ORIGINAL ARTICLE

Analysis of the Impact of Science-Fiction Films and Science-Fictions Books on the Environmental Literacy of 7th-Grade Students

Çiğdem Çakir Şik,[1] Fatma Önen Öztürk[2]

1. *Istanbul Chamber of Commerce Secondary School, Umraniye/Istanbul, Turkey*
2. *Marmara University, Kadıköy/İstanbul, Turkey*

***Abstract**: This study aimed to examine the impact of science-fiction films and books on the environmental literacy of 7th-grade students. The study was conducted during the initial half of the 2022-2023 academic year, involving 63 seventh-grade students from a secondary school in the Ümraniye district of Istanbul, with 21 students in each of the three classes, which exhibited no significant differences among them. One class served as the control group, while the other two constituted the experimental group. Classical methods and techniques were utilized in the control group, while one experimental group engaged with three science fiction movies and the other group utilized three science fiction books and a curriculum. The study employed a mixed design. In the six-week study, the "Environmental Literacy Scale" was used as both a pretest and posttest for quantitative data collection. The quantitative data acquired from this test were analyzed using the SPSS program. The data revealed significant differences in certain sub-problems of the research, as assessed by the sub-dimensions of environmental literacy in the Experiment 1 and Experiment 2 groups. The cognitive skills test and semi-structured interview form were assessed qualitatively. Content analysis was employed to examine qualitative data. The responses provided to the qualitative measurement instruments were converted into codes and themes, and their frequency levels were assessed. The results of the responses and quantitative data coincide. The study suggests that incorporating science-fiction movies and books into science education enhances students' environmental literacy.*

Science Insights Education Frontiers 2025; 29(2): 4765-4790
DOI: 10.15354/sief.25.or812

How to Cite: Çakir Şik, C., & Önen Öztürk, F. (2025). Analysis of the impact of science-fiction films and science-fictions books on the environmental literacy of 7th-grade students. Science Insights Education Frontiers, 29(2): 4765-4790.

***Keywords**: Science Fiction, Science Fiction Movie, Science Fiction Book, Science, Environmental Literacy, Environment, Environmental Education*

***About the Authors**: Çiğdem Çakir Şik, Master, Teacher, Istanbul Chamber of Commerce Secondary School, Umraniye/Istanbul, Turkey. E-mail: crocus_88@hotmail.com . ORCID: https://orcid.org/0000-0003-1771-9727*

Fatma Önen Öztürk, Assoc. Prof., Dr., Ataturk Faculty of Education, Marmara University, Kadıköy/İstanbul, Turkey. E-mail: fatma.onen@marmara.edu.tr . ORCID: https://orcid.org/0000-0002-6160-4671

***Correspondence to**: Çiğdem Çakir Şik at Marmara University in Turkey.*

***Conflict of Interests**: None*

***Funding**: No funding sources declared.*

***AI Declaration**: The authors affirm that artificial intelligence did not contribute to the process of preparing the work.*

Introduction

THE CHANGING world and the developments that have occurred have also caused people's needs to change. The most important way to cope with these changes is education. It is through education that individuals can recognize themselves, understand their environment, and sustain their existence. Therefore, throughout history, all communities and states that have existed have given importance and priority to education and have engaged in efforts in this regard (Yayla, 2005). It is because education has been considered as an element to indicate the development level of the countries (Köçer & Ergüz, 2013). Throughout the process, education has acquired distinct meanings as a result of the changes and developments that have occurred in the world. Recent years have witnessed a variety of global changes, including the onset of the extinction of certain species, the depletion of natural resources as a result of increased industrialization, unconscious consumption, population growth, negative environmental behaviors motivated by personal desires and needs, and air, water, and soil pollution. The primary method to safeguard against the adverse effects of these changes is via environmental education. In this context, educational institutions and instructors bear significant responsibilities. The environmental education provided aims for students to comprehend the environment and cultivate a positive attitude and behavior towards the world. Effective environmental education, systematically incorporated into the school curricula, particularly within the science curriculum, will facilitate the attainment of the desired objectives. Students must be primarily educated as environmentally literate individuals within the framework of these plans and programs to achieve the desired objectives. Environmental literacy is the impetus for individuals to participate in activities that enhance their knowledge, attitudes, and competencies concerning environmental issues, while also promoting active involvement (Roth, 1992). The development of these individuals is dependent upon effective environmental education, thus the significance attributed to environmental literacy is progressively rising. Despite the growing emphasis on environmental education, it is posited that the inadequate level of environmental literacy among students is linked to the pedagogical methods and techniques employed. Bahar, Erdaş Kartal & Özel (2013) have asserted that environmental education is primarily delivered at the cognitive level. This form of education fails to effectuate the intended behavioral transformation in students or to enhance their knowledge and awareness regarding environmental issues. To achieve the desired quality of education and meet established goals, it is essential to cultivate an environment that encourages students to actively engage with problems, independently seek solutions, and develop their own approaches, rather than depending on conventional educational methods. One of these

methods is the constructivist learning approach. The constructivist learning approach is defined as a process where knowledge is not passively received from the environment, but rather constructed by the student themselves. The methods and techniques used in the process of implementing the constructivist learning approach and the classroom environment should be such as to enable the realization of the objectives of this method. The methods to be used in these environments are also important for learning to take place in the best way.

Curricula should enable the development of individuals who can recognize environmental issues, propose solutions to these problems, conduct research, question, and engage in discussions (Atasoy & Ertürk, 2008). For this reason, the teaching methods and techniques used are of great importance. It is believed that using resources related to students' daily lives and that stimulate their interest and curiosity will positively affect the teaching process. Especially considering that today's students are immersed in technology, resources such as television, books, magazines, and cinema can be used as teaching tools. Science fiction movies and books are also among these resources. In our era, where scientific knowledge and technology are increasingly advancing, science fiction is expected to be an effective teaching method. As Seçkin Kapucu (2014) stated, with increasing technology, visual media attracts more attention of individuals and therefore becomes one of the indispensable tools of the education system. Science fiction also includes current and future scientific and technological developments.

