainability Plans 	<ul style="list-style-type: none"> Local to Global Responsibility Community-Based and Societal Level Decision-Making Public Discourse and Policy Organizational and Societal Change Skills and Strategies

Figure 3. Expression of concepts in sustainable education according to teaching levels (USPESD, 2009)

Sustainability concepts determined according to each education level in Figure 2 are primary school 1-4. Grade, middle school 5-8. Grade and Secondary Education 9-12. It is summarized as a class. It is seen that the concepts in the summary are also grouped depending on the 3 basic standards of sustainability. For example, “Students develop a multidisciplinary approach to learning the knowledge, skills and attitudes necessary to continually improve the health and well-being of present and future generations through both personal and collective decisions and actions.” Themes in the form of personal action and collective action were created for the third standard. Under each theme, concepts were created according to grade levels. As the grade level increases, there are differences according to the themes in the increase in the number of concepts.

The contents of the concepts in Figure 3 and the information they cover are also a matter of curiosity in this respect. In this regard, the "USPESD National Sustainability Education Standards" determined the contents of the concepts. While determining these contents, content limitations were made according to grade levels. The contents of the concepts according to grade levels are defined below (USPESD, 2009).

1.5. Primary School 1-4 Grade Sustainability Concepts and Contents

1.5.1. Intergenerational responsibility

Family - Students analyze their roles and responsibilities in their family.

Generations (grandparents, parents, and children) - Students draw and label their family tree identifying different generations. Students understand how their actions today may affect other generations; they take action to minimize negative impacts on future generations (service-learning projects)

1.5.2. Interconnectedness

Relationships - Students interact respectfully with others, including those with whom they have differences.

Historical Connections - Students demonstrate understanding of the concepts of “past”, “present”, and “future.”

Sense of Place – Students demonstrate an understanding of place – the natural systems and cycles, the human/cultural context, and the connections between both. At this grade level they focus on developing their sense of place in their immediate community. Example: Students create a story or drawing that demonstrates their understanding and connection to a special place of significant meaning to themselves, their family, and their community.

1.5.3. Ecological systems

Connection to Nature – Students, in both urban/sub-urban and rural environments spend time outdoors experiencing and interacting with nature by walking, observing, gardening, etc. They feel comfortable being in the outdoors (e.g.: getting dirty, seeing insects and animals), they see the patterns and connections in nature, and they begin to develop a naturalist intelligence.

Plants, Animals, Habitats - Students can distinguish between plants and animals and can explain how living organisms interact with the environment in which they live. Students identify food /energy, water, shelter as basic needs of animals and plants. Examples: Students sort local common organisms into animal and plant groups. They design and build a schoolyard habitat for native species, taking into consideration the basic needs of the plants or animals.

1.5.4. Economic systems

Human Needs and Wants (food, water, energy, shelter) - Students distinguish between personal wants and needs and identify how culture, marketing, and advertising inform their consumption patterns. Students identify food, water, energy and shelter as basic human needs.

1.5.5. Social and cultural systems

Family and Friends - Students define and develop productive and satisfying relationships with others. They value and know how to help create an atmosphere of mutual respect and kindness.

Personal Identity - Students develop a sense of unique worth and personal competence.

Happiness - Students have a sense of well-being and understand which factors contribute to their own and other’s happiness.

Fairness – Students treat others fairly. They develop an understanding that resources need to be shared to meet the needs of living things – across places and generations.

Collaborative Learning - Students perform effectively on teams that set and achieve goals, conduct investigations, solve problems, and create solutions (e.g., by using consensus-building and cooperation to work toward group decisions).

1.5.6. Personal action

Setting Goals - Students assess their own learning by developing criteria for themselves, and use these to set goals and produce high-quality work.

Communicating Ideas - Students use different media to share ideas with diverse audiences.

Making a Difference - Students take an active role in their community and feel a locus of control or self-efficacy. Students understand that everyone has the ability to affect change or impact a system, community, and self

1.5.7. Collective action

Setting Goals - Students work cooperatively and respectfully with people of various groups to set community goals and solve common problems.

Working Together - Students perform effectively on teams that set and achieve goals, conduct investigations, solve problems, and create solutions (e.g., by using consensus-building, conflict resolution, and cooperation to work toward group decisions). Students use systematic and collaborative problem-solving processes, including mediation, to negotiate and resolve conflicts. Students respect and value human diversity as part of a multi-cultural society and world.

2. IMPLICATIONS

Sustainable education contents explained above and presented as examples for primary school level are also defined separately for secondary and secondary education levels. As in every field, it is essential to receive education on this subject from childhood in order to achieve sustainable development goals in terms of raising awareness of individuals. There are many application examples in the relevant literature for this situation, which is reflected in both scientific course contents and environmental education courses. In addition, applications for sustainable education can be designed by accessing other parts of the US Partnership for Education for Sustainable Development USPESD K-12 Standards content.

According to the U.S. Education Partnership for Sustainable Development, educating for sustainability is defined as “a combination of content, learning methods, and outcomes that help students develop a knowledge base about the environment, economy, and society.” The three basic standards that shape sustainability education are briefly as follows:

1- Students understand and can apply the basic concepts and principles of sustainability (i.e.: meeting current needs without compromising the ability of future generations to meet their needs).

2- Students recognize the concept of sustainability as a dynamic state characterized by the interdependence between ecological, economic and social systems and how these interconnected systems affect individual and societal well-being. They develop an understanding of human connection and interdependence with the natural world.

3- Students develop a multidisciplinary approach to learning the knowledge, skills and attitudes necessary to continually improve the health and well-being of current and future generations through both personal and collective decisions and actions. They can envision a sustainable world with fundamental changes that need to be made by individuals, local communities and countries to achieve this.

Sustainability Education is interdisciplinary in nature and therefore core content can be easily integrated into teaching and learning (Sandri, 2022). Educators can use a variety of STEM (Science, Technology, Engineering, and Mathematics) techniques to connect sustainability knowledge to inquiry and action. As in the study of Sousa, Maroco, Gonçalves and Machado (2022), determining factors can be taken into account by considering it from a digital learning perspective. According to the results of the relevant study, if we want a digital sustainability education, the following are important: 1- Characteristics of online classes 2- Support from the School and Professors factor 3- Online classes vs. face-to-face classes and gender.

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