



Research Article

# In the Light of Current Problems in Education: TÜBİTAK Science Child Magazine and Building a Sustainable Future\*

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*Abstract* – The aim of this study is to determine to what extent the texts in Bilim Çocuk (Science Child) magazine, which aim to contribute to the development of 21<sup>st</sup> century skills, recognized as one of the current issues in education, and address the globally shared agenda of sustainable development goals, support the goals of sustainable development and contribute to the scientific development of children that they can utilize in their educational process. In this study, in which qualitative research design was utilized, the data were obtained through document analysis, and the data obtained were tabulated and interpreted with percentages and frequencies. In the selection of the magazines to be included in the study, 72 issues published in 2016-2021, determined by criterion sampling method, which is one of the purposeful sampling methods, were analyzed. According to the findings of the study, it was determined that 92.59% of the texts in Bilim Çocuk magazine belonged to the informative text type and 7.40% to the narrative text type, and that the texts in the magazine were related to SDG 12 "Responsible Production and Consumption" among the seventeen global goals the most (n=31) and the least (n=1) to SDG 8 "Decent Work and Economic Growth". It is recommended to include diversity in the types of texts in the journal and to include other goals that are not yet included in the context of raising awareness about sustainable development goals and encouraging individuals and institutions to take action.

*Key words:* Sustainability, sustainable development goals, children's literature, 21<sup>st</sup> century skills.

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## **Introduction**

Digital literacy, intensive thinking, effective communication, high productivity, spiritual and moral values are the five core domains of the 21st century (Trilling & Fadel, 2009). Reconsidering pedagogy for the 21st century is as significant as identifying the new competencies that today's students should develop. Far from developing students' critical thinking skills or autonomy, traditional approaches still rely on students to memorize or follow simple instructions. What students really need, in order to develop higher-order thinking skills, is to engage in meaningful inquiry-based learning that has real value and relevance for individuals themselves and their communities (Luna Scott, 2015, s. 2).

The qualities that 21st century students have to possess in order to embrace lifelong learning and become information literate are described in detail by the American Association of School Librarians (AASL) in the report titled "Standards for the 21st Century Learner" (AASL, 2009). According to this report, some standards known as "21st Century Learner Standards" were determined. These standards include 81 standards in four dimensions. These are: researching, thinking critically and acquiring knowledge (25 sub-standards), drawing conclusions, forming informed decisions, implementing knowledge in new situations and generating new knowledge (17 sub-standards), sharing knowledge, participating ethically and productively as members of a democratic society (19 sub-standards), and striving for personal and aesthetic development (20 sub-standards) (Gelen, 2017).

The basic principle is that mastery of core subjects and 21st century themes is essential for student success in today's world. Core subjects include English, reading or language arts, world languages; art; math; economics; science; geography; history; government; and civics. In addition to these subjects, schools are encouraged to promote much higher levels of understanding of academic content by integrating 21st century interdisciplinary themes into core subjects. These interdisciplinary themes are: Global Awareness; Financial, Economic, Business, and Entrepreneurial Literacy; Civic Literacy; Health Literacy; Environmental Literacy (AASL, 2009; Battle For Kids, 2019).

Barron and Darling Hammond (2008) state that real-world experiences combined with consistent participation and collaboration provide students with the opportunity to construct and organize knowledge; lead to detailed research, inquiry and analysis processes; and provide participants with the opportunity to communicate effectively. Based on these statements, this study was designed with the foresight that 4C competencies can be acquired

by children through children's literature products that both support students to become digital literate including 21st century skills and provide them with the opportunity to witness the real world experiences described by the researchers. In addition to developing students' 4C competencies, the scientific journals examined in the study also cover sustainability, which is one of the universal concerns of the world and an agenda item for all countries.

Children's literature publishing is a field that takes into account the cognitive, affective and social characteristics of the child and carries out their work with care, attention and meticulousness. Unlike literary products that appeal to adults, it is also important that children's literature products are capable of meeting the needs of children in terms of their skills and developmental characteristics. Therefore, both those who are interested in children's education and researchers working in this field expect from children's literature products that the values and information to be conveyed to the child reader can be conveyed by considering the child's perspective and child reality.

