

CURRENT PERSPECTIVES IN EDUCATIONAL SCIENCES

Editor
Prof. Dr. Adem BAYAR



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Chapter 1

An Action Research for Developing Environmental Awareness in Primary School Students ¹

Elif Nisa ÇEPER DİNÇŞAHİN², F. Belgin ÖZAYDINLI³

This research aims to develop environmental awareness among first-grade primary school students. The study was conducted as an action research, which is one of the qualitative methods of research. The study was conducted within a class of 16 first-grade students in the Beşiktaş district of Istanbul, Turkey, over a total of 23 class hours. Considering the interests and needs of the learners, the research topic of “Plants” was selected. Taking into consideration the aims, dimensions and approaches of environmental education, a total of 11 activities were organized for implementation within the scope of the participant students’ Life Sciences, Visual Arts, Turkish, Mathematics, Music, Drama, and Free Activities courses. The data collection tools employed in the research were mind maps, card-matching activities, semi-structured interviews, and activity evaluation forms. The data collected in the research were analyzed by content analysis. As a result, it was concluded that the participant students developed awareness about the concepts of environment, animate and inanimate, plants, as well as the characteristics and importance of plants through organized activities.

Keywords: Environmental education, Environmental awareness, Action research, Primary Education

¹ This study was developed by updating certain sections of the Master's thesis conducted by Elif Nisa Çeper Dinçşahin under the supervision of Prof. Dr. F. Belgin Özaydınlı.

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Introduction

"No one sees trees. We see fruit, we see nuts, we see wood, we see shade. We see ornaments or pretty fall foliage. Obstacles blocking the road or wrecking the ski slope. Dark, threatening places that must be cleared. We see branches about to crush our roof. We see a cash crop. But trees - trees are invisible". (Powers, 2018, p. 423)

These words of Richard Powers in his work *The Overstory* may seem exaggerated to some, begging the question, "How can something so ubiquitous be invisible?" Some may even object to his wording, with trees being a source of oxygen and we should be grateful for their presence in many aspects of our lives, providing us with many things from paper through to furniture. Unfortunately, our species has a funny way of showing gratitude for the existence of trees. Since agricultural practices began some 12,000 years ago, humans have cut down almost half of the world's estimated 5.8 trillion trees, according to a 2015 study published in *Nature*. Evolutionarily speaking, this has all happened in less than a second. It may be asked that whilst we may see trees, are we actually aware of them?

With these words, Powers shows us the importance of self-awareness through nature. Can education be a key to develop environmental awareness (EA) through nature? In fact, following the Tbilisi declaration of 1977, research has shown that EA can be developed most through the framework for environmental education (EE), from infancy right through to senior years, and in both formal and non-formal venues (Leal Filho et al., 2018). What is meant here is a planned, systematic, programmed, and equal opportunity form of education. Since the first studies based on EA appeared in formal education, a significant amount of research has suggested that the best environmental experiences should include a range of objectives, such as developing a basic appreciation for the natural world in a holistic and interdisciplinary manner (Ardoin & Bowers, 2020; Wilson, 2018). However, how should training be conducted involving holistic EA in a country with a centralized education curriculum, in which the lessons are divided or compartmentalized?

The aim of the current study is to design and implement an educational instruction that is aimed at the development of first-year primary school students' EA, and to examine whether such a design can be effective. For this purpose, answers to the following research questions are sought.

- How did learning activities develop students' awareness of plants?
- What are the students' perspectives on learning activities?

The current study aims to propose an environmentally friendly instructional design with a focus upon classroom implementation within the "normal" school

context, i.e., having a prescribed central curriculum, school resources, organized timetabling, workload, routines, etc. The findings of the current study are intended to set an example for educators in creating their own course designs. The study also aims to develop an understanding of the key aspects of the practices that should be taken into consideration. It is thought that this research, having a substantial design, will contribute to primary school educators' future planning and organization of EE curricula as the pertinent activities are considered to be easily adaptable.

Environmental awareness

Environmental awareness (EA) means the growth and development of one's awareness, understanding, and consciousness towards the biophysical environment and its problems, including human interactions and effects (UNESCO-UNEP, 1983). The main purpose of EA is to develop the skills to perceive, identify, and react to environmental problems, and to perceive environmental stimuli (Schreuder et al., 2016). Individuals with developed EA can establish cause-and-effect relationships regarding environmental problems, and also to act with appropriate care of the natural environment in their daily activities, and with an awareness of the impact of environmental problems affecting both themselves and society as a whole (Gadenne et al., 2009). Since most behaviors are acquired during childhood, they go on to shape our personality, attitude, habits, beliefs, and value judgements in adulthood (Oktay, 2018). In other words, environmental attitudes develop early, and as such are harder to modify as children grow older (Coertjens et al., 2010; Evans et al., 2018; Hahn & Garrett, 2017; Gifford & Sussman, 2012).

Since children learn not only more or better but also differently, experiencing improvements in cognitive, affective, interpersonal, and physical ways (North American Association for Environmental Education, 2016); it is important for them to interact with their environment through direct/indirect experiences (Corraliza & Collado, 2019; Melis et al., 2020). However, the relationship of children with nature is gradually diminishing, which is partly as a consequence of globalization, technology expansion, and increased urbanization (Lekies & Brensinger, 2017; Soga & Gaston, 2016). Since children receive education largely within physical classrooms that are disconnected from nature, and since they may have limited direct experience with living systems (Kahyaoğlu & Yetişir, 2015), they develop much of their knowledge on environmental issues from their parents and peers (Collado et al., 2017). In addition, media can negatively impact on EA, as it draws children away from directly experiencing nature (Hawley, 2018). Today's world creates in children an indifference and

insensitivity to natural events and to the environment (Edwards et al., 2013). Children, who are detached from their natural environment, consider their environment to be made up of a few beings, find it difficult to distinguish between living and non-living, and often do not know how to treat living beings when they encounter them (Louv, 2005). The early years is therefore a critical time in which children actively construct some of the foundational aspects of their environmental identity (Green, 2015). For these reasons, ensuring that children can relate to the environment is rendered possible largely through the formal education of children at the beginning of their learning life. EE should be conducted with a multidisciplinary approach that brings together the relevant parts of each field in a suitably balanced way (UNESCO, 1997). In other words, formal education is there to harmoniously integrate actions such as seeing, hearing, describing, asking, etc. that are already inherent in children (Louv, 2005) through planned and scheduled learning activities.

Context of the study

EE in Turkish primary school curricula

In Turkey, general and specific objectives and learning outcomes of primary education are determined by the Turkish Board of Education, and which is then administered through national curricula by the Turkish Ministry of National Education. In the Life Studies curriculum, observing and protecting plant and animal life, keeping the environment clean, and recycling are handled in the first grade, growing of plants and vegetables, feeding animals, and also recycling are addressed in the second grade, and taking responsibility for nature, the environment, and recycling are the tackled in the third grade. One of the special aims of the Science curriculum, which starts in the third grade, is *to raise awareness of sustainable development regarding society, economy and natural resources*. It is seen that the emphasis is on sustainable development, rather than a sustainable environment. While the third-grade Science curriculum includes issues such as living/non-living and natural/artificial environment; the importance of recycling is emphasized later in the fourth-year Science curriculum. As can be seen, in Turkish primary schooling, EE is mostly included in Life Studies and Science curricula, with the dominant learning outcomes mostly relating to taking care of the environment and recycling. However, in some EA-based research studies performed with primary school students (Atasoy & Ertürk, 2008; Demir & Yalçın, 2014; Tanrıverdi, 2009), it has been noted that there was little knowledge about environmental issues at the individual level, and that both social and individual sensitivities were found to be insufficient, and that

activities to increase consciousness could not have been conducted very thoroughly.

Participants

Researchers

The first researcher in the current study has 6 years of professional experience, and works at the primary school where the research study was conducted. As the *insider*, the teacher-researcher actively participated in the design, implementation, and evaluation process of the action research (AR). The second researcher, having conducted research on EE and has 18 years of experience the area of curriculum development and instruction, worked as a critical friend (i.e., an “*outsider*”) who was there to facilitate the progress of the research through the teacher-researcher. While the insider performed the first-order AR through focusing on the improvement of classroom teaching (*teaching context*); the outsider took on a proactive role in promoting the learning capacity of the teacher-researcher through reflective inquiry (McNiff & Whitehead, 2011).

Study group

The study group of the current research consisted of 16 students. It may be said that there was a positive atmosphere in the classroom, in which communication between the students was seen to be effective. On the basis of confidentiality, during the data analysis process, the students were coded phonetically and culturally with an alternative name that was close to their own.

Research Environment

The research was conducted in the Beşiktaş district of Istanbul, Turkey, in a primary school with students from a socioeconomic background defined as medium or high. The full-time school has a schoolyard that includes different tree species, as well as slides, a playground, and an organic farming garden area.

Design and Implementation of the Learning

In the first design stage, the first researcher, who believed in the necessity of EE and tried to understand the students' actions regarding their natural environment, observed them in and out of class. During the initial observation, it was seen that the students were harming the plants in the schoolyard which stemmed from a lack of a complete understanding of living and non-living things, which was merely based on whether or not an object was able to move as suggested by Margett and Witherington (2011) and also Wright et al. (2015). In order to confirm this idea, the primary education curriculum was thoroughly

studied, and indeed some learning outcomes related to the environment were seen to begin in the first grade, but the conceptualization of living-non-living beings was seen to begin in the third grade. After the review of related literature on EE, it was determined that the principles of EE set out at the Tbilisi conference were knowledge, awareness, attitude, skills and participation, and that the principle that should be developed from preschool to 8 years of age should be awareness (Braus & Wood, 1993). After the decision was made to design the action research with a view to developing EA, the focus of the learning to be designed was determined. The focus of the learning was selected to be intertwined education due to the inflexibility of the present central understanding of education in Turkey and to the interdisciplinary nature of EE. Thus the implementation were carried out within the centralized “normal” school context with school resources, organized timetabling, and in due consideration of workloads of teachers, routines, etc.

In the second design stage, which of the environmental themes to be addressed in early childhood education was appropriate to the current action research was determined. Rather than using a predetermined theme and applying a structured approach that assumed that all of the participant children would be interested in learning the same things at the same time, the theme was selected according to the interests of the children and the approach was not changed so long as the majority of the participants’ interest was maintained. In order to determine the theme, two different activities were prepared: 3-week observation and mind maps. Following analysis of the observations and mind maps, it was noted that the students’ awareness about *plants* was more limited than the other natural environmental concepts.

In the third design stage, learning objectives were organized according to the theme of *Plants*. These learning objectives prepared for EE and were associated with the objectives of courses in Turkish, Life Sciences, Mathematics, Visual Arts, Music, Drama, and Free Activities. In other words, the activities were developed within the scope of the research were prepared according to environmental learning outcomes associated with the students’ related courses. During the third design stage, the content of the EE, activities, instructional methods and techniques, and the environment were determined. In the related literature, while some studies demonstrated that environmental conceptual understanding appears to be related to the construction of a person’s EA (Ardoin et al., 2015; Brulé et al., 2014), others have shown that biological knowledge is necessary but, to some extent, insufficient for adopting pro-environmental behaviors (Gifford & Nilsson, 2014; Villarroel et al., 2017). Thus, while designing the content, the approach known as *Education for the Environment* (Stapp, 1969) was applied. This approach includes environmental conceptual

understanding, gaining values, attitudes, and positive behaviors towards the environment, understanding of the environment as a whole, growing up as a person having sensitivity, awareness, and assertiveness in environmental issues, and educating people in an environmental context. Accordingly, the content was placed into the syllabus as (1) *Structures of plants*, (2) *Physiology of plants; functions of plant organs; development and reproductive characteristics of plants*, and (3) *Importance and function of plants in human life*.

An action plan consisting of 11 activities was then designed in accordance with each course length in the curriculum. Instructional methods/techniques and the environment were selected and organized in accordance with the age of the target learners. The meaning and importance of nature and the integrity of the elements within the environment should be provided for children in the period of concrete operations (7-12) in hands-on activities such as observation, art projects, storytelling, dramatic play, singing, and the measuring of weight and length/height (Atasoy, 2015; Başal, 2005). While the action process was in progress, the activity called *I am Reading for Nature* was removed from the action plan due to problems encountered in its implementation, and the activity *Be the Voice of Trees* was further developed and implemented in its place. A sample lesson plan has been provided in Appendix 1. Activities, their purpose, the learning outcomes of the EE and the learning outcomes of the related curriculum courses are presented in Table 1.

Table 1. Activities, activity purpose, and learning outcomes

Activity name / activity/description	EE learning outcomes	Course Name/Curriculum courses' learning outcomes
<i>Seed Planting</i> Observation	1. Realizes plants are living things. (Cognitive)	Life Sciences (LS) / 2 hours Schoolyard
Students fill cardboard cups with soil, add seeds and a little water. Students then water their plants in an area that receives sunlight so they will grow. Students observe the seedlings' development.	2. Realizes what plants need to grow. (Cognitive) 3. Undertakes the care and protection of a plant. (Affective)	LS.1.6.2. Observes plants in their immediate vicinity. LS.1.6.3. Takes care to protect the animals/plants in their immediate vicinity.

Activity name / activity/description	EE learning outcomes	Course Name/Curriculum courses' learning outcomes
<i>I am in Nature</i> Observation Students make conclusions through observing what living and non-living beings can/cannot do. Students answer questions from the “I am in Nature” activity file.	1. Distinguishes living and non-living features. (Cognitive) 2. Lists the characteristics of living things. (Cognitive)	Life Sciences (LS) / 2 hours Schoolyard/ Classroom LS.1.6.2. Observes plants in their immediate vicinity.
<i>As my Plant Grows, I Measure it</i> Length Measurement Students make first measurement of seedlings growing through the Lego. Students write measurement results taken four times on different dates on the activity worksheet table.	1. Realizes that plants are living beings that grow and need care. (Affective) 2. Measures the height of plants. (Cognitive)	Mathematics (M) / 3 hours Classroom M.1.3.1.1. Compares objects in terms of their length/height. M.1.3.1.2. Measures using a non-standard measuring tool to measure the length/height of a given object. M.1.4.1.1. Reads simple tables with up to two data groups.
<i>I have visited, I have seen, I have drawn</i> Observation Students examine parts of a plant (of their choice) in detail. Students explain the plant's parts through drawings on the activity worksheet.	1. Recognizes different plants. (Cognitive) 2. Writes / draws the parts of the plants. (Cognitive)	Life Sciences (LS) / 3 hours Schoolyard/ Classroom LS.1.6.2. Observes plants in their immediate vicinity.