While the diverse environmental issues we face today provide insights into potential future challenges, it is impossible to assert with certainty what we will encounter. In this context, science fiction is important because it shows us situations we encounter or might encounter today and, in the future, and it can make students think that they are part of these events and that they themselves need to come up with solutions. Because no matter how many environmental issues we encounter, we tend to think that we are not individually responsible. While we possess theoretical knowledge regarding environmental issues, actual behavioral change necessitates experiential engagement and personal involvement in the process. A carefully selected science fiction source, aligned with the course content, can illuminate the process both in its authenticity and its imaginative aspects. According to Balbağ & et al (2012), science fiction movies are resources that contain science, have a fictional story about the future, and appeal to the creativity of individuals. The fact that science fiction elements can be completely or partially real also shows that they can be used as a teaching tool in educational environments. Yazıcı & Altınparmak (2010) stated that science fiction materials attract students' attention more than other classroom activities and increase their learning levels. In addition, since

science fiction is based on both factual and fictional bases and is very interesting for students, it is thought that different films and books based on documentary and fiction, such as Harry Potter, which have been in theaters recently, attract a lot of attention, and in this context, fictional contents containing a wide variety of materials about science and its elements may contribute to the development of skills in areas such as literacy, science education, and environmental education. Roberts (2007) emphasized the relationship between science, technology, and society for scientific literacy. Yore (2012) stated that the basic aspect of literacy depends on the interaction of cognitive, emotional, communicative, and technological skills. Although studies reveal that science fiction is effective in science education, there are very few studies that reveal its effect on environmental education and environmental literacy. This study is important in terms of showing how different science fiction sources are effective both on environmental literacy and on middle school 7th grade students. In an issue that concerns the whole world such as the environment, the effectiveness of this research is revealed by conveying the environmental problems that may occur in the future to students through science fiction, revealing the events that have happened or may happen, and the consequences that may arise if no precautions are taken. From this point, the fundamental question of the research is, "Do science fiction movies and books have an impact on environmental literacy?"

Method

The Model of the Research

This study examines the impact of science fiction movies and books on the environmental literacy of seventh-grade students. The study involved the simultaneous collection of qualitative and quantitative data, followed by data analysis to facilitate a thorough examination of the research problem. The research model is a triangulation design from the mixed research designs. According to Onwuegbuzie Leech (2004), mixed methods design bridges qualitative and quantitative research. This design also offers diverse perspectives on the research problem. This research employs a mixed-methods design, collecting both quantitative and qualitative data to assess the impact of environmental education delivered through science fiction movies and books on students' environmental literacy.

The Population and Sample of the Research

The population of this study encompasses any and all schools in Ümraniye. The sample comprises three randomly chosen 7th-grade classes from a middle school located in the Ümraniye district of Istanbul. The experimental

groups were established through random selection. The research was conducted at the designated middle school during the first half of the 2022-2023 academic year. The study groups were randomly chosen from three classes, comprising two experimental groups and one control group. The study involved 63 students, comprising 21 participants in Experiment 1, 21 in Experiment 2, and 21 in the Control group.

Gathering Data

This study utilized the environmental literacy scale and interview questions for data collection. The environmental literacy scale was employed to gather quantitative data. Developed by Sontay, Gökdere, and Usta in 2015, this scale consists of 4 sub-dimensions. The tests include the environmental knowledge test, the environmental perception test, the environmental behavior test, and the cognitive achievement test. In the general evaluation conducted for the environmental literacy scale, the reliability coefficient α was calculated as 0.804. Thus, it has been determined that the scale is a reliable measurement tool that can be used in the relevant research. The cognitive skills component of the environmental literacy scale and interview inquiries served as qualitative data. The study was carried out over six weeks in three randomly chosen equivalent 7th-grade classes, concentrating on topics and achievements pertaining to "environment." The designation of experimental and control groups among these 7th-grade classes was determined randomly. This study comprises three groups: two experimental groups and one control group. In the experimental groups, science fiction movies were watched, whereas science fiction books were read in the alternative group. The control group was exposed to the current curriculum. The implementation commenced with the identification of the book and movie selections. Based on the chosen class level, it was concluded that the films "Wall-e," "The Day After Tomorrow," and "Avatar" were appropriate for the students' proficiency and corresponded with the content objectives. This decision was informed by the insights of an instructor with prior experience in science fiction and another instructor possessing pertinent academic qualifications in the same field. In a similar manner, science fiction books were evaluated by field experts, and selections were made based on their feedback. Among these books, "Atlantis'in Çocukları 1 (Children of Atlantis 1)," "Kuzey Kutbu'na Gidiyoruz (We Are Going to the North Pole)," and "Dünya Gemisi (World Ship)" were deemed appropriate regarding both page count and content.

Implementation of the Research

Implementations of Experimental Group 1 and Experimental Group 2

Before starting the study, the application process was carried out after the scale was applied to the students in both groups as a pre-test. In this process, the 5E model was applied. The 5E model involves a constructivist process. The 5E model is one of the constructivist teaching model applications that allows students to realize meaningful learning by passing and structuring information through their own mental processes (Ergin, Kanlı, & Tan, 2006). In this model, the student is at the center of learning and is responsible for his/her own learning. Since science courses generally consist of abstract concepts, active participation of students in the process is very important (Nilsson & Driel, 2010; Thurston et al., 2010). Therefore, the 5E model is a science curriculum that allows students to structure the process and use technology based on experimental activities.

This model consists of 5 stages. These stages are Enter/Engage, Explore, Explain, Elaborate and Evaluate (Ergin, Kanlı & Tan, 2006).

The implementation process of the study was carried out as follows During the Introductory Phase, several visuals related to the topic were presented to the students. Inquiries were made regarding these visuals to elicit their predictions. Consequently, their prior knowledge was disclosed through the responses they offered.