With the development of the printing press, the priority attributed to children's education increased, and with the widespread distribution of printed media organs that would meet the need for reading, it acquired a particular value. Children's newspapers and magazines, one of the elements of printed publications prepared for children, took their place among the important literary genres that would meet children's reading needs in this period. Through the texts presented to children in these newspapers and magazines, children are provided with information about different literary genres, the development of vocabulary is supported, scientific developments in the world can be traced, and a great contribution is offered to children's general culture levels and reading culture development (Şahin, 2009, s. 17).

Children's magazines have had an essential place among children's literature publishing materials from past to present. Yıldız and Karaca (2020) stated that the purpose of publishing children's magazines is to support children's development, that age and development are taken into account, the information presented in the magazine is prepared for children's interests and needs, and both texts that develop literary enjoyment and puzzles that aim to entertain children are included in children's magazines. It is believed that children's magazines should contain texts and activities that can create integrity with the child's formal and informal education. In this sense, children's magazines are a medium that can both contribute to the child's educational process and play an active role in the transfer of current and cultural information. While the texts in children's magazines enable children to acquire up-to-date

information, they also support the acquisition of reading habits (Karaca, 2022). Through the activities in the magazine, children are provided with the opportunity to develop their fine motor skills and interact with their peers while being entertained.

As the world rapidly evolves and transforms, so do the questions children raise. The many stimuli they are exposed to in their environment also alter the way they feel and think. Especially the 7-12 age group can experience some transformations in the way they perceive the world through social media, media outlets and social responsibility projects that they interact with during formal education. In the children's literature products prepared for this age group, new life situations fictionalized from a child's perspective in works written for them by authors and illustrators who prioritize their transformation with the world shed light on new questions that need to be answered in their minds. Children are asked questions such as "What can I do to love and protect nature?", "How can living species be taken under protection?", "What kind of negativities await us in life if living species are not taken under protection?", "Why should I be sensitive to the living creatures and nature around me?" or "Can life be prolonged thanks to the smart chip that is said to be able to identify the microbe in a short time?", "Can wearable technological products make our lives easier but also bring some problems?", "How can I introduce climate action to my environment?", "What changes can I make in my school and home to become a responsible consumer?". Children's magazines should encourage children to think about the answers to these and similar questions, stimulate their imagination, and provide a natural learning environment in which they can support the adoption of a sensitive approach to the universe, their environment and living things. In our country, the magazine *Bilim Çocuk* (Science Child) published by TÜBİTAK Publications, which published its first issue in January 1998, has an important place among existing periodicals where children can seek answers to similar questions.

Published by TÜBİTAK Publications, *Bilim Çocuk* (Science Child) is a magazine that contains texts that contain scientific information that encourages children to think, question, criticize and research, and targets primary school students in the 7-12 age group, as well as preschool children and their parents. The aim of the magazine can be expressed as "to make children love science from an early age by telling them about science, the world and the universe, to demonstrate that science is a part of life, to raise the desire to do research, to ask questions, to be curious and to read" (Dedeoğlu et al., 2011).

When the content of the journal is examined, it is observed that in each issue there are current and scientific topics that are related to the previous issue, titles within the framework of a specific theme, and some sections with texts and activity examples appropriate to that theme. The common headings in each issue are: the section titled "What's New? " section with current scientific information, the cartoon series "Stories of a Scientist with Bagel and Cheese", which includes information about a scientist and his contributions to science, the book promotion section "A New Book", which includes the introduction of a book suitable for the age level, the writing column "Let's Ask and Answer", which includes the answer to a question about a subject that one of the readers is curious about, and the section "Sky Diary", which includes astronomy information, There are activity pages titled "Let's Have Fun Thinking", "Science at Home", "Wonders in Boots", "Letter Box", "From Your Observation Notebook", which include examples of various activities; the "From You" section, which includes written or visual works sent to the magazine by readers to share their feelings and thoughts; and the "Answers" section, where the correct answers to the activities in the magazine are presented to readers.