Activity name / activity/description	EE learning outcomes	Course Name/Curriculum courses' learning outcomes
<i>Give a Hand to Nature</i> Art Project Students who designed a tree model study parts of a tree with two- and three-dimensional concepts.	1. Arranges the parts of a tree on a two-dimensional surface. (Cognitive) 2. Decides the material to be used in the plant design. (Cognitive) 3. Creates two- and/or three-dimensional designs of the plant. (Kinesthetic)	Visual Arts (VA) / 2 hours Classroom VA.1.1.2. Uses different materials, items, tools and techniques in visual art studies. VA.1.1.5. Arranges forms on a two-dimensional surface.
<i>I am a Tree</i> Drama Each student in turn wears the model tree prepared in the Visual Arts class, whilst other students pull at the branches of the model tree. Students share their feelings after the activity.	Through the different roles taken, students analyze the feelings of a tree. (Social-affective / kinesthetic).	Drama (D) / 2 hours Schoolyard/ Classroom D.6. Sees events, facts and problems by putting themselves in the shoes of others.
<i>I am Reading for Nature</i> Silent Reading Students read the “Travelling Tree” book. Note: The only activity of the AR that did not go as planned.	1. Realizes what can happen in the absence of plants. (Affective) 2. Realizes that they are also part of nature. (Cognitive / affective).	Turkish (T) / 2 hours Schoolyard T.1.3.1. Recognizes the basic parts of reading materials. T.1.3.12. Applies reading strategies.

Activity name / activity/description	EE learning outcomes	Course Name/Curriculum courses' learning outcomes
<i>Be the Voice of Trees</i> Free writing Students write letters to people using the language of plants.	Writes their feelings/ thoughts about the environment. (Cognitive / Affective)	Turkish (T) / 2 hours Classroom T.1.4.5. Writes meaningful and regular sentences. T.1.4.7. Leaves appropriate spaces between letters, words, and sentences. T.1.4.8. Uses punctuation correctly.
<i>World Without Plants</i> Art Project Students imagine and then paint a world without plants.	Reflects their emotions and thoughts through visual artwork by imagining a world without plants. (Social-affective)	Visual Arts (VA) / 2 hours Classroom VA.1.1.3. Reflects their feelings and thoughts through visual artwork. VA.1.1.4. Creates visual artworks inspired by the given themes and topics etc.
<i>I am Singing for Nature</i> Art Project / Singing Students sing “From Seed to Sapling,” accompanied by the maracas they designed.	Sings songs about the love and importance of plants. (Social-affective).	Music (MU) / 2 hours Classroom MU.1.A.6. Distinguishes between harmonious and disharmonious sounds. MU.1.C.2. Accompanies music learned with a rhythm instrument they created.
<i>TEMA Foundation</i> Students listen to a presentation of experts from the TEMA Foundation and ask questions.	Recognizes environmental organizations and their studies. (Social/ Affective).	Free Activities (FA) / 1 hour School Gym FA. Listens/watches the speeches appropriate to their level.

At the beginning of each activity, introductory activities such as video demonstrations, visuals, games, and preparatory questions were utilised to motivate the students so as to develop their imagination, encourage them to participate in the class activity dialogue, and to concretize the concepts being taught. During the activities' implementation, particular attention was paid to maintain the students' interest and motivation, the students' active-passive balance, and the principle of graduality (progression of activities from simple to complex). Following completion of each activity, students filled activity evaluation forms.

Method

Research model

This study is designed according to the AR model, also known as *teacher research* which is one of the qualitative research paradigms employed to examine EA in students, to observe the implementation process in detail (Yıldırım & Şimşek, 2016), to find effective solutions to problems that arise during the implementation (Stringer, 2007), and to study a real class situation in order to understand and improve the quality of teaching (Johnson, 2011). As it enables teachers to develop their own teaching practices either alone or with another teacher or expert (Hendricks, 2006), a *Class AR* was applied in the current study. In this research, a cyclical path was followed instead of a hierarchical and gradual path, depending on the requirements of each given situation relating to the activities. The AR cycle, given in the Design and Implementation of the Learning section, used in this research is presented in Figure 1.

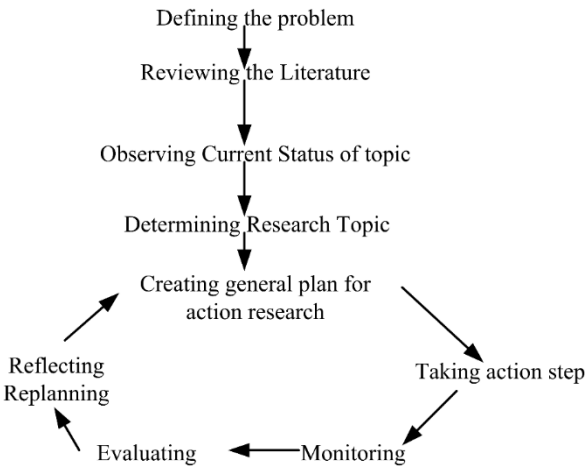


Figure 1. Action Research Cycle

Data Collection Tools

Initial and final Mind Maps

Since mind maps convey an individual's views and thoughts (Kortelainen & Vanhala, 2004), prior to and following completion of all activities the students were asked to write the word "Environment" in the middle of a blank piece of paper and to then draw pictures of the things they associate with it as branches.

Initial and final Animate/Inanimate Card Matching

All of the pictures that the students drew on their mind maps were itemized on a page in a Word file. A second page was titled *Animate* and *Inanimate*, with the page divided into two columns by a line. Before and after each activity's completion the students were asked to cut the pictures from their mind maps and stick them under the headings of *Animate* or *Inanimate*; or in the middle of the page if they were unsure.

Initial and final Semi-structured interview questions

Before and after each activity's completion a semi-structured interview was conducted to enable the teacher-researcher to ask additional questions to the students in order to gain detailed information and understand the inner world of the individual, and to thereby better understand their perspective (Creswell, 2015). The semi-structured interview questions (SSIQs) used were as follows:

- SSIQ 1: What do you think environment means? What comes to your mind?
- SSIQ 2: What do you think a living being is?
- SSIQ 3: What do you think are the common characteristics of living beings?
(plus: if not understood) What can living beings do and not do?
- SSIQ 4: Do you think plants are living or non-living? Why?
(where response is: "they grow") What do plants need to grow?
(where response is "they breathe") How do you think they breathe?
- SSIQ 5: What do you think a world without plants would be like?

Student activity files

In order to determine the students' thoughts, feelings and what they understood from each of the planned activities (Meth, 2003), the students were each asked to complete an activity file following each activity, which varied per activity, for the purpose of monitoring the AR and to reveal whether or not the learning objectives of the lessons were being adequately met.

Activity Evaluation Form

After the completion of all the activities, each student evaluated the activities by placing an [X] sign in the box next to the expression of *Like*, *Not Sure*, or *Don't Like* for each activity. They then wrote their favorite activities, ordered from favorite to least favorite, beneath the form. In order to bring the research together in chronological terms and with a holistic perspective, the teacher-researcher maintained a diary throughout the study (see Appendix 2), which included observations, emotions, reactions, assumptions, and explanations (Meth, 2003) from the beginning through to the end of the process. Also, during the activities, the participant students were asked to complete a diary entry after each activity based on the questions of “*What did you do today?*”, “*What did you learn?*”, “*What did you feel?*”, “*What did you love the most?*”, and “*What else would you do?*” The diaries were then used by the researcher to improve interpretation of the results of the data collection tools, along with the purpose of monitoring any difficulties encountered and the notable positive aspects of the research, but the diary entries were not included in exercise of coding the collected data.

Data Analysis

In this research, content analysis was used for in-depth analysis of the collected data, since there were no predetermined themes or dimensions to the study (Mayring, 2014). *Semi-structured interviews* and *written activity files* were transcribed verbatim in order to bring together similar data within the framework of specific concepts and themes, and to interpret them in a way that readers could understand. In the content analysis of the mind maps, *Animate/Inanimate Card Matching activity*, and *visual activity files*, the objects in the pictures drawn by the students were transcribed one by one and codes were created. Main and sub-categories were obtained from the codes, and themes were reached from the categories.

Validity and Reliability

As a qualitative research study, in order to ensure it was methodologically sound and the findings considered as reliable (Lincoln & Guba, 1985), the credibility, confirmability, transferability, and dependability aspects were taken into account. In order to ensure credibility of the research's findings, the data were collected using five different tools, which were then compared with each other in order to see whether or not they showed consistency. For the students', a *draw and write technique* was applied since the drawing activities provided them with more cognitive control over their expression (Kalvaitis & Monhardt, 2012).

For confirmability, in order to prevent data loss during the research process, the activities were photographically recorded, and the semi-structured interviews were audio recorded. The longer-term view (3-week pre-trial observation, 3-week pre-trial and post-trial period, and 3-week implementation period) is an important factor in the quality assessment of the research. In the content analysis, coding was conducted by two independent researchers. The reliability formula for the two coders, as proposed by Miles and Huberman (1994), was calculated using the $P = Na / (Na + Nd)$ formula. The coding reliability calculations were found to be .88 for the semi-structured interviews, .92 for the mind maps, .87 for the animate/inanimate Card Matching, and .95 for the activity evaluation forms. For transferability and dependability, the environment and process are described in detail, with direct excerpts from the collected data provided so as to enable readers to visualize the research in their minds and to help teachers who may wish to apply the same or similar processes in their own classroom. The results obtained from the findings are presented in relation to each other and also in relation to the published literature.

Findings

Findings relating to the first research question

Students' awareness of the concepts related to environment

The content analysis of the students' initial mind maps (IMM) and final mind maps (FMM) are presented in Table 2.

Table 2. Content analysis of environment-related concepts based on students’ mind maps

Themes / Categories	Frequency		Themes / Categories	Frequency	
	IMM	FMM		IMM	FMM
ANIMATE			INANIMATE		
Plant	-	8	Natural		
Trees	8	15	Soil	3	6
Branch	1	4	Mountain	7	2
Leaves	-	5	Sun/Moon/Sky	3	8
Trunk	-	6	Ocean/Sea/Lake	3	7
Roots	-	6	Cloud/Rain	2	10
Flowers	7	11	Stone	-	2
Daisy/sunflower	-	8	Artificial		
Grass/Bushes	3	8	Vehicles	7	8
Fruits	1	4	Things		
Animal			Paper/Book	-	12
Birds	1	5	Ball/Toy	3	8
Mammals	9	24	Flag	1	6
Human	4	16	Garbage Bin	-	5
Insects	18	21	Architecture		
Fish	-	3	Statue	-	6
Reptiles	-	2	Road/Bridge	4	5
Snail	2	5	Buildings	4	11
Worm	1	1	Park	-	4
Centipede	-	7			
Frog	-	6			

When the Plant category within the ANIMATE theme was analyzed, it was seen that eight of the students wrote *plant* in their final mind maps, whilst none of the students had used plants in describing the pictures they drew prior to the implementation. It was seen that more flower types had been used by the students in the final mind maps. In addition, while almost none of the students could express a tree according to its parts prior to the implementation, some of the students were seen to draw/write a tree with branches, stems, roots, and leaves as its sections following the implementation.

When the final Animal category in the ANIMATE theme was analyzed, it was seen that the students had drawn pictures of frogs, bears, zebras, horses, pigs, snakes, fish, centipedes, butterflies, and ants, which had not been used in the students’ first mind maps. In addition, an increased occurrence of their drawing humans showed that following the implementation, all of the students had accepted human beings as part of the environment.

As for the INANIMATE theme, it was seen that there were drawings made in the final mind maps of the students of garbage bins, park areas, and pencils and books in the *artificial category* and rain in the *natural category* which had not been included in the first mind maps of the students.

The content analysis of the students' responses to the initial and final semi-structured interview question (SSIQ 1) and to the question *What have you seen in nature?* in the corresponding student activity form (SAF) are presented in Table 3.

Table 3. Content analysis of initial and final SSIQ 1 and SAF

Themes / Categories	Frequency		
	SSIQ 1 Initial	SAF I am in nature	SSIQ 1 Final
ANIMATE			
Plant	6	4	2
Trees	1	9	12
Flowers	2	8	10
Grass	-	4	7
Animal	3	7	8
Human	2	14	14
INANIMATE			
Cloud/Sun	-	5	8
Vehicles	1	5	2
Buildings	4	4	3
Things (Garbage Bin)	-	4	6
Sea	1	7	11
Location	10	-	-
Playground	-	3	4
Outside	-	1	2
Green /Wetland area	-	4	7
Architecture (statue)	-	5	5

The students mostly defined the environment as simply a *place* prior to the implementation and *the place where the trees were* and *the place where the plants were* following the implementation. After the implementation, rather than simply using the term *place*, three new expressions, *playground*, *outside*, and *green/wetland area* were seen to have been added to the students' definitions. Considering the student activity form and final semi-structured interviews as a whole, it was observed that the students, whose environmental concept was limited to only a few living beings prior to the implementation, were able to provide more detailed definitions and descriptions following the implementation.

Figure 2 and Figure 3 provide example mind maps of a student, followed by text from their semi-structured interview, and then Figure 4 illustrates an excerpt from the corresponding activity file of the same student.

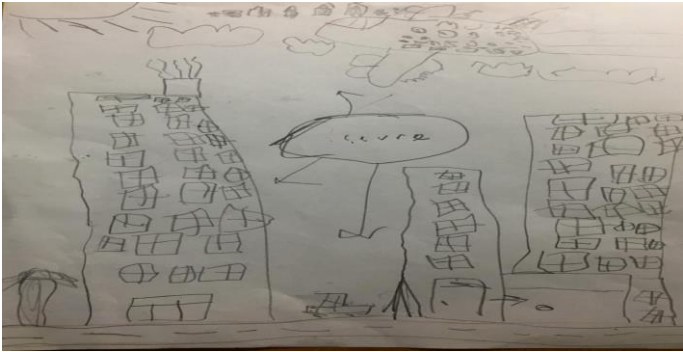


Figure 2. Ece's initial mind map without living beings in her drawing

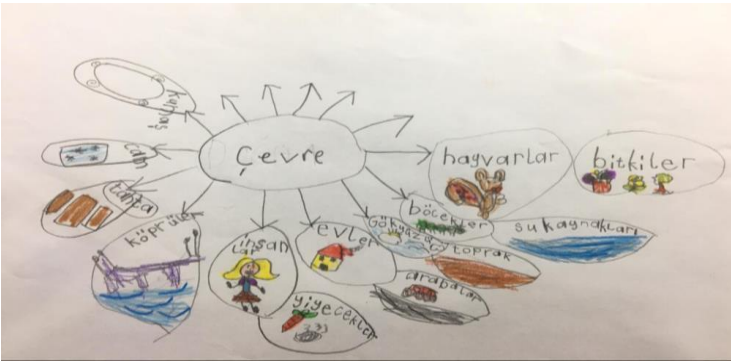


Figure 3. Ece's final mind map, with living and non-living beings in her drawing

- SSIQ 1: *What do you think environment means? What comes to your mind?*
- Ece: *Hmm... environment, well; a place with houses and cars. [Initial SSIQ 1]*
- Ece: *There are people, houses, greenery, every living thing in it, and non-living beings, too. [Final SSIQ 1]*

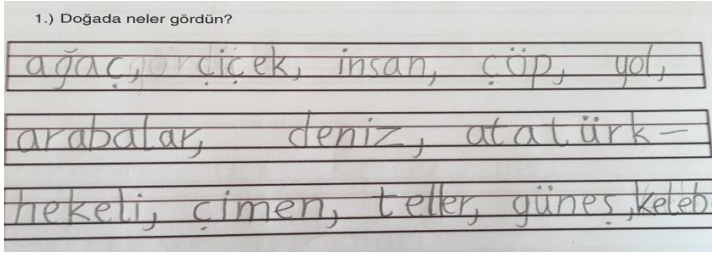


Figure 4. Ece's answer to: "What have you seen in nature?"
("I am in nature" activity file)

[Translation: trees, flowers, human, garbage bin, road, cars, sea, Atatürk statue, grass, wire, sun, butterfly]

Ece's first drawing contains a few artificial and natural environmental elements such as buildings, aircraft, cars, clouds, and the sun, whilst her final drawing included artificial environmental elements such as a bridge, house, wood, glass as well as natural environmental elements such as flowers, animals, plants (three different flower drawings), vegetables, insects, the sea, sky, humans, and soil/earth in her drawings/writings. It was therefore seen that the student (Ece), who defined the environment with houses and roads in her initial interview, considered the environment as a whole with both living and non-living elements in both her final interview and in the corresponding *I am in nature* activity form.