During the Exploration Phase, the science fiction movies chosen for Experimental Group 1 were presented sequentially over duration of six weeks. During the implementation, while the movies were being watched, the teacher paused the film at necessary points, asked the students questions related to the topics in the movie, and ensured that the students grasped the movie's subject. The science fiction books chosen for the Experimental Group 2 were read consecutively over a period of 6 weeks with each book allocated duration of 2 weeks for the students. During this period, students were encouraged to read the books at home, in addition to class hours, to ensure completion.

In the Explanation Phase, after each completed movie and book, students were asked to comment on the movie to express their thoughts and opinions and share them with their friends. At this stage, the teacher provided the necessary explanations both to ensure the accuracy of the knowledge and concepts the students reached and to reveal the emotions and skills acquired.

In the Deepening Phase, students were asked to prepare posters to reflect the emotions and knowledge they gained after watching/reading each movie and book.

Shape 1: posters prepared by the students of the Experiment 1 group in the deepening phase.

Shape 2: posters prepared by the students of the Experiment 2 group in the deepening phase.

In the Evaluation Phase, Students participated in a question-and-answer session following each movie and book. The knowledge and concepts acquired by students from the movie/book were articulated. Initially, the teacher disseminated the information obtained through questions, and then, the students were encouraged to evaluate the process by posing questions to one another.

Implementations of the Control Group

The students in the control group also covered the same topics and achievements in class as the students in the experimental group. The science fiction activities conducted in the experimental groups were not conducted with the control group; only the activities from the MoNE textbook were included. Before starting the lesson, the environmental literacy scale was administered as a pre-test to the students. The environmental literacy scale post-test was administered to all groups.

After completing the process above, the environmental literacy scale posttest was administered to all groups.

Data Analysis

The collected data were organized on a computer and analyzed utilizing the SPSS 22 software package. Non-parametric methods were employed to assess the impact of science fiction movies and books on the environmental literacy of seventh-grade students. For small samples, it is advisable to analyze the collected data utilizing non-parametric methods. In order to examine the impact of science fiction movies and books on environmental literacy, it was decided to use non-parametric tests in the groups of the relevant study, each consisting of 21 people. For the analysis of differences between the experimental and control groups, the Mann Whitney U Test was used, and the Wilcoxon Signed-Rank Test was employed to examine the changes in the data obtained from the experimental and control groups over time (comparison of pre-test and post-test) (Kilmen, 2015: 127-128).

In the qualitative aspect of the research, data obtained from the cognitive achievement test and semi-structured interview questions were used. The answers were analyzed through content analysis. Codes and themes were analyzed by multiple researchers to ensure validity and reliability. The code list was examined by 4 people, 2 science and technology teachers and 1 lecturer, together with the researcher, and the consistency of the code list was determined. To ensure reliability, the reliability of the coders was examined and the reliability ratio between the 4 coders was determined as 0.88 using Miles and Huberman's (1994) reliability formula. With these results, it was concluded that the cognitive skills test was reliable. The answers given to the cognitive skills test were compiled, and codes were created based on the concepts related to each question. The codes created were used in the content analysis. Later, the codes assigned to the responses were classified into themes. Separate codes and themes have been created for the pre-test and post-test data of the control and experimental groups. The themes were used both in the comparison of pre-test and post-test data within the groups themselves and in

Table 1. Comparison of Environmental Knowledge Scores of Students in the Experimental Group 1 and Control Group based on the pretest and posttest.

Score	Groups	N	$\bar{x}_{rank}$	$\sum_{rank}$	U	Z	p
Pretest	Experimental G.1	21	23.64	496.50	175.500	-1.143	0.253
	Control G.	21	19.36	406.50			
Posttest	Experimental G.1	21	24.98	524.50	147.500	-1.856	0.063
	Control G.	21	18.02	378.50			

the comparison of the experimental and control groups with each other. Frequency values were determined based on the common themes in the responses to each question. The responses given to the semi-structured interview form were also analyzed to create codes and themes for each question. The frequency values were determined based on the similar themes contained in the responses to each question.

Findings

Findings Obtained from the Quantitative Data

In this section of the research, there are quantitative results related to the examination of the impact of using science fiction movies and science fiction books in science classes on the environmental literacy of 7th grade students.

Findings regarding the comparison of the environmental knowledge scores of students in the Experimental Group 1 and Control Group based on the pretest and posttest

As indicated in **Table 1**, there was no statistically significant difference between the pre-test and post-test scores of environmental knowledge for the students in the Experimental Group 1 and the Control Group.

Findings regarding the comparison of the environmental perception test scores of students in the Experimental Group 1 and Control Group based on the pretest and posttest

As indicated in **Table 2**, there was no statistically significant difference between the pre-test and post-test scores of the environmental perception of the students in the Experimental Group 1 and the Control Group.

Table 2. Comparison of Environmental Perception Scores of Students in the Experimental Group 1 and Control Group based on the Pretest and Posttest.

Score	Groups	N	x̄rank	∑rank	U	Z	p
Pretest	Experimental G.1	21	22.40	470.50	201.500	-0.479	0.632
	Control G.	21	20.60	432.50			
Posttest	Experimental G.1	21	19.86	417.00	186.000	-0.870	0.384
	Control G.	21	23.14	486.00			

Table 3. Comparison of Environmental Behavior Scores of Students in the Experimental Group 1and Control Group based on the Pretest and Posttest.

Score	Groups	N	$\bar{x}_{rank}$	$\sum_{rank}$	U	Z	p
Pretest	**Experimental G.1**	21	20.88	438.50	207.500	-0.328	0.743
	Control G.	21	22.12	464.50			
Posttest	**Experimental G.1**	21	21.50	451.50	220.500	0.000	1.00
	Control G.	21	21.50	451.50			

Findings regarding the comparison of environmental behavior test scores of students in the Experimental Group 1 and Control Group based on the pretest and posttest

As indicated in **Table 3**, there was no statistically significant difference between the pre-test and post-test scores of environmental behavior among the students in the Experimental Group 1 and the Control Group.

Findings regarding the comparison of environmental knowledge scores of students in the Experimental Group 2 and the Control Group based on the pretest and posttest

As indicated in **Table 4**, there was no statistically significant difference between the pre-test and post-test scores of environmental knowledge for the students in the Experimental Group 2 and the Control Group.

Findings regarding the comparison of environmental perception scores of students in the Experimental Group 2 and Control Group based on the pretest and posttest

Table 4. Comparison of Environmental Knowledge Scores of Students in the Experimental Group 2 and Control Group based the Pretest and Posttest.

Score	Groups	N	$\bar{x}_{rank}$	$\sum_{rank}$	U	Z	p
Pretest	**Experimental G.2**	21	21.57	453.00	219.000	-0.038	0.970
	Control G.	21	21.43	540.00			
Posttest	**Experimental G.2**	21	18.07	379.50	148.500	-1.826	0.068
	Control G.	21	24.93	523.50			

Table 5. Comparison of Environmental Perception Scores of Students in the Experimental Group 2 and Control Group based on the Pretest and Posttest.

Score	Groups	N	$\bar{x}_{rank}$	$\sum_{rank}$	U	Z	p
Pretest	**Experimental G.2**	21	22.19	466.00	206.000	-0.365	0.715
	Control G.	21	20.81	437.00			
Posttest	**Experimental G.2**	21	20.19	424.00	193.000	-0.694	0.488
	Control G.	21	22.81	479.00			

Table 6. Comparison of Environmental Behavior Scores of Students in the Experimental Group 2 and Control Groups Based on the Posttest and Pretest.

Score	Groups	N	$\bar{x}_{rank}$	$\sum_{rank}$	U	Z	p
Pretest	**Experimental G.2**	21	23.07	484.50	187.500	-0.832	0.406
	Control G.	21	19.93	418.50			
Posttest	**Experimental G.2**	21	19.76	415.00	184.000	-0.919	0.358
	Control G.	21	23.24	488.00			

As indicated in **Table 5**, there was no statistically significant difference between the pretest and posttest scores of environmental perception for the students in the Experimental Group 2 and the Control Group.

Findings regarding the comparison of environmental behavior test scores of students in the Experimental Group 2 and Control Group based on the pretest and posttest

As indicated in **Table 6**, there was no statistically significant difference between the pretest and posttest scores of environmental

Table 7. Comparison of Environmental Knowledge Test Scores of Students in the Experimental Group 1 based on the Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	9	10.89	98.00	-0.127	0.899
Positive Ranks	10	9.20	92.00		
No difference	2				

Table 8. Comparison of Environmental Knowledge Test Scores of Students in the Experimental Group 2 based on the Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	5	6.60	33.00	-2.313	0.021*
Positive Ranks	13	10.62	138.00		
No difference	3	6.60	33.00	-2.313	0.021*
*p<0.5					

behaviors for the students in the Experimental Group 2 and the Control Group.

Findings regarding the comparison of environmental knowledge test scores of students in the Experimental Group 1, Experimental Group 2 and Control Group based on pretest and posttest scores

As indicated in **Table** 7, there was no statistically significant difference between the pretest and posttest scores of environmental knowledge for the students in the Experimental Group 1.

As indicated in **Table 8**, there was a statistically significant difference between the pretest and posttest scores of environmental knowledge for the students in the Experimental Group 2.

As indicated in **Table 9**, there was no statistically significant difference between the pretest and posttest scores of environmental knowledge for the students in the Control Group.

Findings regarding the comparison of pretest and posttest scores of environmental perception test for the students in the Experimental Group 1, Experimental Group 2 and Control Group

Table 9. Comparison of Environmental Knowledge Test Scores of Students in the Control Group based on the Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	10	9.30	93.00	-0.1.889	0.059
Positive Ranks	5	5.40	27.00		
No difference	6				

Table 10. Comparison of Environmental Perception Test Scores of Students in the Experimental Group 1 based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	10	10.00	100.00	-0.187	0.852
Positive Ranks	10	11.00	110.00		
No difference	1				

Table 11. Comparison of Environmental Perception Test Scores of Students in the Experimental Group 2 based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	5	5.20	26.00	-2.393	0.017*
Positive Ranks	12	10.58	127.00		
No difference	4				.
*p<0.5					

As indicated in **Table 10**, there was no statistically significant difference between the pretest and posttest scores of environmental perception test for the students in the Experimental Group 1.

As indicated in **Table 1**1, there was a statistically significant difference between the pretest and posttest scores of environmental perception test for the students in the Experimental Group 2.

As indicated in **Table 1**2, there was no statistically significant difference between the pretest and posttest scores of environmental perception test for the students in the Control Group.

Table 12. Comparison of Environmental Perception Test Scores of Students in the Control Group based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	9	5.56	50.00	-0.1.814	0S.070
Positive Ranks	10	14.00	140.00		
No difference	2				

Table 13. Comparison of Environmental Behavior Test Scores of Students in the Experimental Group 1 based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	10	9.60	96.00	-0.336	0.737
Positive Ranks	10	11.40	114.00		
No difference	1				

Table 14. Comparison of Environmental Behavior Test Scores of Students in the Experimental Group 2 based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	6	6.92	41.50	-2.373	.018*
Positive Ranks	14	12.04	168.50		
No difference	1				.
*p<0.5					

Findings regarding the comparison of environmental behavior test scores of students in the Experimental Group 1, Experimental Group 2 and Control Group based on pretest and posttest

As indicated in **Table 13**, there was no statistically significant difference between the pretest and posttest scores of environmental behavior test for the students in the Experimental Group 1.