Students' awareness of the living and non-living

In the initial card-matching activity, six of the students had used the word *plant* in the INANIMATE category, whilst two of the same six students correctly used the word *tree* in the ANIMATE category. This showed that those students considered trees to be something different from plants. In the final card-matching activity, none of the students had used the word *plant* for the INANIMATE category. Notably, those students who were *not sure* about the *sun*, *earth*, *leaf*, and *mountain* prior to the implementation had placed them correctly following the implementation.

The findings relating to the second initial and final semi-structured interview question (SSIQ 2) and to the question *Which of the beings you saw were animate?* in the student activity form (SAF) are presented in Table 4.

Table 4. Content analysis of initial and final SSIQ 2 and SAF

Themes / Categories	Frequency		
	SSIQ 2 Initial	SAF I am in nature	SSIQ 2 Final
Moving things	5	-	-
Plants	2	8	7
Trees	2	7	6
Leaves	-	4	3
Flowers	2	5	5
Animals	7	9	9
Human	1	10	10

The increase in all categories for the *plants* and *animals* themes, and the addition of a new category (*leaves*) under the plants theme, and the disappearance of the *moving things* as a theme in the final interviews showed that the students had a more concrete and distinctive concept of *living beings*. The following is an example of a student's semi-structured interview and one of their activity files (see Figure 5).

SSIQ 2: *What do you think a living being is?*
 Belis: *Living being... It is like a moving animal. (Initial SSIQ 2)*
 Belis: *Something breathing. They are moving beings, but some cannot move. (Final SSIQ 2)*

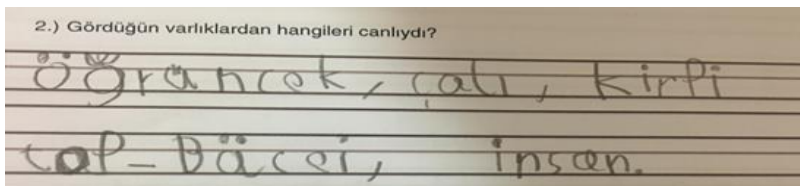


Figure 5. Belis' answer to: “What have you seen in nature?” (“I am in nature” activity file)

[Translation: *Spider, bush, hedgehog, ball beetle, human*]

The student thought for a long time during their initial semi-structured interview and then defined living beings only as animals with *the ability to move*. The student wrote examples of animals (e.g., spider, hedgehog, and ball beetle), plants (bush), and humans on the “I am in nature” activity sheet, and included *breathing* as a feature of living things in the final semi-structured interview. It is

thought that with the expression *Some of them cannot move*, the student had referred to plants.

The students' answers regarding the similar characteristics of living things in the third initial and final semi-structured interview question (SSIQ 3) and their responses to the question *What are the common characteristics of living beings that you saw?* in the student activity form (SAF) are presented in Table 5.

Table 5. Content analysis of initial and final SSIQ 3 and SAF

Themes / Categories	Frequency		
	SSIQ 3 Initial	SAF I am in nature	SSIQ 3 Final
Feeding			
Drinking	2	12	14
Eating	2	12	15
Moving/Acting	8	2	2
Running/walking	2	-	-
Speaking	1	-	1
Climbing/jumping	2	-	3
Flying	-	-	1
Growing	1	16	16
Breathing	2	15	14
Dying	-	12	8
Having organs	8	-	-

It can be said that there was a decrease in the variety of expressions in the final interview, but that there was an increased number of expressions. While the most frequent responses prior to the implementation were *moving* and *having organs*, following the implementation *breathing*, *growing*, *drinking*, and *eating* became dominant. Most of the students seemed to realize that *moving/acting* was not a common feature of all living beings. In the following is an example of a student's semi-structured interview, whilst Figure 6 shows an excerpt from the corresponding activity file.

SSIQ 3: *What do you think are the common characteristics of living beings?*

Fatmagül: *Living things have bones, heart, and a butt.* (Initial SSIQ 3)

Fatmagül: *Living things can breathe, eat and sleep, and they grow up.* (Final SSIQ 3)

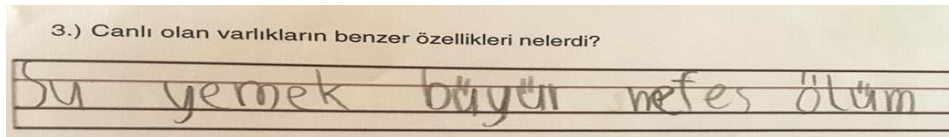


Figure 6. Fatmagül’s answer to: “What are the common characteristics of living beings you saw in nature?”
 (“I am in nature” activity file)
 [Translation: water, food, growing, breathing, death]

In the initial interview, the student, who expressed the living characteristics as *having organs*, ignored the plants while listing these characteristics, and in their final interview, she listed the characteristics of a living being as breathing, eating, and growing. After observing living things in the school garden as part of the *I am in nature* activity, the student added the concept of *dying* to the common characteristics of living things.

Students’ awareness of the characteristics of plants

In their initial mind maps, none of the students, who mostly drew pictures of trees and flowers, were able to identify the parts of the plants, and none included the roots of a tree in their drawings. In their final mind maps, it was noted that eight of the students drew plant pictures in detail and that five of the students had added roots to the trees. In the *I have visited, I have seen, I have drawn* activity file, all of the students completely drew the plants they had observed, and also correctly performed the matching of the sections of a plant. The students’ answers to the fourth initial and final semi-structured interview question (SSIQ 4) about the characteristics of plants are presented in Table 6.

Table 6. Content analysis of initial and final SSIQ 4

Themes / Categories	Frequency	
	Initial SSIQ 4	Final SSIQ 4
LIVING	7	16
Breathing	3	11
Feeling Pain	6	9
Drinking	2	5
Feeding	-	5
Growth	6	16
Sources of growth		
Water	6	13
Soil	2	9
Sun	4	11

Themes / Categories	Frequency	
	Initial SSIQ 4	Final SSIQ 4
Seed	1	3
Roots	3	-
Oxygen	1	5
Care	-	8
Being a life source	-	3
Cleaning the air	-	6
NON-LIVING	9	-

As can be seen from Table 6, in the initial interview, the students' most common response to naming the characteristics of plants was *growth*, although almost half of the students said plants were non-living. They said that plants needed mostly water and then sunlight in order to grow. In the final interviews, none of the students stated that plants were non-living. There was an increase in the number of students who said that plants could breathe and that they felt pain, and a new theme of *feeding* was also added. In the final interviews, the most common responses to the characteristics of plants were *living beings* and *growth*; what they needed most in order to grow was expressed as *water*, whilst there was an increase seen in the responses of *sunlight* and *soil*. In addition, *care* was added to the things that plants needed to grow following the activity. The students who were unable to express during their initial interview how plants breathed responded *through the leaves* in their final interview. It was seen that *source of living* emerged as a new category following the activity. When the students' mind maps, final semi-structured interviews, and both the *Seed Planting* and *I have Visited, I have seen, I have Drawn* activity papers were analyzed as a whole, the students were seen to have stated that plants grew, breathed, and required looking after (needed care). Figure 7 and Figure 8 present a student's initial and final mind maps, respectively, which are followed by excerpts from the same student's initial and final semi-structured interviews.



Figure 7. Lila's initial mind map without any parts of the plants

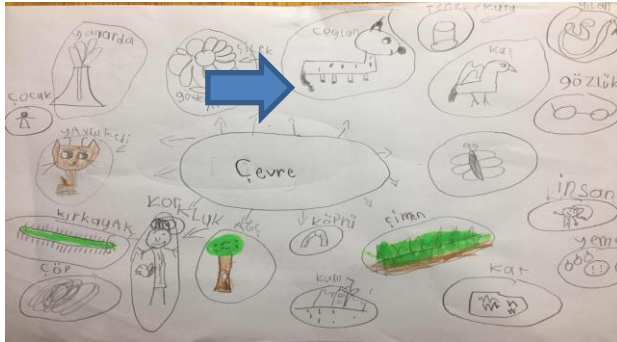


Figure 8. Lila's final mind map, showing plants with their parts

SSIQ 4 [initial]:

Are plants living or non-living?

Lila: Non-living.

Why do you think plants are non-living?

Lila: [laughing] How can they be alive?
They can't climb.

SSIQ 4 [final]:

Are plants living or non-living?

Lila: Living, of course.

Why do you think plants are living?

Lila: They can grow up, drink water, breathe, and feed.

You say they breathe. How do they breathe?

Lila: With their leaves.

You say they grow. What do plants need to grow?

Lila: Water, soil, sunlight, food, and care. If we don't look after them, they will immediately die.

Figure 9 presents the painting that the same student (Lila) created for the corresponding activity file, after which excerpts from the same activity file are presented in Figure 10.

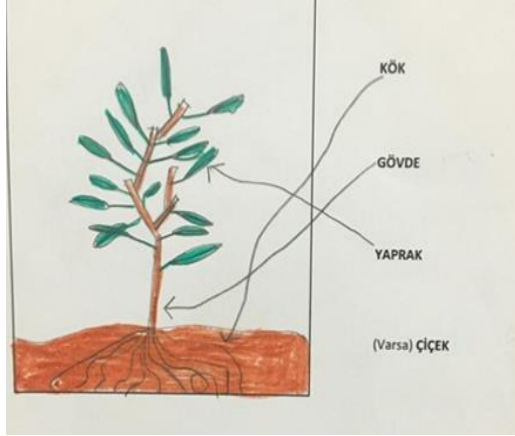


Figure 9. Lila's painting of a plant following the "I have visited, I have seen, I have drawn" activity

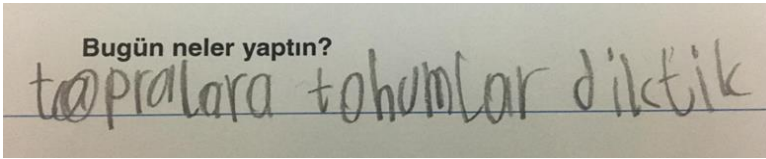


Figure 10a. Lila's activity file following the Seed Planting activity
[Translation: "What did you do today?" "Today, we planted seeds"]

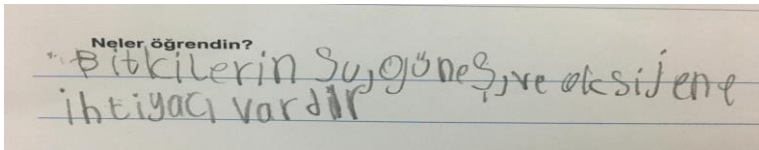


Figure 10b. Lila's activity file following the Seed Planting activity
[Translation: "What did you learn today?" "Plants need water, sun and oxygen to grow."]

Students' awareness about the importance of plants

The fifth initial and final semi-structured interview question focused on the importance of plants, and the findings are presented in Table 7.

Table 7. Content analysis of initial and final SSIQ 5

Themes / Categories	Frequency	
	SSIQ 5 Initial	SSIQ 5 Final
Vital Effects		
Fatal/ Harmful	3	8
Oxygenless	1	6
Emotional Effects		
Boring	1	3
Bad/ Sad	11	10
Good/ Interesting	5	-
Environmental Effects		
Dry	-	3
Littered	2	4
No flowers	1	5
Dirty	-	5
Others		
Gray(ish)/ Black(ish)	6	5
Colorless	-	6
Don't know	6	-

As can be seen from Table 7, prior to the implementation, the students used only limited vocabulary and definitions in expressing their ideas. The highest level of increase seen following the implementation was in the response *oxygenless*. The responses of *dry*, *dirty*, and *colorless* were not seen prior to the implementation. In addition, responses such as *good*, *interesting*, and *don't know*, which were evident prior to the implementation, were no longer used following the application. Thus, it can be said that all of the students responded by answering the questions. Within the scope of the responses given, the effects of a world without plants were divided into four themes, as *vital effects*, *emotional effects*, *environmental effects*, and *other effects*. The students considered the plants to be important in view of their vital, emotional, and environmental effects. Following the implementation, having provided answers such as *gray* and *colorless*, the students had also displayed an artistic awareness too.

Table 8 presents the findings of the “Be the Voice of Trees,” “I am Singing for Nature,” “I am a Tree,” “World Without Plants,” and “TEMA Foundation” activity files.

Table 8. Findings related to activity files

Be the Voice of Trees	I am Singing for Nature	I am a Tree	World Without Plants	TEMA Foundation
Plants' right to life.	Transformation of seeds into a sapling and then into a tree.	Realizing that plants can also suffer, but that they are unable to express it.	Artificial environmental elements (roads, trains, etc.) drawn with colored pencils.	Recognizing different tree species.
Respect / love for plants.	The importance of forests.	Feeling very bad.	Natural environmental elements were drawn as lifeless, with plants withered and people/ animals lifeless.	The importance of protecting nature.
Benefits of plants to nature/humanity (providing fruit and vegetables, cleaning the air, providing oxygen).	Seeds needs soil, sunlight, and water to grow.	Feeling extremely ashamed.	Black smoke coming from chimneys of houses; there were no people in them.	Knowledge of environmental organizations.
	Forests are home to different creatures.	Feeling sad for not being able to speak or explain your problem. Anxiety of not being able to escape.	Sky painted gray. People's eyes crossed out.	The importance of planting saplings.
			Police / Red Crescent cars offering help. Some drawings have no living beings.	

When the files of the five activities are considered as a whole, it can be seen that the students stated plants being considered important for sustainable life, and that life would disappear in their absence. Stating that plants are creatures that

grow, suffer, and have needs, the students internalized the concept that plants are unable to speak or explain their problems when they incur damage, and stated that plants should therefore be respected. Finally, those students who are familiar with the voluntary organizations working on EA, stated that forests are home to many living creatures. One of the student's responses to the fifth semi-structured interview question are presented as follows, together with excerpts from the corresponding activity file (see Figure 11).