As indicated in **Table 14**, there was a statistically significant difference between the pretest and posttest scores of environmental behavior test for the students in the Experimental Group 2 ($z = -2.373$, $p = 0.018$).

As indicated in **Table 15**, there was no statistically significant difference between the pretest and posttest scores of environmental behavior test for the students in the Control Group.

Table 15. Comparison of Environmental Behavior Test Scores of Students in the Control Group Based on Pretest and Posttest.

Pretest-Posttest	N	Mean Rank	Rank Sum	z	p
Negative Ranks	10	11.50	115.00	-0.374	0.708
Positive Ranks	10	9.50	95.00		
No difference	1				

Table 16. Responses of the Experimental Group 1, Experimental Group 2 and Control Group Students to the Question "What environmental issues do you consider important?"

	f		
	Control group	**Experimental group 1**	**Experimental group 2**
Issues caused by wastes.	21	19	20
Issues caused by human actions.	11	10	4
Issues caused by global warming.	7	7	10
Issues caused by the harm inflicted on living beings.	5		8
Issues caused by nature events.	2	2	1
Space-related issues		1	

Findings Based On Qualitative Data

In this section of the research, qualitative findings regarding the examination of the impact of using science fiction films and science fiction books in science classes on the environmental literacy of 7th grade students are presented. In this context, the cognitive achievement test, which is a sub-dimension of the environmental literacy scale, was administered as a pre-test and post-test, and the responses to semi-structured interview questions were examined.

Pretest Data of the Experimental Group 1, Experimental Group 2 and Control Group

When **Table 16** is examined, when asked what environmental problems do you consider important, 21 students from the control group answered the following questions: problems caused by waste (K9 "environmental

Table 17. Responses of the Experiment group 1, Experiment group 2 and Control Group Students to the Question "Which of the environmental issues you mentioned is the most important?"

	f		
	Control group	**Experimental group 1**	**Experimental group 2**
Global warming	7	5	5
People's lack of awareness in their actions	4		3
Wasting	3		
Environmental pollution	4	3	8
Wastes	3	9	4
Space-related issues		1	
noise pollution		1	
Damage to living things			1

pollution" C11 "problems caused by nuclear reactors"), 11 students answered the following questions: problems caused by humans (C3 "people cutting down trees" C15 "concreting"), 7 students answered the following questions: global warming (C16 "ozone layer depletion" C17 "climate change"), 5 students answered the following questions: damage to living things (C2 "harming animals" C11 "overfishing") and 2 students answered the following questions: problems caused by natural events (C15 "erosion"). From the Experimental group 1, 19 students gave the answers as problems caused by waste (E1 "garbage that people throw away", E4 "fumes coming out of car exhausts"), 10 students gave the answers as problems caused by people (E11 "hunting of endangered species", E17 "cutting down our trees"), 7 students gave the answers as global warming (E3 "drought", E5 "global warming"), 2 students gave the answers as problems caused by natural events (E19 "activities such as floods and water"). From the Experimental group 2, 20 students gave the answers as problems caused by waste (S8 "not throwing garbage in the trash"), 10 students gave the answers as problems caused by global warming (S1 "global warming"), 8 students gave the answers as problems caused by harm to living things (S4 "hunting") and 4 students gave the answers as unconscious behaviors of people (S9 "people throwing garbage on the ground", S11 "cutting down trees").

When looking at **Table 17**, it is stated that 7 students from the Control group saw global warming as the most important environmental problem, 4 students saw people acting unconsciously, 4 students saw environmental pollution, 3 students saw waste, and 3 students saw waste. When looking at the Experimental 1 group students, 9 students saw garbage pollution, 5 students saw global warming, and 3 students saw environmental

Table 18. Solution suggestions of Experiment group 1, Experiment group 2 and Control group students for the mentioned environmental problems.

		f	
	Control group	**Experiment group 1**	**Experiment group 2**
Using clean energy sources	4		
Protecting nature	10	2	3
Reducing air pollution	3	4	6
Recycling	4	5	8
Being frugal, making saving	1	2	
Prohibiting smoking	1		
Preventing population growth	2		
Act consciously	5	7	6
Protecting animals	1	1	
Obeying the rules		4	
Taking safety precautions		2	
Issuing fines		2	2
Reducing space pollution		1	
Using organic products			1

pollution. On the other hand, it is seen that 8 students from the Experimental 2 group saw environmental pollution, 5 students saw global warming, 4 students saw waste, 3 students saw people acting unconsciously, and 1 student saw harm to living things as the most important environmental problem.

Some student answers given for the reasons why the environmental problems mentioned are the most important are as follows.

C9 “the use of non-renewable energies (fossil fuels)”

C18 “if we harm living beings, the balance of the world may be disrupted.”

C9 “water pollution”

C21 “food, papers, recyclable materials are thrown into the trash”

C4 “we need to throw garbage in garbage can”

E16 “treating the environment badly”

E3 “because of people’s using water carelessly, insensibly”

E18 “release of waste waters to seas from factories “

E10 “non-functional satellites”

E19 “it is because of littering”

S19 “littering”

S12 “acting insensibly”

S14 “Climate change “

S11 “polluting” “littering”

S9 “burning forests”

Table 19. Responses of Experimental group 1, Experimental group 2 and Control Group Students to the Question "What environmental issues do you consider important?"

		f	
	Control group	**Experimental group 1**	**Experimental group 2**
Issues caused by wastes.	18	19	19
Issues caused by human actions.	6	5	9
Issues caused by global warming.	6	13	16
Issues caused by the harm inflicted on living beings.	5		
Issues caused by nature events.	3		6
nuclear problems	1		
Raw material shortage		2	

When **Table 18** is examined, it is seen that the solution suggestions of the control group students are as follows: 4 students use clean energy sources, 10 students protect nature, 3 students reduce air pollution, 4 students recycle, 1 student be thrifty, 1 student ban smoking, 2 students prevent population growth, 5 students act consciously and 1 student protect animals. From the experimental group 1 students, 2 students stated as protect nature, 4 students reduce air pollution, 5 students recycle, 2 students be thrifty, 7 students act consciously, 1 student protect animals, 4 students obey the rules, 2 students take safety precautions and 2 students punish. From the experimental group 2 students, 3 students stated as protect nature, 6 students reduce air pollution, 8 students recycle, 6 students act consciously and 2 students punish.