- SSIQ 5: *What would the world be like without plants?*
Mustafa: *Bad. (Initial SSIQ 5)*
Mustafa: *It would be such a grayish, colorless, stuffy, and dry place. (Final SSIQ 5)*

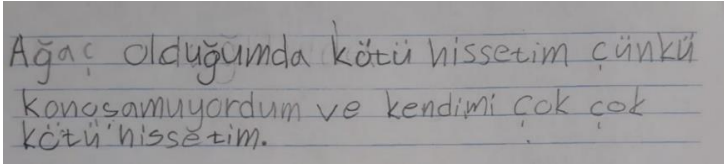


Figure 11a. Mustafa's tree planting activity form

[Translation: "I felt really bad when I was a tree because I couldn't speak"]

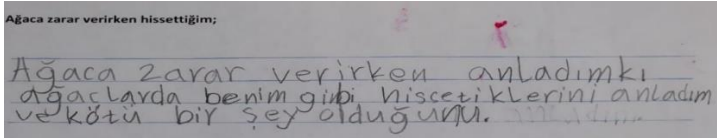


Figure 11b. Mustafa's tree planting activity form

[Translation: "While I was doing harm to the tree, I realized that trees also felt like me"]

In his response, Mustafa stated that he felt very bad because he could not speak out and explain his problem when he played the role of a tree, and wrote that he understood that the trees also felt like him.

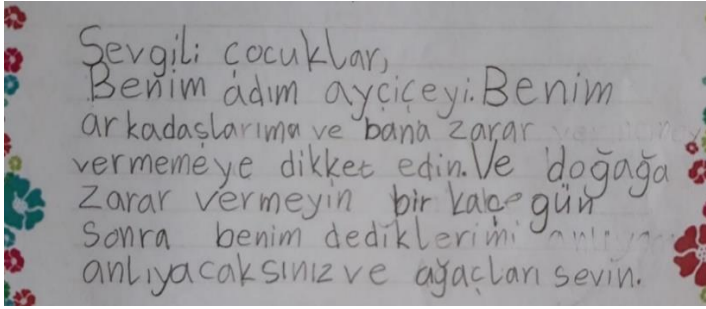


Figure 12. Mustafa's "Be the Voice of Trees" activity file
[Translation: "Dear kids. My name is sunflower. Be sure not to harm me and my friends. And don't harm to the nature. You'll understand me one day"]

Mustafa wrote in his letter to children with the voice of a sunflower, stating that they should not harm either himself or his friends, that they should love trees and they would learn to understand him after a while.

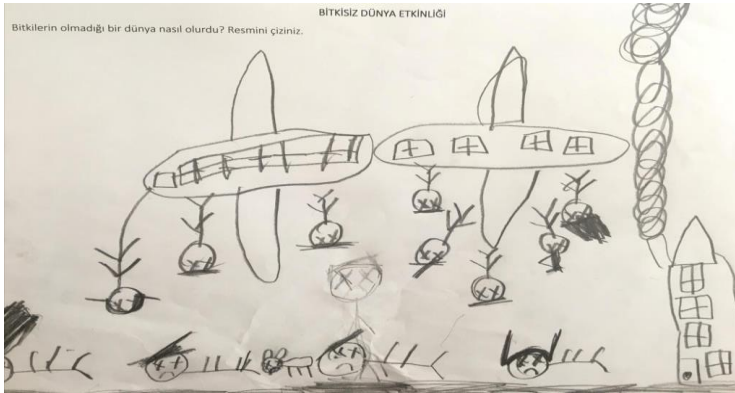


Figure 13. Mustafa's drawing in the "World Without Plants" activity

In the explanation of the picture, the student said, "The men on the plane are falling and dying. Also, the people on the ground and the animals are dead. The smoke of the house is getting into the air and everywhere is poisoned." He emphasized that life would disappear and everything would turn gray.

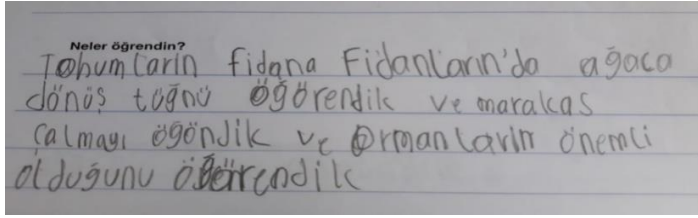


Figure 14. Mustafa's "I am Singing for Nature" activity file

Mustafa wrote on the activity sheet that they had learned how to play the maracas, that seeds turned into saplings, saplings turn into trees, and that forests are considered to be important.

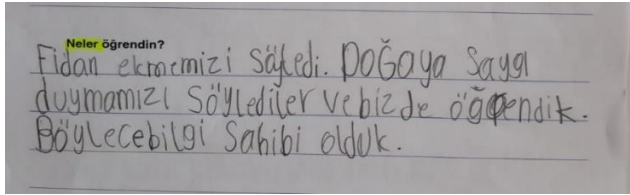


Figure 15. Mustafa's TEMA Foundation activity file

Mustafa wrote that he was informed about the importance of planting saplings and respecting nature during the *TEMA Foundation* activity.

Findings relating to the second research question

The responses of the students to the Activity Evaluation Forms are presented in Table 9.

Table 9. Students' views (all activities)

Activity name	Frequency			
	Liked	Undecided	Not Liked	Most liked
Seed Planting	16	-	-	4
I am in Nature	14	2	-	1
I have visited, I have seen, I have drawn	14	2	-	-
As my plant grows, I measure it	10	3	3	-
Give a Hand to Nature	16	-	-	1
I am a Tree	15	1	-	1
I am Reading for Nature	3	8	5	-
Be the Voice of Trees	12	3	1	3
World Without Plants	13	3	-	2
I am Singing for Nature	16	-	-	3
TEMA Foundation	6	6	4	1
Total	135	28	13	16

As can be seen from Table 9, *Seed Planting*, *Give a Hand to Nature*, and *I'm Singing for Nature* activities, which were mostly art-based projects, were reportedly appreciated by all of the students. The *undecided* and *not liked* response was mostly applicable to the *I am Reading for Nature* activity, which was changed within the scope of the AR project. According to student responses, the *Seed Planting*, *Be the Voice of Trees*, *World Without Plants*, *I am Singing for Nature*, *I am a Tree*, *TEMA Foundation*, and *I am in Nature* activities were the most popular, respectively. However, the *I have visited*, *I have seen*, *I have drawn*, *As my Plant Grows*, *I Measure it*, and *I am Reading for Nature* activities were not found to be among the students' most favored activities. Thus, by the end of the AR, it could be said that the development process of each student varied according to their own merits. Their overall progress through the AR is addressed in the next section.

Discussion and Conclusion

The first topic to be addressed here is the content and organization of the instruction. In this study, *Education for the environment* was employed, which was created by Stapp (1969) to enable students to gain conceptual EA, to comprehend their environment as a whole, and to positively change their environmental behaviors. When considering the students' awareness about the environment-related concepts, it can be concluded that following the AR, all of the participant students accepted human beings as an element of the environment. When the students' awareness regarding the concept of animate-inanimate objects and their characteristics is considered, it can be concluded that the living beings that came to the minds of the children were diversified, and that none of the students considered plants to be non-living following the AR. This finding aligns with recent evidence that structured, activity-based interventions in early years settings measurably shift children's conceptual understanding of living things and their environmental awareness; for instance, Kanaki et al. (2025) demonstrated that technology-integrated activities in early childhood settings can simultaneously foster environmental awareness alongside other cognitive skills, while Küpeli and Bayındır (2025) found that the quality of preschool outdoor education environments is a significant predictor of children's environmental attitude, awareness, and affinity toward nature. The students were able to express the different parts of the plants, and they were able to make exact matches of the parts of plants following the AR. In this context, the activities used in the research were effective in developing the first-grade primary school students' conceptual EA. In addition, through the instruction they received, the students were able to see the term *environment* as a concept that is integral with all forms of life, and accepted themselves too as a part of the environment, instead of as a subject

detached from real life. In addition, the students stated that a world without plants could not be considered a *beautiful* world.

One of the strengths of the instruction may be considered that it was organized in accordance with the principle of graduality. It may be concluded that, through focusing on the characteristics of living beings such as movement, nutrition, and growth, the activities that formed the current research enabled the participants to better distinguish between the concepts of the animate and inanimate. This conclusion is consistent with the view that, as Amprasiz, Papadopoulou and Malandrakis (2021), Ardoin et al. (2015), and Brulé et al. (2014), and also Tao (2016) stated in the literature, the correct perception of the world of plants by children is rendered possible through their comprehension that plants are living organisms. Thus, it is recommended that the primary school curriculum in Turkey should be reconsidered in accordance with the principle of graduality accompanied by a holistic approach. Recent comparative evidence supports this recommendation: Lepičnik Vodopivec and Šindić (2025) found that preschools implementing structured eco-programs achieved significantly higher and more integrated environmental, social, and economic sustainability outcomes than those without such programs, underscoring the value of systematic, curriculum-embedded environmental instruction over occasional or optional activities. Similarly, Sihvonen et al. (2024) emphasized that involving parents alongside the formal curriculum strengthens the durability of sustainability-related learning outcomes in young children, suggesting that the current study's classroom-embedded design could be further reinforced through family involvement.

Another strength of the instruction in the current study was implementing a design with a focus on classroom implementation within a conventional school context; having made no changes to the learning objectives of the current curriculum. In this study, being implemented in different courses, the implementation were effective in raising the awareness of the students since, as stated by Wilson (2018), holistic development is a key tenet that early childhood education and EE share with a view to making EE part of the ordinary school improvement process rather than an optional educational perspective, as also stated by Mogren, Gericke and Scherp (2019). During the process of implementation, the students not only gained the necessary skills within the scope of the curriculum and the course in which the activity was applied, but they also developed their EA. In this respect, the current research presents concrete and detailed course designs to classroom teachers who are sensitive about EE, but may have doubts as to how it should be applied. Through the implementation, students are better able to see the environment as a concept associated with the whole life, instead of as a subject largely disconnected from other courses and

independent from most implementations applied within the classic classroom environment. In other words, the current study revealed that providing students with an EA naturally and in a way that is integrated with all courses can be more effective than more discrete forms of artificial application within a course, as also suggested by Muntean and Ginju (2017).

The third topic to be reviewed here concerns the activities conducted throughout the research. Arts-based pedagogies applied throughout the project had a distinct effect on the children's awareness of their natural environment, which was also suggested by Flowers et.al (2015), Tarr (2008) and Staples et.al (2019). Additionally, the activities, which were conducted in direct contact with the environment were seen to be effective in improving the EA of the students, which was also suggested by Özdemir (2010), Şimşekli (2010), and Yardımcı Çapkınoğlu (2009) in their studies also with primary school students. A recent scoping review by Falchi and Zurru (2024) similarly concluded that direct, experiential, and activity-based practices are consistently identified as the most effective environmental education approaches at the primary level across empirical studies, while a broader systematic review by Zhang, Jung, and Asari (2025) noted that despite growing volume, environmental education research still shows gaps in translating hands-on, arts-based practices into standard curricula — a gap the current study's classroom-embedded AR design directly addresses. On the other hand, since the current study was conducted at a school with relatively more natural environmental facilities than other schools, it may be pertinent that some of the outdoor activities would be considered difficult to apply in schools that do not possess such facilities, which raises the idea that the current research findings may not be generalizable. Though this situation may be considered a limitation of the current study, it should not be ignored that the findings of this AR are not of a type that would be generalized anyway. In other words, it may be possible to conduct the same instruction as seen in the current study in other schools that present similar conditions, and that it may be possible for teachers working in schools that have lesser facilities to choose alternative activities that are deemed more appropriate for the context of their own school, and to modify the other activities in accordance with the conditions at their school. While the *Seed Planting*, *As my Plant Grows*, *I Measure it*, *Give a Hand to Nature*, *I am a Tree*, and *I am Singing for Nature* activities may be applied with materials that teachers can readily gain access to, the activities of *World Without Plants*, *Be the Voice of Trees*, and *I am Reading for Nature* could be considered as activities that require no special conditions.

Though the activities conducted within the scope of the current research were planned in due consideration of the developmental characteristics of the

participant students, some of the activities may be said to have been less effective than others. For example, the *I am Reading for Nature* activity, which is an activity that caused certain problem issues such as distraction and boredom among the students during the process. As a result, the *I am Reading for Nature* activity, in which the participant children were expected to be active mentally and passive physically, did not yield positive results as the environment in which it was conducted included a considerable amount of stimuli. In contrast, it may be said that with less stimuli, the *Be the Voice of Trees* activity was considered to be more effective. The *TEMA Foundation* activity, for which the students showed interest but found it less effective than the others, resulted in some of the participant students becoming bored, as the activity took longer than originally planned, the invited speakers were unable to address the students at their level from time to time, and the activity location could be said to have been rather noisy. Although the apparent ineffectiveness of the *TEMA* activity in turning the students into *environmental volunteers* may seem to be a limitation of the current study, this was consistent with the view also emphasized by Braus and Wood (1993), that environmental skills, and participation and volunteerism for the environment could only be successfully developed after the ninth grade. Recent intervention research offers a possible explanation: Sezer Balcı, Öğüt Düzen, and Yalçın (2025), in a randomized controlled study with 60-72-month-old children, found that awareness programs grounded in structured social learning principles (e.g., modeling, guided practice) produced measurably stronger behavioral outcomes than passive or lecture-based formats — consistent with the current study's finding that passive, presentation-heavy formats (as in *TEMA* and *I am Reading for Nature*) were less effective than interactive, hands-on activities. When the whole AR is considered, according to the students' responses (*Liked*, *Undecided*, *Not Liked*, and *Most liked*), it may be concluded that the type of activities prepared in future applications should be hands-on and/or arts-based activities, should not include long-term presentations, and should not be conducted within an environment that includes significant levels of stimuli.

The final topic to be addressed here concerns the method of research that was applied in the current study. As stated by Green (2017), the methodological approaches of research involving young children falls under great scrutiny and adult researchers must continue to critically engage in discussion on what it means to engage children as active participants in research. The method chosen in the current study fits into AR, as emphasized by Cain and Harris (2013) and also Hodgson (2013), wherein reflexivity should be a central part of the research process with children, whereas, researchers critically reflect not only on their role and their assumptions, but also on the choice of methods and their

implementation. In addition to improving the research skills of the teacher-researcher, the current study's AR also led to an improvement in the researcher's teaching skills, with new knowledge and understanding gained regarding how to improve educational practices and to resolve significant issues encountered in the classroom (Hine & Lavery, 2014; Mills, 2014; Stringer, 2007). The application also provided the researcher with the opportunity to observe the students better, and to see how certain issues may have stemmed from the manner in which the teaching material was presented and not from the students themselves. In summary, more teachers and researchers should be encouraged to conduct AR practices as they create opportunities for self-evaluation, to see their shortcomings, and to gather information about how young children can learn more efficiently.