Posttest Data of the Experimental Group 1, Experimental Group 2 and Control Group

When **Table 19** is examined, it is seen that 18 students from the control group answered the question of what environmental problems they consider important as problems caused by waste (C5 "environmental pollution"), 6 students as problems caused by humans ("C11 "deforestation"), 6 students as global warming (C16 "depletion of the ozone layer"), 5 students as damage to living things (C11 "overfishing"), 3 students as problems caused by natural events (C17 "increase in natural disasters") and 1 student as nuclear problems (C21 "nuclear leaks"). 19 students from the Experimental group 1 answered the question as problems caused by waste (E11 "throwing garbage on the ground"), 5 students as problems caused by humans (E18 "excessive

Table 20. Responses of Experimental group 1, Experimental group 2 and Control Group Students to the Question "Which is the most important among the issues you have mentioned?"

	f		
	Control group	**Experimental group 1**	**Experimental group 2**
Global warming	5	9	7
People's lack of awareness in their actions	2	2	1
Environmental pollution	11	10	12
Damage to living things	3		
Natural events	1		
Acid rain			1

use of resources"), 13 students as global warming (E13 "depletion of the ozone layer") and 2 students as raw material shortage (E10 "hunger"). 19 students from the Experimental group 2 answered the question as problems caused by waste (S5 "water pollution"), 16 students as the problems caused by global warming (S13 "greenhouse gases"), 9 students stated the problems caused by humans (S15 "fire") and 6 students stated the problems caused by natural events (S11 "floods").

When the answers of the Control group students are examined in **Table 20**, it is seen that the most important environmental problem is 5 students' global warming, 2 students' unconscious behavior of people, 11 students' environmental pollution, 3 students' harm to living things and 1 student's acid rain. When the students of the Experimental 1 group are examined, 9 students stated that global warming, 2 students' unconscious behavior of people and 10 students stated that environmental pollution. It is seen that the students of the Experimental 2 group stated that the most important environmental problem is 7 students' global warming, 1 student's unconscious behavior of people and 12 students stated that environmental pollution.

Some student answers given for the reason why the stated environmental problems are the most important are as follows.

C14 "air pollution, not paying attention to factories

C15 "people's being insensitive to the environment"

C2 "polluted air"

C21 "factory smoke mixing into the air"

E17 "plastics"

E10 "ozone layer's getting thinner"

E18 "due to overuse of papers, cardboards (wasting)

S19 "factory gases" "cars' exhaust gases"

Table 21. Solution suggestions of Experiment group 1, Experiment group 2 and Control group students for the mentioned environmental problems.

	f		
	Control group	**Experimental group 1**	**Experimental group 2**
Using clean energy sources		**4**	**3**
Protecting nature	2		
Reducing air pollution	6	4	8
Recycling	4	6	4
Being sensitive	11	7	7
Protecting animals	1		
Imposing fines		1	
Planting trees	3		1
Helping each other	1		
Using public transportation		5	4
Raising awareness among people		4	2
Imposing fines		1	
Making campaigns			1

S6 “due to littering”

S10 “gases from cars exhaust system”

S11 “using environment insensibly because of keeping the nature dirty”

When **Table 21** is examined, as a solution suggestion from the control group students, 2 students stated that they would protect nature, 6 students that they would reduce air pollution, 4 students that they would recycle, 11 students that they would be sensitive, 1 student that they would protect animals, 3 students that they would plant trees and 1 student that they would help each other. From the experimental group 1 students, 4 students stated that they would use clean energy sources, 4 students that they would reduce air pollution, 6 students that they would recycle, 7 students that they would be sensitive, 1 student that they would punish, 5 students that they would use public transportation, 4 students that they would raise awareness and 1 student that they would punish. From the experimental group 2 students, 3 students stated that they would use clean energy sources, 8 students that they would reduce air pollution, 4 students that they would recycle, 7 students that they would be sensitive, 1 student that they would plant trees, 4 students that they would use public transportation, 2 students that they would raise awareness and 1 student that they would campaign.

Table 22. The Responses of the Experimental Group 1 and 2 Students to the Interview Questions Related to the Science Fiction Movies and Books.

Questions	Themes	Experimental 1						Experimental 2					
		E2	E5	E11	E14	E18	E21	S2	S5	S7	S8	S15	S19
Have the books you read/movies you watched contributed to your environmental knowledge? If yes, what are they? Which concepts?	Positive contribution	+	+	+	+	+	+	+	+	+		+	+
	Raising awareness	+	+		+	+	+				+		
	Reasons of Environmental pollution	+	+			+			+	+		+	
	Recognizing global warming	+	+	+		+		+	+	+			
	Reasons of natural disasters								+	+	+		+
How do you think your perspective on environmental issues and your behaviors towards the environment have been or would be affected by those above?	Showing the importance of recycling							+		+			
	Enabling to be careful		+		+	+					+	+	+
	Being beneficial	+					+						
Have they inspired you to find solutions to environmental issues?	Inspired	+	+	+	+	+	+	+	+	+	+		
	Will inspire in time											+	+
Which environmental issues has the book/movie helped you notice?	Global warming		+	+	+	+	+	+	+	+		+	+
	Forest destruction		+										
	Environmental pollution	+			+	+			+		+	+	
	Drought							+					
	Carbon footprint												+
	Natural disaster						+			+	+	+	+
	Resource depletion			+		+	+						
Has the use of science fiction in science classes been effective in environmental education? What are the advantages and disadvantages?	Fun learning					+							
	Being effective	+	+	+		+	+		+	+	+	+	+
	Being advantageous	+	+	+	+	+		+		+			+
	Enabling to re-do							+					
Have you encountered any environmental issues you heard about in movies/books in your daily life? If so, what were they? How did you react? If you encountered it again, would you behave differently?	Being frugal			+	+								
	Recycling			+							+		
	Being sensitive	+	+			+	+	+	+		+	+	+
	Protecting forests												+
	Keeping the environment clean	+		+		+	+		+	+			+

Findings from Interviews with the Experimental Groups

The themes created for each of the six questions asked in the interview are listed under the questions. **Table 22** shows the answers given by the students.

Conclusion and Discussion

Looking at the results of the study, it is observed that the teaching technique using science fiction movies and science fiction books has a positive impact on students. It can be said that the impact of this is due to the fact that events that have not yet occurred or abstract concepts that are likely to happen in the future are presented to students through this method and technique. Seçkin Kapucu (2014) also states that audiovisual tools play an effective role in the hypostatization of abstract concepts. Similarly, it has been shown that science fiction provides an opportunity to explore difficult concepts and allows students to make connections by comparing known concepts with new ones (cited in Sürmeli, 2012). Given that current topics such as the environment frequently arise in daily discourse, it is evident that employing diverse teaching methods in the instruction of these subjects enhances and solidifies students' learning. Acar (2003) states in his study with high school students that science fiction stories enhance students' thinking abilities and facilitate the learning of subjects. According to Yağcı Demirkıran (2022), science fiction elements enhance children's knowledge and learning capacities in scientific subjects. The positive impact of science fiction on students' knowledge and conceptual levels is not observed in their environmental sensitivity in the same way. The results indicate that it is not effective in instilling affective tendencies towards the environment in students or changing their environmental responsibilities, or that there may be other factors influencing students' affective tendencies towards the environment. Although science fiction can convey plausible events that are close to reality, in order for affective changes to occur, students must actively participate in the learning environment and be directly confronted with certain environmental situations. Similarly, Karaosmanoğlu (2017) states that while it is easy to change knowledge, it is more difficult to change attitudes, values, responsibilities, and problem-solving skills. Okur (2021) measures the affective characteristics towards science using a teaching technique with scientific stories with primary school students and stated that there was no significant difference between the study groups. In the literature, there are also studies that show the opposite of these results. In the study of Özdemir (2006) the story method is used as a literary product and an increase in students' sensitivity towards the environment is found. In Acar's (2003) study with high school students, it is concluded that science fiction stories developed a positive attitude towards physics topics among the

students. Another factor examined in the study is environmentally-friendly behaviors. When the data is examined, it shows that science fiction movies have a somewhat positive impact on environmentally friendly behaviors. According to Birkök (2008), films can easily convey behavioral models to students in addition to teaching and can be effective in creating behavioral change. Through movies, awareness can be increased regarding sensitivity towards nature and the environment, human responsibility, the potential end of nature due to unconscious or incorrect usage, and the behavioral changes they can develop to preserve the order in nature (Yılmaz, 2018). Takmaz (2018) states that movies contribute to increasing awareness of the consequences of our behaviors. On the other hand, it has been shown that science fiction books do not have a positive impact. When looking at studies on environmental behaviors, it has been found that not only studies conducted on students but also at the parental level, their family environment or changes in their surroundings are effective in developing positive environmental behaviors (Akıllı & Genç, 2015). In the research on environmental literacy, Erdoğan (2009) states that demographic factors are influential in students developing responsible behaviors towards the environment. Nicklason (2006) mentions the inadequacy in taking action despite being aware of environmental problems. As a similar result, Kahraman & Karataş (2012) states that students are able to develop both critical thinking and problem-solving skills by putting themselves in the place of the story characters in the technique used.

Examining all the answers, it is observed that students have had a certain level of environmental knowledge even before the study. It may be because the environment is a current topic and students are exposed to environmental issues in school or family settings. In addition, although there is no significant difference between the responses of the experimental and control groups, it can be said that the change in the responses given by the experimental group 1 and experimental group 2 students in the pre-test and post-test implementations, or the increase in codes and themes, is due to the teaching techniques of science fiction sources.

Utilizing science fiction in science education will keep the lesson away from rote memorization, allowing students to learn information that they cannot see and experience in real life. Additionally, utilizing science fiction works (movie, story, play, etc.) during the science education process will make science education more enjoyable (Bilgin, 2016). In this context, the objective of the new educational program, namely to develop students' ability to adapt to changing living conditions and to cultivate original and innovative thinking skills (MoNE, 2017), can be achieved through the use of science fiction movies and science fiction books. Thus, individuals who possess sufficient environmental knowledge, are sensitive to the

environment, and can find solutions to environmental problems will be raised.

Reference

Acar, H. (2003). Fizik eğitiminde bilimkurgu hikâyelerinin kullanılması. Marmara University, Institute of Educational Sciences, Department of Secondary School Science and Mathematics Education, Master's Thesis

Akıllı, M. and Genç, M. (2015). Ortaokul Öğrencilerinin Çevre Okuryazarlığı Alt Boyutlarının Çeşitli Değişkenler Açısından İncelenmesi. Sakarya University Journal of Education, 5/2 p. 81-97

Atasoy, E. and Ertürk, H. (2008). İlköğretim öğrencilerinin çevresel tutum ve çevre bilgisi üzerine bir alan araştırması. Erzincan Faculty of Education Journal Issue: 10-1

Bahar, M., Erdaş, E. and Özel, R. (2013). İlköğretim hayat bilgisi programında çevre eğitimi. Abant İzzet Baysal University Faculty of Education Journal, 13 (2), 1-25.