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Appendix 1

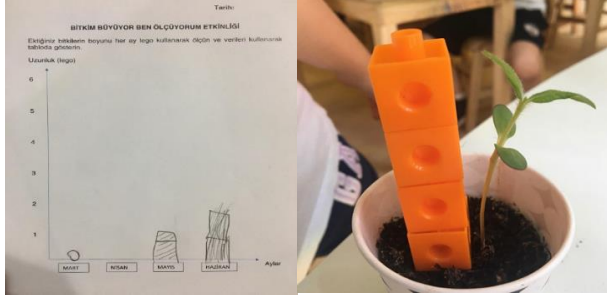
Name of the course	As my plant grows, I measure it
Date	First measurement - 21.03 Second Measurement- 27. 03 Third Measurement- 09.04 Final Measurement and Tabulation- 12.04
Related Env. Ed. Dimension	Cognitive-Kinesthetic
Course:	Mathematics
Learning Domain	M1. Measuring Length/height M.2. Data Collection and Evaluation
Learning outcomes of the lesson (M) Learning Outcomes in EE	M.1.1. Compares and sorts objects in terms of their length/height. M.1.2. To measure length/height, selects the appropriate non-standard measuring tool and performs the measurement. M.2.1 Reads simple tables with up to two data groups. EE 1. Measures the height of plants. EE. 2. Realizes that plants are living creatures that grow. EE. 3. Realizes that plants are living creatures that need care.
Terms or concepts:	Table, data
Duration:	40+40+40 min.
Place:	Classroom
Instructional Tools	Legos, pencil
Evaluation	<i>As my Plant Grows, I Measure it</i> activity form

Introduction

Classes are conducted using Lego, with 10 pieces distributed to each student. Students are asked to line up five Lego pieces first and then three Lego pieces one after the other. Students are then asked to compare the height of two different Lego pieces and to make inferences about the terms tall/short.

Explanation and Elaboration

The students, having familiarized themselves with the non-standard measuring tools in the previous lesson, try to estimate the height of the plants they have planted in the context of the Life Science lesson – Planting Activity by Lego units. Then, they measure the height of their plants with Lego pieces and record the measurement results on the worksheet. After the measurements have been made on four different dates, the students present the measurement results on a graph. The students who grew the plants share with their friends how they cared for the growth of their plants, and those whose plants had withered shared what they had missed doing.



Height (in Lego pieces) vs. months graph (March, April, May, June)

Appendix 2. Excerpts from Researcher's diary

Give a Hand to Nature

My idea of explaining two and three dimensions through asking students to compare their own hands and the hands they drew on paper made sense to the Visual Arts teacher when I sought her opinion. I expected the students to draw the patterns of their hands alone, but some could not manage it. For this reason, I drew the hand patterns for some of the students. The students were laughing and commenting on each other's hands as they cut out their hand patterns. At that time, one of the students said, "I will give the tree the best hand." After preparing the hand patterns, there was a little commotion because all of the students gathered together excitedly; I resolved the problem by assigning everyone a task. The event took longer than I had expected, but we loved the tree model that was produced.

I am a tree

I asked the students to form a circle as soon as I went out to the garden, but it took some time for them to get together and form a ring. As I did not think of calling the students to wear the tree model according to their name on the list, all of the students of course wanted to be the first. I handled the situation by letting them wear the tree model according to their seating arrangement. Both the children who were wearing the tree model and those with the opposite role had great fun. Since some of the students hit the tree model a little hard and the model was damaged, I observed that the lesson seemed to be quite enjoyable for the students. I think it was a very effective activity in developing a sense of empathy; it was also a nice detail that the event was held next to a real tree.



Chapter 2

Multiliteracies in Primary School Teacher Education: The Pedagogical Potential of Multimodal Film Texts through the Example of *WALL-E*

Aslı Ceren ALAÇAM¹

ABSTRACT

Meaning in contemporary media environments is produced not only through linguistic elements but also through the interaction of visual, audio, gestural, and spatial modes. This situation requires children to develop the ability to analyse multimodal texts and primary teachers to acquire the competencies necessary to use such texts for pedagogical purposes. This study aims to examine the multiliteracies approach within the context of primary teacher education and to evaluate the pedagogical potential of a film text based on its multimodal structure. For this purpose, the opening sequence of *WALL-E* was analysed in terms of the contributions of linguistic, visual, audio, gestural, and spatial modes to meaning-making and the relationships among these modes; the critical and cultural meanings produced by the sequence; and its potential contribution to pre-service primary teachers' multimodal analysis, critical inquiry, and redesign skills. The analysis revealed that meanings related to environmental destruction, loneliness, consumer culture, and corporate power are constructed through the combined use of different modes. The sequence was also considered suitable for interdisciplinary activities related to Turkish Language, Life Studies, Science, Social Studies, and Visual Arts. The study argues that films can serve as learning resources that support pre-service teachers' multimodal analysis, critical media literacy, and pedagogical redesign skills. Since the study is limited to the theoretical analysis of a particular sequence from a single film, future research is recommended to examine the proposed activities through practice-based studies.

Keywords: Multiliteracies, multimodality, primary school teacher education, film analysis, *WALL-E*

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1. INTRODUCTION

Today, media have become an integral part of human life. With advances in technological opportunities and easier access to these technologies, social media and video-sharing platforms have begun to occupy an important place in the lives of people of all ages. Producing content on these platforms, accessing content created by others, and interacting with it have become ordinary practices of everyday life.

These new practices of production, sharing, and consumption constitute the new media environment surrounding children. While digital environments that permeate everyday life provide opportunities for learning, play, and social interaction, they may also expose children to various risks (OECD, 2025). The extent to which children engage with the content produced in these media environments, as well as their potential vulnerability to related risks, may vary according to the social, economic, and physical conditions in which they live.

Consequently, the ability to read media content critically and consciously has become essential for children surrounded by media. This is important not only for understanding content accurately, but also for evaluating the meanings conveyed through that content from multiple perspectives and recognising potentially risky situations (Grizzle et al., 2021).

Content presented in digital media may embody commercial or ideological intentions. For example, the ways in which members of a particular group are represented and labelled in a text -or are excluded from representation within a particular context- can generate distinct meanings. This requires students to develop sensitivity to issues of representation and to adopt a critical perspective toward the texts they encounter (Cazden, 2005, pp. 260–261). Similarly, advertisements often employ emotional appeals tailored to specific target audiences. Children therefore need to learn how to recognise these structures and analyse their implicit purposes (Luke, 2005, pp. 80–81).

The rapid circulation of content and the fact that children may encounter it without any prior filtering make it necessary for them to develop new forms of literacy in relation to media. Literacy should therefore be understood not merely as a set of technical skills, but as a social and cultural practice (UNESCO, 2004).

At the same time, digital media environments expose children to an increasingly broad and diverse range of content. This array of possibilities also encompasses numerous and varied meanings. In this new media environment, the content that captures children's attention and encourages their engagement is largely composed of multimodal structures that combine images, sound, movement, writing, and video. Each element within a multimodal structure contributes to shaping the meaning of the text. Particularly in mass media and

social media, meaning is produced not through written language alone, but also through the meanings conveyed by visual, auditory, spatial, and behavioural elements. The multimodal structures with which children interact therefore require multidimensional evaluation. Presenting content through multiple semiotic modes both expands its potential for meaning and creates the need to consider several variables simultaneously (New London Group, 1996). Accordingly, the changing nature of contemporary media requires individuals to develop the ability to analyse multimodal texts. These abilities point to a form of literacy that involves not only reading written text, but also understanding the logic of the screen, interpreting the language of images, and recognising how multimedia elements come together to form a design of meaning (Kress, 2003).

To develop these literacy-related competencies in relation to multimodal content, children need to receive appropriate education from an early age. Such education should provide content suited to the nature of multimodal texts, enable children to engage actively with these texts, and support their ability to analyse the relationships among different modes of meaning. Primary school teachers are among the key figures who can guide children in meeting this need. Therefore, primary school teachers need to possess the competencies required to interpret multimodal media texts and use them for pedagogical purposes.

Accordingly, this study aims to examine the multiliteracies approach within the context of primary school teacher education and to evaluate the pedagogical potential of a selected film's multimodal structure for primary school teacher education.

To this end, the concept of multiliteracies and the theoretical foundations of the approach will first be discussed.

2. CONCEPTUAL FRAMEWORK: Multiliteracies and Primary School Teacher Education

2.1. Multiliteracies

The development of information and communication technologies and the emergence of new media in the twenty-first century have created diverse and intensive opportunities for interaction. This situation requires new forms of literacy that extend beyond the ability to read and write printed texts. Accordingly, individuals need new and multiple literacies that enable them to engage in practices such as analysing “multimedia texts, designing digital narratives, or actively participating in online communities” (Destebaşı, 2025, p. 860).

Multiliteracies, an approach that explains the effects of technological developments on literacy and the transformation of literacy practices, was

introduced by the New London Group in its 1996 study. The authors argued that changes occurring in working lives, public lives, and private lives under the influence of fast capitalism, pluralistic forms of citizenship, and communication technologies had created a new reality. They therefore emphasised the need for a new form of literacy education that would enable individuals to adapt to these changing conditions. In this regard, they based the need for the proposed multiliteracies approach on two main considerations: the “social, cultural, and linguistic diversity” of the contemporary world and the “multimodality of meaning-making.” Within the pedagogy supported by these considerations, students should see themselves as “active participants in social change and active designers of social futures” (New London Group, 1996, p. 64).

Multimodal Meaning-Making

Traditional literacy education largely focuses on reading and writing standard written language. The New London Group states that meaning is produced through linguistic, visual, audio, gestural, and spatial modes, while multimodal meaning emerges from the relationships among these different modes. Accordingly, six main areas were identified to explain patterns of meaning-making. The modes of meaning are as follows (New London Group, 1996, pp. 78, 80):

- Linguistic Meanings: Words and grammatical structures.
- Visual Meanings: Images, page layouts, and screen formats.
- Audio Meanings: Music and sound effects.
- Gestural Meanings: Body language and movement.
- Spatial Meanings: The meanings of environmental and architectural spaces.
- Multimodal Meanings: The relationships among all the other modes.

Rather than constituting a domain that is entirely independent of the other modes of meaning, multimodal meaning refers to the dynamic relationships established among linguistic, visual, audio, gestural, and spatial modes. The New London Group (1996) attributes particular importance to multimodal meaning because of its capacity to connect the other modes.

In communication, modes do not produce meaning in isolation; rather, they operate as an “ensemble.” Within this ensemble, each mode performs a particular role and function (Kress, 2010). Accordingly, meaning in media texts should be examined through a holistic approach that considers the relationships among multiple modes.

The Design of Meaning Approach

The New London Group conceptualises meaning-making as an active, dynamic, and creative process of Design. The concept of Design refers both to the structure of the meaning product and to the process through which that product is created. Accordingly, any semiotic activity can be understood as a Design process consisting of three fundamental elements: Available Designs, Designing, and The Redesigned (New London Group, 1996, pp. 73–77):

Available Designs: These are the pre-existing resources available to individuals for meaning-making. They may include languages, discourses, text genres, styles, and resources belonging to different semiotic systems.

Designing: This refers to the active process of meaning-making that individuals undertake with and upon Available Designs. During this process, individuals select, relate, interpret, recontextualise, combine, and transform available resources. In doing so, they reinterpret the texts they encounter in accordance with their own experiences, knowledge, and social positions.

The Redesigned: This refers to the new meaning or product that emerges at the end of the Designing process. The resulting product is not a direct repetition of the Available Designs; however, neither is it entirely independent of them or solely the product of individual creativity.

Viewing meaning as Design within multiliteracies pedagogy positions students as active meaning-makers. By using different modes, including visual, audio, and linguistic modes, this approach enables students to re-represent and recreate the world from different perspectives (Cope & Kalantzis, 2013). In this respect, it provides opportunities for innovative and creative learning experiences.

2.2. Multiliteracies in Primary School Teacher Education

Over the three decades since the New London Group (1996) introduced the multiliteracies approach, developments in media and communication have accelerated dramatically, while multimodal texts and cultural diversity have come to occupy an increasingly prominent place in people's lives. This transformation has heightened the need for multiliteracies competencies that extend beyond conventional reading and writing skills.

In line with shifts in international education policies, multiliteracies have been incorporated into basic education curricula in various countries and regions. Existing practices indicate that students are increasingly engaging with texts containing multimodal elements and that linguistic, cultural, and individual diversity is being taken into consideration (Kulju et al., 2018).

The development of children's multiliteracies skills depends on

strengthening the competencies of primary school teachers and pre-service primary school teachers in this area. Accordingly, teacher educators responsible for preparing future teachers must also possess these competencies. Rowsell et al. (2008) note that when the approach remains at a superficial and merely conceptual level in teacher education, it becomes more difficult for pre-service teachers to translate it into classroom practice later in their careers.

For the multiliteracies approach to be effectively implemented in primary education, primary school teachers need to be educated in accordance with this pedagogy. Teacher education should therefore aim to prepare teachers not merely as individuals capable of reading multimodal texts, but as professionals who can select, analyse, and redesign such texts in line with pedagogical purposes.

Given the nature of multiliteracies, the teacher's role should move beyond that of a traditional transmitter of knowledge and evolve into that of a conductor who orchestrates meaning-making activities across multiple modes in the classroom. Teachers should also act as active designers in the construction of social futures (Jewitt, 2008).

In addition to the metaphors of the teacher as designer and conductor, the literature also positions teachers as “decision-makers” and “guides” in multiliteracies education. Within a multimodal pedagogical approach, teachers act as decision-makers in determining which modes of representation should be used to present curricular content and how these modes should be organised (Lim et al., 2023). They must also make choices consistent with the multiliteracies approach by considering the extent to which digital technologies should be integrated into their teaching programmes (Walsh, 2010). Accordingly, teacher education should equip pre-service teachers with multiliteracies competencies such as making informed decisions about content, selecting appropriate materials, analysing the modes through which meaning is produced, and interpreting the representations embedded in those materials.

In the Türkiye Century Education Model, literacy skills are not treated as competencies confined to a particular subject but as one of the cross-curricular components. Under the heading “Literacy Skills,” the model identifies nine areas: information, digital, financial, visual, cultural, citizenship, data, sustainability, and art literacy.

In the Türkiye Century Education Model, the development of literacy skills is organised across three progressive levels. The awareness level focuses on recognising and understanding the fundamental knowledge, concepts, and phenomena associated with a particular literacy domain and developing sensitivity towards them. The functionality level involves recognising the

relationships among these elements, while the action level refers to applying the acquired knowledge in practice (Millî Eğitim Bakanlığı [MEB], 2025, p. 37).

The literacy framework adopted in the Türkiye Century Education Model is not directly equivalent to the multiliteracies approach proposed by the New London Group (1996), although the two share several overlapping features. The holistic treatment of different literacy domains and the organisation of literacy skills across the levels of awareness, functionality, and action, rather than confining them to the theoretical level, are among the characteristics that bring the two approaches closer together (MEB, 2025, pp. 37–40; New London Group, 1996). In addition, the digital literacy and sustainability literacy domains included in the Türkiye Century Education Model encompass various skills that can be associated with the multiliteracies approach (MEB, 2025, pp. 37–40).

3. Multimodal Film Analysis and Pedagogical Opportunities through the Example of *WALL-E*

This section presents an illustrative film analysis grounded in the theoretical framework. The pedagogical opportunities that films offer from a multiliteracies perspective are discussed through a selected segment, with particular reference to primary school teacher education.

3.1. Analytical Approach and Selection of the Film Segment

Among animated films viewed by both children and adults, *WALL-E* was selected for analysis based on three criteria: the prominence of multimodal meaning-making, the inclusion of social and cultural themes conducive to critical discussion, and the pedagogical opportunities it offers for primary school teacher education.