Balbağ, M. Z., Yenilmez, K., ve Turğut, M. (2012). Matematik ve fen bilgisi öğretmen adaylarının bilimkurgu filmlerine yönelik görüşlerinin bazı değişkenler açısından incelenmesi. Journal of Education and Teaching Research. Volume: 1, Issue: 3, 2146-9199

Bilgin, L. N. (2016). Bilim kurgunun fen bilimleri dersinin öğrenme hedeflerine yönelik fen bilimleri öğretmenlerinin görüşleri. Ahi Evran University Institute of Science Department of Primary Education, Master's Thesis.

Birkök, M. C. (2008). Bir toplumsallaştırma aracı olarak eğitimde alternatif medya kullanımı: Sinema filmleri. Journal of Human Sciences, 5(2).

Erdoğan, M. (2009). "Fifth grade students' environmental literacy and the factors affecting students' environmentally responsible behaviors," Ph.D. - Doctoral Program, Middle East Technical University,

Ergin, İ., Kanlı, U. ve Tan, M. (2006). Fizik eğitiminde 5E modeli'nin öğrencilerin akademik başarısına etkisinin incelenmesi. GÜ, Gazi Faculty of Education Journal, Volume 27, Issue 2 191-209

Kahraman, F. and Karataş, F.Ö. (2012). Bilim tarihi temelli hikayeler kullanımı ile 7.Sınıf "Basit Makineler"" konusunun öğretimi: bir eylem araştırması, X. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi. Niğde

Karaosmanoğlu, A. B., (2017). Örnek olay yönteminin 7. sınıf ortaokul öğrencilerinin çevre okuryazarlığına etkisi. Kastamonu University Institute of Sciences Department of Primary Education, Master's Thesis

Kilmen, S. (2015). Eğitim araştırmacıları için SPSS uygulamalı istatistik. Edge Akademi received from: https://www.researchgate.net/publication/312041689_Egitim_arastirmacilari_icin_SPSS_uygulamali_istatistik

Köçer, M., and Koçoğlu, E. (2020). Eğitim tarihi. Ankara: Pegem Akademi

MoNE. (2017). İlköğretim Fen ve Teknoloji Dersi (4.5.sınıflar) Öğretim Programı. Turkiye Ministry of National Education Board of Education, Ankara

Nicklason, L. H. (2006). Influence of scientific terminology on the environmental attitudes of college students. Royal Roads University, Victoria, Canada, Master's thesis

Nilsson, P. & Van Driel, J. (2010). Teaching together and learning together–Primary science student teachers' and their mentors' joint teaching and learning in the primary classroom. DOI: https://doi.org/10.1016/j.tate.2010.03.009 obtained from the address

Okur, S. (2021). Hikayelerle fen öğretiminin öğrencilerin akademik başarılarına,

tutumlarına, hikaye yazma becerilerine ve uygulamaya yönelik görüşlerine etkisi. Alanya Alaaddin Keykubat University Institute of Postgraduate Education Department of Math and Science Education, Master's Thesis

Onwuegbuzie, A. J. & Leech, N. L. (2004). "Enhancing the interpretation of "Significant" Findings: The role of mixed methods research". The Qualitative Report, 9(4): 770-792. Received from: https://eric.ed.gov/?id=EJ853033

Özdemir, O. (2006). Yazınsal bir tür olarak öykü'nün çevre duyarlığına etkisi ve çevre eğitimi açısından değerlendirilmesi. Eurasian Journal of Educational Research, (23), 159-167.

Roberts, D. A. (2007). Scientifc literacy/science literacy. In S. K. Abell & N. G. Lederman (Eds.), Handbook of research on science education (pp. 729–780). Lawrence Erlbaum Associates

Roth, C. E. (1992). Environmental literacy: Its roots, evolution and directions in the 1990s. ERIC Document Reproduction Service No. ED348 235

Seçkin Kapucu, M. (2014). Fen ve teknoloji dersinde görsel medya kullanımına yönelik fen bilgisi öğretmenlerin görüşleri. Pegem Eğitim ve Öğretim Dergisi. 4(2), 75-90.

Sontay, G., Gökdere M. ve Usta, E. (2015). Ortaokul seviyesinde çevre okuryazarlık bileşenleri ile ilgili ölçek geliştirme çalışması. Necatibey Faculty of Education, Elektronik Fen ve Matematik Eğitimi Dergisi (EFMED) Volume 9, Issue 1, June 2015, p 49-80.

Surmeli, H. (2012). Examination the effect of science fiction films on science education students' attitudes towards STS course. Procedia-Social and Behavioral Sciences, 47, 1012-1016.

Takmaz, S., Yılmaz, M. and Kalpaklı F. (2018). Doğa ve çevre eğitimi için öğretim materyali olarak Avatar filmi. Pamukkale University Institute of Social Sciences Journal, Issue 30, January

Yağcı Demirkıran, T. (2022). Bilgin Adalı' nın fantastik ve bilimkurgu türündeki eserlerinin çocuk eğitimine katkısının incelenmesi. Bursa Uludağ University Institute of Educational Sciences Department of Educational Sciences Turkish Education. Master's Thesis

Yayla, A. (2005). Kant'ın ahlak eğitimi anlayışı. Ankara University Faculty of Educational Sciences Journal volume: 38, issue: 1, 73-86

Yazıcı N. N. ve Altınparmak, M. (2010). Science fiction aided biotechnology instruction: effects of bioethics group discussions on achievement and attitudes. Procedia Social and Behavioral Sciences 2, 4125–4129

Yılmaz, M. (2018). Filmlerin öğretim materyali olarak kullanılması ve biyoloji eğitimindeki yansımaları. Journal of Research in Informal Environments, 3(2), 24-37

Yore, L. D. (2012). Science literacy for all-more than a slogan, logo, or rally fag! In K. C. D. Tan & M. Kim (Eds.), Issues and challenges in science education research: moving forward (pp. 5–23). Springer. DOI: https://doi.org/10.1007/978-94-007-3980-2_2.

.

Received: April 04, 2025
Revised: May 17, 2025
Accepted: May 25, 2025