First, the film was viewed in its entirety several times in order to develop a holistic understanding of its overall meaning and major themes. In line with the purpose of the study, sequences and scenes that could reveal the film's pedagogical potential for developing multiliteracies in primary school teacher education were identified.

The selected scenes were evaluated across three dimensions:

1. The contribution of linguistic, visual, auditory, gestural, and spatial modes to meaning-making, as well as the relationships among these modes
2. The critical and cultural meanings produced by the scenes
3. The potential contributions of the scenes to the development of pre-service primary school teachers' skills in multimodal analysis, critical inquiry, and redesign

As a result of this evaluation, the opening sequence, which brings together

multimodal, critical, and pedagogical dimensions in a particularly concentrated form, was purposefully selected in accordance with the aim and scope of the study.

3.2. Introduction to the Film and the Opening Sequence

Film Synopsis

WALL-E (Stanton, 2008) is an American animated romantic science-fiction film produced by Pixar. The Earth has been abandoned after excessive consumption and environmental neglect turned the planet into an immense wasteland. Set in the twenty-ninth century, the story depicts humanity living for approximately 700 years aboard a spacecraft called the Axiom. Robots were left behind on Earth to clean and organise the planet. The film's protagonist, WALL-E, is one of these robots and continues to carry out his assigned task alone in the deserted city.

One day, WALL-E encounters EVE, a robot sent from the Axiom on a reconnaissance mission, and an emotional bond develops between them. WALL-E gives EVE a living plant that he has found on Earth. When EVE returns to the Axiom with the plant, WALL-E follows her and finds himself aboard the spacecraft. The discovery of plant life provides crucial evidence that Earth may once again be habitable and activates the protocol for humanity's return. The captain of the Axiom attempts to initiate this process, but AUTO, the ship's robotic artificial intelligence system, prevents him from doing so. With the assistance of the captain and the ship's passengers, WALL-E and EVE recover the plant and enable humanity to return to Earth. WALL-E, who is damaged during this process, is repaired by EVE using replacement parts on Earth. The film concludes by showing human civilisation being rebuilt and developed through cooperation between humans and robots.

Selected Film Sequence

The opening sequence selected from the film introduces both the condition of the Earth and the character of WALL-E.

The film opens with the credits accompanied by a cheerful song, after which an abandoned Earth dominated by shades of yellow, brown, and grey emerges through a cloud of dust. As the music gradually fades, a robot bearing the name WALL-E is introduced while carrying out his daily routine of collecting, compacting, and stacking waste. He curiously examines and sorts the objects he finds among the rubbish while engaging in playful interaction with his companion, a cockroach. As the sequence progresses, the music becomes increasingly tense and dramatic. The logos of the Buy'n Large (BNL)

corporation first appear on a vast superstore and subsequently on billboards and almost every building in the city. Later, newspaper headlines visible among piles of paper and an on-screen advertisement for the Axiom spacecraft provide information about the condition of the Earth and how humanity was transported away from the planet.

3.3. Multimodal Meaning-Making

Table 1
Multimodal Meaning-Making in the Opening Sequence of WALL-E

Analytical Category	Evidence from the Sequence	Meaning Produced
Linguistic Mode	BNL corporate slogans, newspaper headlines, and advertising messages	The encroachment of consumerist discourse into public space
Visual Mode	Brown and faded colours Huge towers of garbage, abandoned structures	Environmental destruction and uninhabitability
Audio Mode	Wind, mechanical sounds, prolonged silence	Loneliness and abandonment
Gestural Mode	WALL-E's repetitive and mechanical movements	A monotonous existence
Gestural Mode	WALL-E's playful interactions with the cockroach	WALL-E's human-like qualities and tendency to form emotional bonds
Spatial Mode	WALL-E being depicted as very small among enormous piles of garbage	The individual's powerlessness in the face of environmental catastrophe
Visual-Linguistic Relation	The presentation of BNL corporate slogans alongside dystopian imagery	A world devastated by consumption
Visual-Audio-Linguistic Relation	The juxtaposition of the cheerful lyrics of the opening song with images of a dystopian Earth	The contrast between the old and the new world
Visual-Audio Relation	The increasing dramatization of the music after BNL advertisements begin to appear	The establishment of a critical relationship between the existing dystopian world and the corporation

As shown in the table, an analysis of the opening sequence in terms of modes indicates that linguistic, visual, auditory, gestural, and spatial modes all contribute to meaning-making, and that different modes occasionally combine to produce new meanings.

The lyrics of the cheerful song “Put On Your Sunday Clothes” heard at the beginning of the film, express a desire to leave small-town life behind and experience the vitality of the city. When the optimistic opening created by this song from an old musical is interpreted together with the dystopian images of Earth that follow, a contrast emerges between the former world and the present one. While the song produces a positive meaning through auditory and linguistic modes, the Earth depicted visually in dull brown tones conveys a negative meaning. When these meanings are brought together, they suggest that the world has deteriorated from a once more hopeful condition. The song reflects people’s aspiration to move toward larger cities with great expectations. Similarly, the film shows how a world driven by the pursuit of more advanced technologies and larger structures is ultimately damaged by this process.

In the opening sequence, the Earth is depicted on a vast scale, in dull and dirty colours, as a lifeless and desolate environment, while WALL-E is presented as extremely small among the enormous piles of waste. This use of the spatial mode conveys the character’s loneliness and helplessness in the face of a devastated world. WALL-E’s small, mechanical, and repetitive movements while carrying out his task also emphasise not only his robotic nature but the monotony of his existence.

Rather than communicating through words and spoken language, WALL-E relies on sounds and gestures. His playful movements toward the cockroach, together with the cheerful sounds he makes during these interactions, suggest that he possesses human-like emotions and has a friendly, humorous disposition. In this respect, the auditory and gestural modes work together to produce meaning about the character’s personality.

In the opening sequence, the linguistic mode is employed primarily through BNL slogans, newspaper headlines, advertising jingles, and on-screen text rather than through dialogue between characters. After WALL-E and the condition of the Earth are introduced, the music becomes increasingly tense and dramatic. The Buy’n Large (BNL) brand first appears on a vast superstore, the Ultrastore, and subsequently on billboards, a petrol station, and almost every building in the city. In the background, the jingle “Buy n Large superstore, all you need and more” can be heard. A newspaper lying among piles of paper displays the headline “Too much trash!!! Earth covered, BNL CEO declares global emergency.” The frame then shifts to a billboard bearing the slogan “Do your part, fill your cart.” This sequence suggests that BNL had permeated virtually every aspect of life before the destruction of the Earth. While the company’s name and slogans are repeatedly presented through the linguistic mode, the visual saturation of the environment with advertisements creates an

almost polluting effect. Together with the increasingly dramatic music, these elements establish a critical relationship between the consumerist system represented by the corporation and environmental collapse. This section therefore provides an example of linguistic, visual, and auditory elements working together to produce meaning.

3.4. Critical and Cultural Meanings

The multimodal arrangement employed in the opening of the film serves not only to depict environmental destruction but also to produce critical meanings related to consumption, corporate power, and social responsibility. The repeated presence of BNL logos throughout the city suggests that the company is not merely a commercial organisation, but a powerful institution that has occupied public spaces and become highly influential in the organisation of social life. Its power is portrayed as so enduring that its presence remains visible even after humanity has abandoned the Earth. In this respect, the sequence highlights the global influence of large corporations.

The jingle “Buy’n Large superstore, all you need and more,” heard in this sequence, encourages a shift from a culture of need to a culture of desire in consumption. The slogan “Do your part, fill your cart,” meanwhile, presents consumption as a form of individual responsibility.

The newspaper headline “Too much trash!!! Earth covered, BNL CEO declares global emergency” ironically reveals that even the danger created by consumption-related waste is defined and announced by the corporation, suggesting that individuals have been deprived of agency and that power is concentrated in the hands of BNL. By assuming the authority to speak in response to the destruction caused by its own policies, the corporation effectively deprives the public even of the opportunity to adopt an activist role. This representation opens to criticism a social order in which social responsibility is shaped by corporate discourse.

When the sequence is considered as a whole, consumption is represented not merely as a matter of individual choice but as a system that shapes both social life and the environment. The juxtaposition of cheerful advertising music with images of an Earth covered in piles of waste makes visible the contradictions inherent in consumer culture.

3.5. Pedagogical Opportunities for Primary School Teacher Education

With both its multimodal structure and the contrasts it offers for critical reading, the opening sequence provides rich learning material for multiliteracies education. It has the potential to support pre-service primary school teachers’

abilities to analyse multimodal texts, critically interrogate them, and transform them into learning activities appropriate for the primary school level.

The contribution of the different modes in the sequence to meaning-making can be examined and discussed with both pre-service teachers and primary school students. In this way, pre-service teachers' multimodal analysis competencies can be developed. In a related activity, the sequence may be paused at selected points, and the pre-service teachers may be asked to explain what meanings are produced through images, music, environmental sounds, written expressions, bodily movements, and spatial arrangements. Their responses can then be examined in terms of the modes through which meaning is conveyed, enabling them to establish relationships between modes and meanings. For example, they may be asked what kind of expectation is created by the film's cheerful opening song, how the subsequent images of an abandoned Earth alter this expectation, and what meaning emerges when these two elements are presented consecutively. Such questions can provide opportunities for pre-service teachers to conduct a multimodal analysis. Following this activity, they may be asked to design how a similar multimodal analysis activity could be simplified and adapted for third- or fourth-grade primary school students.

The opening sequence contains no dialogue. Pre-service teachers may be asked to examine WALL-E's body language and the sounds he produces and to draw inferences about his personality and emotions. This activity could also serve as an example of a "visual reading" activity that they may later implement in their own classrooms. In addition, showing the entire sequence first without sound and then with its original soundtrack may provide a basis for discussing both the importance of visual reading and the contribution of auditory elements to meaning-making.

In addition to supporting the development of pre-service teachers' critical inquiry skills, the sequence also enables the design of interdisciplinary activities that can be associated with Turkish, Visual Arts, Life Studies, Science, and Social Studies. After viewing the opening sequence, pre-service teachers may be asked to develop possible scenarios about what might have happened before the Earth reached its present condition. The scenarios prepared in groups may be presented in written or oral form and linked to the Turkish course. The same activity may be adapted to Visual Arts by asking participants to represent their possible scenarios through drawings or posters. Scenarios concerning the developments that may have caused the devastation of the Earth can be examined within the framework of ecology in Life Studies and Science. In Social Studies, these possible scenarios may be used to discuss the relationship

between humans and the natural environment, as well as individual and collective responsibilities toward the environment.

Following this activity, pre-service teachers may be asked to design an activity demonstrating how the sequence could be used at the primary school level to address environmental awareness or conscious consumption. Within this framework, they may prepare discussion questions appropriate for children, create alternative versions of the slogans used in the film, or design a multimodal poster or public service announcement that emphasises environmental responsibility. In this way, pre-service teachers would not only analyse an existing media text but also gain experience in pedagogically redesigning it.

4. DISCUSSION AND CONCLUSION

In this study, the opening sequence of *WALL-E* was examined within the framework of the multiliteracies approach, and the pedagogical possibilities that the sequence may offer for primary teacher education were evaluated.

The analysis provides an example of how meaning in the film is produced through visual, audio, linguistic, gestural, and spatial modes, as well as through the relationships established among these modes. In this respect, the analysis concretises the New London Group's (1996) argument that multimodal meaning emerges through the combination of different semiotic modes.

Films are structures in which sounds and images come together to form a spatial and temporal whole. They are not merely objects to be watched, but complex multimodal systems. Therefore, the ability to analyse or produce such systems is essential for media literacy (Burn, 2017). The analysis conducted through a selected sequence from *WALL-E* demonstrates the suitability of films for multimodal analysis. Jewitt (2008) argues that teachers occupy a position in which they orchestrate a range of modal resources in the classroom, including gesture, gaze, positioning, posture, actions involving books and boards, and speech. Developing competence in managing such resources requires an understanding of the modes through which meaning is produced. From this perspective, examining how different meaning-making resources work together in films may help pre-service teachers understand not only the production of meaning in media but also the nature of meaning itself.

In addition to the modal analysis of the film content, the meanings of the representations presented in the film were critically examined, and examples of primary school activities that could be designed on the basis of this analysis were provided. In this respect, the study demonstrates the rich potential of films as instructional materials.

Lim et al. (2023) identify teachers' interest in and attitudes towards multimodality, as well as their preparedness to teach multiliteracies, among the factors associated with the challenges encountered in implementing multimodal pedagogies. Addressing multimodal media content as instructional material in teacher education may therefore contribute to pre-service teachers' preparedness in this area.

The activities proposed in the section on pedagogical possibilities may contribute to the development of pre-service primary teachers' multimodal analysis, critical inquiry, and redesign skills. This process can also be associated with the New London Group's (1996) approach to the design of meaning. If the proposed process is implemented with pre-service teachers, their use of the Available Designs while watching the film and their efforts to relate and interpret these elements in accordance with their own knowledge, experiences, and social positions would constitute the process of Designing. Producing alternative slogans, posters, public service announcements, stories, or classroom activities based on the film could be considered an activity leading to the creation of new meaning products within the scope of The Redesigned. In this way, pre-service teachers may move beyond being readers of a ready-made media text and become active participants who transform meaning and design new pedagogical content.

Rowsell et al. (2008) emphasise that the multiliteracies approach in teacher education should move beyond a superficial and conceptual level. The *WALL-E* example demonstrates how theoretical knowledge can be transformed into practice through a concrete media text and how pre-service teachers can participate in the process as both analysts and designers.

The possibility of relating the sequence examined in the film to Turkish Language, Life Studies, Science, Social Studies, and Visual Arts also reveals the potential of films for interdisciplinary teaching. In this way, multiliteracies can move beyond being a field of competence confined to a particular subject and become a holistic pedagogical approach that connects different areas of learning. This structure may also be compatible with the treatment of literacy skills as cross-curricular components in the Türkiye Century Education Model. Areas included in the model, such as digital literacy, visual literacy, sustainability literacy, cultural literacy, and art literacy, can be addressed together through the *WALL-E* sequence.

In conclusion, the opening sequence of *WALL-E* demonstrates that films are multimodal texts that make the relationships among different modes of meaning visible, open the social and cultural representations in media texts to critical examination, and can be transformed into interdisciplinary teaching activities.

In this respect, films should be regarded as learning resources that can support pre-service primary teachers' multimodal analysis, critical inquiry, and pedagogical redesign skills. Nevertheless, this study is limited to a particular sequence from a single film and to the theoretical evaluation of the proposed activities. Practice-based research could make the pedagogical potential of films in primary teacher education more visible. Accordingly, studies in which the multiliteracies approach is addressed at the practical level within primary teacher education programmes are recommended.

Future research could implement activities developed through different films and media texts with pre-service teachers and examine the effects of these practices on students' multiliteracies skills. Such research could help determine how the pedagogical possibilities identified in this study are reflected in practice.

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Chapter 3

Fundamental and Analytical Dimensions for Education Policy Studies

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1. Introduction

Education policies are a set of formal aims, rules, and strategies that a country establishes to cultivate its human resources in line with its development goals. These policies primarily guide how the education system operates, the curricula, and the allocation of resources. Educational policies, which define the aims and priorities of education in a country and what needs to be done in this area, are also related to the question of what kind of person is being raised. Many factors influence educational policies, including the existing political structure, social change, economic needs, national and global political developments, scientific and technological advancements, geographical location, population structure, and periodic dynamics. Because education is a complex process concerning human beings, it requires addressing the issue from all its philosophical, psychological, sociological, cultural, political, legal, economic, and historical dimensions, and the formulation of educational policies supported by data from all disciplines. With the advent of nation-states, educational policies began to be determined by central authorities. Thus, schools became institutions that, along with societal values, also transmitted the official views and ideologies of the state to younger generations through education.

Simultaneously, political science studies developed and became increasingly specialized, developing thought based on areas of study. Thus, education policy studies, especially from the 1950s onwards, became a sub-discipline of political science. In the 1950s, in Argentina, Brazil, Chile, Mexico, and Colombia, the "institutionalism" approach, a branch of educational policy science, emerged with the establishment of educational policy departments, focusing on lawmaking and comparative education. Tello (2014) distinguishes between educational policy as a theoretical field (singular) and educational policies as a socio-political reality that needs to be analyzed, examined, and researched (plural). Therefore, educational policy is the object of study of educational policy science. Similar to other fields of study, the field of educational policy can be defined as a theoretical

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field where knowledge is produced through various research, disseminated through various educational/academic training programs, and the application of this knowledge is developed through professions as a tool for political decision-making.

2. The Components of Educational Policy Studies

While the components of educational policy studies can be developed, it may not be possible to formulate a theory of educational policy. The epistemological argument for educational policy studies does not require a distinction between the various disciplines that support it. Educational policy studies do not follow the classical path of science—or pseudoscience—disciplines; instead, they challenge the emergence of scientism by combining science and knowledge.

The field of educational policy studies is structured in this way because its formation as a scientific field is based on complex connections and intersections between different disciplines. Educational policy studies is described as a "networked field." The network has a doubly complex structure due to the acceptance of elements located within the grid. The analytical perspective in educational policy studies characterizes the object of study as a multidimensional socio-educational reality. It includes various aspects, each with its own specific methods of analysis, such as the state, court decisions, micro-politics, political discourse, political debate, educational administration, the right to education, etc.

In 2013, UNESCO published the Handbook of Educational Policy (HEP), consisting of Books I and II. These two books serve as the primary reference sources for this field. HEP was developed as a result of a regional assessment conducted by UNESCO National Education Support Strategy (UNESS) in Bangkok in 2010. Based on this assessment, HEP was created as a practical guide for UNESCO program implementers in the field in the programming and analysis of education sector policies in the relevant countries.

The first book contains a conceptual framework for education policy analysis and addresses key issues in conducting policy dialogue between UNESCO partners and their counterparts in their respective countries. The second book emphasizes a methodological approach along with practical tools for documenting and organizing various information for education policy analysis. The role of national education policy is to define the fundamental aims and priorities that the government wishes to achieve in education at both the sector and sub-sector levels; emphasis is placed on specific aspects such as access, quality, teachers, and other issues. The strategy specifies how these policy aims will be achieved. A plan is developed to define the objectives, activities to be implemented, and a timeline. It also outlines the responsibilities of each party and

the resources required to implement the previously formulated policies and strategies. By definition, this document defines a policy as a general statement outlining the fundamental aims and priorities of the government. Formally, policy must be constitutional and may be sector-specific (education sector policy) or sub-sector-specific (primary education, higher education, etc.), or address specific issues such as university capacity. Policies define a specific perspective aimed at seeking solutions to problems stemming from an issue. General policies often contain general statements. These general statements offer more specific assumptions about the sub-sector.

Policymakers should base their policies on research, evidence gathering, and discussion to identify problems or needs and to present proposed perspectives for addressing those problems or needs. As mentioned in the previous section, the search for evidence and data is conducted in a methodological and responsible manner.

3. The Education Policy Cycle

Policymakers should establish a vision and strategic goals. For example, when a political party wins a majority in parliament and forms a government, it should set strategic goals in the field of education, such as increasing the participation of young people from low-income families in secondary education. Following this, a policy analysis is conducted as the first step. Once the vision is defined, the policy cycle begins with an analysis of the current situation and agreement on policy directions to achieve the vision. Then, various policy options are formulated, their funding is designed, and evaluated. This stage concludes with the identification of priorities and the planning of the next steps to be taken.

- The planning phase is carried out according to the defined policy direction and priorities. An implementation strategy is designed, along with a detailed and financial plan of various activities. In this phase, a set of concrete outputs, targets, actions, and timelines are determined; the roles and responsibilities of each stakeholder, as well as the necessary resources, are also defined. A monitoring and evaluation framework should also be clearly established in this phase.
- The implementation phase is the execution of the planned and budgeted activities according to the relevant timelines and responsibilities to achieve the targets.
- Finally, an evaluation is conducted, consisting of a series of activities that are regularly monitored and reviewed. Adjustments can be made if necessary. Various aspects such as relevance, efficiency, effectiveness, impact, and sustainability are also evaluated. The evaluation results provide input to inform and improve future policies.

4. Context of the Education System

The education sector does not function in isolation from other sectors at the national, regional, or international level. Reforms in the education sector will affect other sectors. Education policy reforms generally aim to meet specific needs and are also influenced by regional and global education agendas. Currently, the global priority is the Education for All (EFA) commitment, an international pledge to provide high-quality basic education for all children, youth, and adults. This commitment was announced in 1990 and reaffirmed in 2000, further developed as six education goals to be achieved by 2015. Simultaneously, in September 2000, eight development agendas known as the Millennium Development Goals (MDGs) were formulated, setting specific targets for 2015. The goals outlined in the MDGs and the EFA provide an international development framework for measuring and comparing achievements at global, regional, and national levels. Most countries incorporate these goals into their development policies and monitoring systems, and these two agendas form the basis for mobilizing resources in the education sector.

The Millennium Development Goals (MDGs) address poverty, education, health, equity, environment, and partnerships. Education is key to achieving all aspects of the MDGs. Therefore, Education for All (EFA) is considered a prerequisite for achieving the MDGs. EFA goals are related to the MDGs but place a strong emphasis on the quality of education and broaden the scope of the education aspect of the MDGs to include a lifelong learning perspective, which is also aligned with the improvement of the health aspects.

It is acknowledged that EFA goals can be overlooked when countries focus solely on achieving the MDGs. For example, since both the MDGs and EFA emphasize access to basic education, other areas of education such as literacy and life skills, post-secondary education, technical and vocational education and training tend to be overlooked by donors and governments. Although improving the quality of education is the sixth goal of the Education for All (EFA), the Millennium Development Goals (MDGs) do not explicitly mention the quality of education, and this appears to be a lower priority than access to education. Therefore, analyzing the relationship between national education policies and the EFA goals raises several questions, such as:

- *To what extent do national education policies integrate commitments to achieving the EFA goals? If none or very little is integrated, what should be done to fulfill these commitments?*
- *Is a country's commitment to adequate resources aligned with international expectations for achieving the EFA goals?*

- *Is the country in question actively managing progress toward achieving the Education for All (EFA) goal? If so, what has been achieved and what are the shortcomings? Are there policies and actions in place to accelerate the achievement of the EFA?*
- *Has past emphasis on specific aspects of education negatively impacted overall education policy? Has the focus on access taken into account quality and equity approaches in secondary and higher education?*

In addition to the commitments to the EFA and Millennium Development Goals (MDGs) described above, there are a number of international commitments and policies that guide education policy reform at the national level. These policies and agreements help shape how public policy is formulated; these include:

- Article 26 of the Universal Declaration of Human Rights (1948);
- Convention Against Discrimination in Education (1960);
- International Convention on the Elimination of All Forms of Racial Discrimination (1965);
- Convention on the Elimination of All Forms of Discrimination against Women (1979);
- Convention on the Rights of the Child (1989);
- Agreement on the Importation of Educational, Scientific and Cultural Materials (1976);
- Convention on Technical and Vocational Education (1979); and
- Regional Convention on the Recognition of Studies, Diplomas and Degrees in Higher Education in Asia and the Pacific (1983).

When analyzing national education policies and their implementation, it is necessary to verify the extent to which these international and regional conventions and agreements are adequately respected, considered, and implemented, and what actions are taken when shortcomings are identified.

Education is a key sector in national development. For effective implementation, education policies should be designed in conjunction with development policies in other sectors. Early childhood education is a sub-sector directly related to general education, health, and community development. Technical and Vocational Education and Training (TVET) is closely linked to the economy and employment. Therefore, national education policies should consider and reflect various important factors and contexts such as geography, demographics, economics, socio-cultural and political factors and contexts.

Geography and Demography

Geographical factors such as mountains, seas, lakes, rivers, roads, and climate, as well as demographic factors such as population structure, distribution, population growth, and others, influence decision-making processes not only regarding the number and location of schools, teacher training and distribution, publication and dissemination of learning materials, etc., but also in determining investment priorities and the scale of priorities within the education system itself. Understanding the ethnic, religious, and linguistic composition of the population will help education policy to orient itself by taking into account the differences in language, beliefs, traditions, and practices of different groups within a country. Geographical and demographic data for each country should be readily available and accessible from various national and international sources, including national statistical offices and others.

Economy

The structure and characteristics of the national economy play a significant role in influencing education policy. Changes in production and employment patterns in terms of the composition of the agricultural-industrial-service sectors are key factors in human resource development and education policy. Income levels affect access to education and educational outcomes. The economic climate also determines the budget and financial resources allocated to the education sector. Therefore, education policy analysts should pay close attention to the interaction between education and the economy. A high ratio of public education spending to GDP or total government spending does not always mean better quality education. Examples and observations from various countries show that spending effectiveness, along with transparency and accountability, are key elements in determining value for money in the education sector.

Society and Culture

The effectiveness of education as a primary public service is often influenced by social structure. Social science studies show that social structure is a combination of various factors such as income class, ethnicity, linguistic and religious groups, social backwardness, and marginalized and vulnerable groups. Some of these social groups have different attitudes and values regarding the benefits, priorities, and how education is obtained. Traditional cultures are skeptical about the impact of school education on access and participation. This view relates to the content and methods of education, including the language used in teaching and learning. Therefore, education policy analysts should carefully examine the interaction between the education sector and socio-cultural issues.

Policy

As explained in the previous section, policy is related to politics. Education policy formulation must be consistent with overall national development policies and the political context that shapes them. A key tool in analyzing national education policy is understanding the political and administrative mechanisms: where and how decisions are made, who the key players are, their strengths and weaknesses, and potential future political changes.

Understanding these factors will provide a basis for assessing how education policy and decision-making processes are influenced by the political context, and how education policy can proactively influence the political context. The administrative design of education, including the degree to which decision-making processes are decentralized, also has a strong impact on education. Some ministries in some countries are highly centralized in the formulation and implementation of policies. On the other hand, other countries may have delegated policy-formulating authority and planning responsibilities to sub-national levels.

5. Dimensions in Education Policy Analysis

The education sector has various sub-sectors: early childhood care and education, primary education, secondary education, higher education, technical and vocational education and training, and non-formal education. Each sub-sector can be analyzed through various key aspects and dimensions specific to the education sector.

Access and Equity

Article 26 of the UN Universal Declaration of Human Rights lists the right to education as one of the fundamental human rights. Like health, education is a basic service, and as stated in the constitutions of most countries, governments have an obligation to ensure access to education for all citizens. Therefore, the key issues addressed in education policy analysis are:

- ensuring adequate educational opportunities in the country,
- ensuring access to educational opportunities for all,
- ensuring full participation and equal benefit of all from education.

The extent to which current education policies and plans address these fundamental issues and existing inequalities is a crucial part of education policy analysis. Accessibility refers to the extent to which educational facilities and opportunities are accessible to everyone who needs them. This can include factors such as the location and size of schools, their ability to reach the country's geographic area and population. It also refers to the percentage of the population that has access to and utilizes various facilities and opportunities. In primary education, this is measured using various indicators such as capacity, capacity

ratio, and capacity by age. In secondary education, it can measure the transition from secondary school capacity to primary school graduates.

Participation refers to the extent to which a population participates in and utilizes available educational services, ideally throughout the service period up to the end of the educational term. Often, individuals do not participate fully and effectively at the intended level of education. Indicators commonly used are completion rates (or even dropout rates), repetition, or school dropout rates.

Equality is a crucial aspect of education policy. The level of equity in services affects access to education. Equity analysis assesses whether educational services are provided equally to all segments of society. Most educational equity analyses ignore specific data such as gender, administrative region, geographic location, socio-cultural group, income percentage, education level, and type of service provider (public, semi-public, or private). It is also necessary to analyze trends of change over time, such as past, present, and future.

Quality

There is no universal definition of good quality education; various definitions can be proposed. The 2005 Global Monitoring Report identified five key factors influencing quality: context, student characteristics, inputs, teaching and learning process, and outcomes. Currently, educational quality is addressed through the lens of learning outcomes, including literacy, numerical skills, critical thinking, job skills, responsible citizenship, and others. These are categorized as cognitive and non-cognitive abilities.

National education strategies and policies can be analyzed to determine the level of importance given to quality. This is done by examining not only inputs such as student characteristics, teacher capacity and motivation, teaching materials, and physical environment, but also how policies, institutions, leaders, and teachers intervene to facilitate effective learning.

Management

The management aspect ensures the efficient and effective implementation of policies and plans. Management analysis encompasses institutions (planning, formulation, and implementation of policies), processes (programs and projects in service delivery), resources (human and financial), and performance (monitoring, evaluation, and quality control). The management agenda is not easy to answer as it includes quite complex issues, but it is vital for achieving the development goals of the education sector. Public administration focuses on measuring results (not output). Public administration focuses on how institutions interact with each other to achieve good and desired results. Some important issues within the management aspect include the delivery of educational services, leadership capacity, transparency, and accountability.

Funding

The role of funding, including budgeting, implementation, and accountability, is crucial in achieving educational goals. This also relates to how financial resources are mobilized, allocated, and used in the provision of educational services. Funding management in the education sector should consider three dimensions: availability and resources, allocation, and use. Although resources and funds are often used interchangeably, all funding sources must ultimately be converted into monetary terms to facilitate the budgeting process for the education sector and integrate it into the overall socio-economic planning of the country or region. A distinction must be made between financial planning (budgeting) and actual spending, referred to as "budget deviation." Budgeted allocations are often not fulfilled due to ineffective and inefficient management.

Monitoring and Evaluation

Monitoring and Evaluation (M&E) is an integral part of the policy cycle. M&E consists of information gathering and analysis activities that allow policy actors to learn from their experiences and provide indicators for improvements in policy and further implementation. It is important to specify the differences between monitoring, review, and evaluation. Monitoring is not just an evaluation but a process where activities are regularly observed and analyzed, with a particular emphasis on efficiency. Review, similar to monitoring, is conducted by the party responsible for the activity. It is done less frequently than monitoring but focuses on effectiveness and ensures that the activity produces the desired outcome. Evaluation is usually done by an external party. The assessment emphasizes the program's impact as well as its sustainability.

6. Cross-Sectoral Issues

All sub-sectors of education are closely interconnected. This relationship is reinforced by various cross-sectoral issues that encompass all levels and types of education and directly impact analytical dimensions related to access, quality, and education management. In line with UNESCO's priorities, these cross-sectoral themes include: teacher policy, gender, sustainable development, HIV and AIDS, information and communication technology, and the management of education statistics and information.

Teacher Policy

The quality of education in any country depends primarily on the quality of the teaching staff within the education system and higher education institutions, including teachers and practitioners, technical trainers and instructors in vocational training institutions, and facilitators in informal education centres and

programmes. Policy analysts dealing with teacher education need to address issues related to recruitment, training, placement, remuneration, working conditions, and career development. Both pre-service and in-service teacher training and instruction are important components of this analysis.

Teacher education and advanced professional development addresses a variety of issues related to the organization, content, methods, and quality of educational programs at all levels and types of education (Yıldırım, 2025). This includes educational approaches to the professional development of teachers and other educational staff. This topic is also related to professional standards and ethical codes for educational staff. Meanwhile, in the field of teacher recruitment and management, issues related to teacher demand and surplus, selection for the teaching profession, and teacher assignment and reassignment are inextricably linked. Teacher management and administration are inextricably linked to the criteria set for applicants who should be involved with teacher education programs. Furthermore, policies regarding the special placement of teachers working in remote areas and teachers assigned to teach students with special needs, as well as the monitoring and evaluation of teacher performance, are also relevant. Meanwhile, working conditions and teacher status are also among the issues that policy analysts need to consider. Related issues include teacher workload, employment status, wages and benefits, job opportunities, career development, and participation in decision-making processes.

Gender

Gender refers to the determination of the social roles of women and men within their families, communities, and cultures. The concept of gender encompasses expectations regarding their characteristics, abilities, and behaviors. These roles and expectations are the result of past learning and are passed down from one generation to the next. They are not determined or fixed by biological factors; they can change in line with the interests of justice and equality between women and men.

The Millennium Development Goals and the Education for All (EFA) emphasize the importance of gender equality in education. Gender equality in education is achieved by ensuring that women and men have equal opportunities in access to and participation in education. Gender-sensitive curricula, teaching materials, and teaching and learning processes ensure that women and men are equally equipped with the life skills and attitudes they will need to reach their full potential. Furthermore, gender-sensitive education ensures that individuals, regardless of their gender, are aware of their human rights within and outside the education system.

Gender equality is a cross-sectoral issue that needs to be considered at all levels and in all aspects of education. This requires an assessment of outcomes for both women and men in every planned policy and action, known as "mainstreaming gender equality." This is a strategy to create awareness and experiences for women and men as an integral part of the design, implementation, monitoring, and evaluation of policies and programs in all areas, including education. This ensures that all women/girls and men/young men benefit equally and fairly. Legal frameworks and policy capacities to create gender equality will strengthen the environment to promote gender equality, particularly within a fair legal framework and non-discriminatory policies. Many countries have already designed legal and policy frameworks for gender equality and translated them into concrete policies and actions. Medeiros et al. (2015) is a study suggesting the need for positive action to create equality in education through policies such as fair laws, regulations, and planning.

Curriculum materials often convey images and ideas that contribute to gender stereotypes and the internalization and acceptance of similar behaviors. This is called gender-biased curriculum and teaching materials. This situation is also related to the gender gap between higher education and primary education. The increasing disparity in social and economic returns at different educational levels for boys and girls may be the main reason for this difference. When it comes to higher education, priority is given to boys.

Sustainable Development

The world is facing serious environmental degradation along with climate change. It is estimated that the rate at which humanity is collectively consuming natural resources is 1.4 times faster than the Earth's ability to regenerate itself. With a global population of approximately 7 billion, projected to reach 9 billion by 2050, human-induced stresses and threats to the environment will pose a major challenge. Since environmental problems stem from human activities, they can only be mitigated by improving human knowledge and sensitivity. Education for Sustainable Development aims to create a just society for present and future generations by empowering individuals through attitudes, behaviors, knowledge, and skills.

SDE equips students with the ability to question traditional expectations and to challenge people's worldview. This also enables students to imagine a more just and sustainable world and to see how our values, beliefs, and behaviors will lead us to this goal. Therefore, Sustainable Development Education (SDE) is about learning to change and learning about change. SDE is a holistic concept encompassing social, cultural, environmental, and economic issues, and therefore has the potential to touch every aspect of life and includes comprehensive

learning strategies. SDE interventions will include teacher training, curriculum development, educational planning and policy, and classroom activities. Engaging with media and other stakeholders to raise awareness and provide education is also a strategic part of SDE.

Sustainable Development Education (SDE) serves as an educational platform on how to create a sustainable environment upon which society and human life depend. The core concepts of SDE are defined according to national contexts and priorities that may be relevant to various areas such as freshwater conservation, health, peace and conflict resolution, disaster mitigation, pollution control, and hunger. UNESCO prioritizes climate change education and disaster risk reduction for Asia and the Pacific.

Community engagement is a solution to the sustainability of the above concepts. Sustainable Development Education (SDE) provides a direct link to learning about economic, environmental, and social issues. Connecting SDE directly with communities through a problem-solving approach helps transform education from a process of knowledge transfer to the application of relevant knowledge. The strategic benefits of integrating sustainable development principles into SDE are recognized, including student-centered pedagogy, field experiences and project-based learning, a more integrated curriculum, and support for the development of critical thinking skills.

Information and Communication Technology

I found an interesting article by Infeld and Adams (2014) addressing the role and potential of Wikipedia in learning and improving the quality of public policy through online content. Wikipedia, which many educators underestimate, actually has significant pedagogical value. This is evidence that information and communication technology (ICT) has the potential to increase access to information, make learning possible anytime, anywhere, and make learning more enjoyable for students, thereby increasing engagement levels and learning outcomes. The use of ICT can improve the quality of teaching, provide opportunities to create more relevant and engaging teaching materials, improve educational governance, develop educational service delivery strategies, and make services more cost-effective.

The term information and communication technology (ICT) encompasses all forms of technology used to transmit, process, store, create, display, share, or exchange information through electronic devices. Examples of ICT used in education include educational radio programs, DVDs, mobile phone applications, and interactive computer programs. ICT in education is a theme that intersects across all types and levels of education. Policies regarding the use of ICT are embedded in a wide range of educational fields, including education policy,

teacher training, teaching and learning, non-formal education, monitoring and measuring change, research and information sharing, and other cross-sector ICT programs.

Several key ICT issues in education policy relate to developing appropriate policies and plans to facilitate the integration of various forms of ICT across the education system. In teacher training, the capacity of teachers to effectively use ICT in student-centered learning is developed; the use of ICT in teacher training is also addressed. Another aspect is the development and delivery of learning content using ICT. Finally, the use of ICT in non-formal and informal education is also important. Information and communication technologies can be used to help adolescents and adults acquire literacy skills and expand their life opportunities.

Education Data and Information Management

Data and statistics are fundamentally necessary for creating evidence-based policies and implementing and monitoring outcomes-oriented programs. However, data will only be useful when it is relevant, reliable, consistent, and readily accessible. Many countries have developed Education Management Information Systems (EMIS) to collect data and produce up-to-date statistics for policy use, but most of these systems have failed to achieve their intended purpose. There is often an inconsistent understanding of terminology, definitions, methodologies, and data sources in efforts to produce good education indicators. This will affect the accuracy and quality of the data collected. The UNESCO Institute for Statistics has concluded that data quality depends on several dimensions, including:

- Policy relevance
- Validity and reliability
- Potential for inference
- Timeliness and accuracy
- Openness and transparency
- Comparability through existing standards
- Accessibility and affordability
- Consistency (across space and time)

In education policy formulation, data quality is determined by accuracy, reliability, and consistent information. Quality data will enable decision-makers to make appropriate and up-to-date policy choices. Planners and statisticians should maintain a close relationship. Statistics play a crucial role at every stage of the policy cycle. A lack of coordination will make it difficult to formulate compelling policies. Planners often prepare plans containing various goals and

monitoring indicators with little involvement from statisticians or without professional validation to determine whether the indicators used are feasible, meaningful, and realistic for measurement. Meanwhile, statisticians are busy collecting data without consulting planners, assuming the data will be useful to them.

A vast amount of data is collected in every country, but insufficient attention is paid to transforming this data into useful information that ultimately forms the basis of decision-making. Some statistical data is only useful for a short time. Those presenting data should also consider sustainability and systemic aspects. This often stems from a lack of clear planning and an understanding of the appropriateness of the data within the country's context.

7. The Role of Social Sciences in Education Policy Analysis

When discussing policy implementation, the problems in the field are often far more complex than the three policymakers who identify the problems and ultimately formulate the policy. To understand the implementation of education policy, it is crucial to examine the context in which it is implemented. Therefore, Dumas and Anyon (2006) state that the implementation of education policy should be conceptualized as a social practice that takes place within a social context.

Today, the dominant (mainstream) thinking in analyzing education policy is largely driven by an approach known as neoliberalism. This approach stems from the neoliberal economic model, popularized by the United States and the United Kingdom, particularly during the administrations of Ronald Reagan and Margaret Thatcher, and often referred to as Reaganomics or Thatcherism. They prioritize efforts to implement equality in education. Neoliberalism, as an ideology, emphasizes freedom and market solutions to economic and social problems. Neoliberal social policy envisages limiting the state's role to providing basic infrastructure and civil and financial regulation, leaving economic activity to the market (Wacquant 2001). In public policy, this means abandoning public investment in public goods, while in the cultural sphere, it allows for the existence of groups that can be held responsible for failure.

Critical analysts attack the neoliberal paradigm, which Gramsci called "economism," for its tendency towards economic reductionism. They argue that this paradigm reduces the role of all social relations and human organizations to economic explanations. Some modern Marxists offer more complex explanations for this area of political economy. Urban geographer David Harvey argues that capitalism is fueled by racism (Merrieffield, 2002). Markets operate in scarcity, which is the basis of competition. Without competition, profits do not increase,

and the system fails. Scarcity in urban life is created by allowing the existence of impoverished areas, typically inhabited by African Americans and Latinos in America. The existence of these areas continues until urban expansion increases profits through urban development. These poor communities are marginalized and receive nothing from development. The justification for their exclusion is usually the rising cost of living and the need for regional development toward an ideal that is not for them.

Fitzer (2016), criticizes how the transfer of wealth to the rich in the workforce, wealth accumulation, and education occurs in the United States, leading to social and economic inequality. He unequivocally states that this is like a return to the dark ages. Neoliberalism here means injustice, and in the conclusion, he notes that this also has an impact on education. Policymakers in the US have paid little attention to the importance of public education because corporations, unlike in Britain after the Industrial Revolution, are not inclined to employ highly skilled or moderately skilled workers due to automation and robotics.

In a broader context, as a variant of the critical analytic approach, there is world systems theory, also known as neo-institutional theory, which posits that modern states establish a set of institutional standards that enforce norms and values rather than political and cultural contexts. Proponents of this school of thought, such as Immanuel Wallerstein, critique this as the dominance of developed countries, which he calls the "center," while positioning poor developing countries as the periphery.

Sutton (2015), using the same center and periphery concepts, also presents dependency theory as another variant of critical analysis, classified as post-colonial theory. This school of thought has many critical figures, such as Fernando Cardoso from Brazil, Albert Memmi from Africa, and Franz Fanon. Referring to Ali Mazrui, he states that African universities are a clear manifestation of the cultural dominance of their former colonial masters. Griffith (2015), in his contemporary work, proposes systemic change, arguing from a world systems theory perspective, not only in the developing world. He believes that current education is not sufficiently fair, equitable, and democratic.

The existence and development of critical analysis cannot be considered separately from the role of Jürgen Habermas, a key figure of the Frankfurt School. According to him, there are three forms of knowledge quest undertaken by humans. The first is what is called "causal or law-like relationships," often pursued by the exact sciences and also by the social sciences. The second is the pursuit of knowledge through empirical analysis. This analytical model is ultimately called instrumental knowledge, which aims to study processes in order to achieve a goal. The pursuit of knowledge is carried out through empirical

analysis. This analytical model is ultimately called instrumental knowledge, which aims to examine processes in order to achieve a goal. Secondly, there is knowledge called interpretive or hermeneutical knowledge, which seeks and develops mutual understanding among humanity by providing nuances and meanings of cultural and human values. Thirdly, there is knowledge called liberating knowledge, which creates awareness of relationships and dependencies based on ideologies used to transform principles (Sutton, 2001).

While causal relationships remain dominant in educational policy studies, we cannot ignore the importance of more in-depth and focused studies, as in the tradition of qualitative research and analysis. Various factors, such as race, race, and ethnicity, play a decisive role in class formation, interclass relations, and identity. Marxist critical analysis gives particular importance to class, as well as race. The structure of working-class or peasant classes, often assumed to stem from capitalist forms of exploitation, shares common principles. Class becomes not only a field of economic exploitation but ultimately a political and ideological field.

Therefore, Honig (2009) notes that the poor tend to identify not only with their economic status but also with their social identity and class position. He concludes that social formation influences the economic structure of society. In many cases, general policies cannot be effectively implemented. The true essence can only be examined through qualitative and critical approaches, perhaps even ethnographic, ethnomethodological, and case studies.

Studies emphasizing historical analysis can also be cited as examples. Edwards, Jr. and DeMatthes (2014) conducted a historical study on developing countries and the United States, taking the end of World War II as a starting point. They focused on the ongoing decentralization trend in education. What they found was not a decentralization that emphasized the community level, but rather reforms that emphasized accountability. However, this study used political economy analysis, drawing on articles published in three leading education policy journals (*Journal of Education Policy*, *Journal of Education Administration*, and *Harvard Education Review*). This illuminating political economy study examined how corruption affects the relationship between foreign direct investment (FDI) and human capital variables in the 107 countries studied; this is a topic of great interest to the education sector in general as an effort to increase national competitiveness.

7. Conclusion

Education is a complex social activity. While there is no easy way to analyze the many related policy dimensions, we can begin by simply defining education as a process related to the allocation and use of available resources to achieve educational, social, and economic goals. Education policy choices fall into two categories: (1) resource allocation across education levels and types, affecting the overall structure of the education system, and (2) allocation within each education level, ultimately affecting operational design at the school and classroom level. If we emphasize the second policy option, we must analyze the overall management of expenditures at a particular education level or focus on specific components. Since teachers are often one of the most significant components of education costs, the management of expenditures related to teachers requires a careful approach.

Some education systems provide better monitoring and funding in terms of the number and qualifications of teaching staff and the availability of books and other teaching materials. Better-funded schools tend to achieve better results, as indicated by student learning outcomes and career success indicators, but this is not always consistent. Some teachers may have more expertise than others, which may allow them to achieve better results despite having fewer resources. These results show that while tangible resources influence outcomes, interactions between teachers and students also play a crucial role. For policymakers, teacher management requires: efficient placement of teachers in schools and classrooms and efficient management of teachers' pedagogical processes in the classroom. In a well-managed education system, we expect teachers to be placed in schools proportionate to the size of the student population. Teacher placement is expected to result in adequate and efficient performance.

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