In recent years, there has been a socio-ecological change and transformation in the world. It is inevitable to establish a balance in this substantial change that cannot be ignored and to prevent some of the problems arising from the change in question. At the same time, future generations as well as today's people should be able to benefit from the existing resources. Considering all these, the countries of the world have certain responsibilities in the socio-economic field. These responsibilities have become even more significant with the universal call to action called the Sustainable Development Goals (SDGs), which was published in January 2016 and signed by 193 United Nations member states. The goal of the SDGs is to produce solutions and make improvements to the aforementioned issues, which have been determined until 2030 and gathered under 17 main headings. The 17 main topics in this universal call for action are as follows: "End poverty, end hunger, health and quality of life, quality education, gender equality, clean water and sanitation, accessible and clean energy, decent work and economic growth, industry, innovation and infrastructure, minimization of inequalities, sustainable cities and communities, responsible production and consumption, climate action, life in water, life on land, peace, justice and strong institutions, partnerships for purposes". These goals are global in nature as they concern all of humanity. Due to this characteristic, the steps to be undertaken for each goal will ensure the realization of the call to action and will make it possible to achieve these goals. In order to become an

aware, sensitive and conscious society, it is necessary to ensure that the next generation is informed about the current global problems and possible solutions to reach the goals set for possible solutions. As stated by Yapıcı (2003), "the only way for sustainable development to move from being an initiative to being put into practice is to raise individuals who believe in the concept of sustainable development and adopt it as a philosophy of life." (s. 226).

Therefore, while informing today's children, the adults of tomorrow to whom this world we live in is entrusted, about these issues, it is possible to benefit from written sources such as children's magazines that support them in acquiring a reading culture as well as visual media organs. Children's magazines have both current and universal qualities that inform children about global problems. For this reason, they are publications that encourage the acquisition of knowledge by generations with high levels of awareness, consciousness and sensitivity to what is happening. Together with the presentation of scientific information, these publications can be considered as a suitable type in terms of children's publishing that keeps the child's sense of curiosity active, gives them the responsibility of thinking and questioning, and develops their ability to analyze and problem-solve.

### **Purpose and Importance of the Study**

When the field literature is examined, studies can be encountered that evaluate children's magazines in terms of their relationship with basic language skills in Turkish language lessons (Tanrıkulu, 2021), their connection with science concepts (Aksüt, 2021), their approach from a perspective of values (Tekin Bahrilli & Göloğlu Demir, 2021), their alignment with 5th-grade social studies curriculum outcomes (Gez & Ekiz, 2021), the connection of science-related content with the history of science (Yavuzoğlu & Pektaş, 2020), the associability of magazine content with lessons (Tanrıkulu, 2020), a general exploratory study (Yıldız & Karaca, 2020), the relationship between gender role representation and media (Yiğitbaşı & Sarıçam, 2020), fundamental principles of children's literature (Demirdal, 2019), the transfer of values and alignment with primary education curriculum (Güler, 2019), children's rights (Pembegül, 2019), the value of patriotism (Yılmaz & Duman, 2018), and strategies for constructing gender roles (Gürkan, 2017).

However, when the academic studies previously conducted in the field of education and sustainable development goals are examined; it is observed that there are some studies conducted in terms of teachers' values and beliefs towards the education process (Tekin, 2021), science teaching undergraduate students' attitudes towards the environment with

documentary filming activity (Aslan Efe, Yücel & Efe, 2020), metaphorical perceptions of prospective primary school teachers (Kaygısız, 2020), social, environmental and economic dimensions (Gedik, 2020), curriculum analysis of the science course (Ateş, 2019) and the relationship with the education process (Yapıcı, 2003). When the existing studies were examined, it was observed that the concepts of children's magazines and sustainable development goals were not examined together in any study. When the literature studies are examined, it is believed that the current study will make a unique contribution to the field. Within the scope of the research, the question "To what extent do the texts in Bilim Çocuk magazine support SDGs?" and the following sub-problems are addressed.

### **Sub-Problems of the Research**

1. What is the distribution of text types that include SDGs in Bilim Çocuk magazine?
2. How are the texts in Bilim Çocuk magazine distributed according to SDGs?
3. Does the frequency of the texts in Bilim Çocuk magazine to include SDGs differ according to the years of publication?

### **Method**

#### **Research Design**

In the study, qualitative research design was employed in the descriptive survey model and the data were analyzed through document analysis. In document analysis, which is defined as a systematic process in which both printed and electronic materials are examined and evaluated, different documents that constitute the data set are collected, examined and questioned and the analysis process is carried out (Özkan, 2022). In the analysis process, in addition to personal documents, print media sources, periodicals, magazines, journals, newspapers, magazines and books are also utilized (Yıldırım & Şimşek, 2011).

#### **Participants**

Criterion sampling method, which is one of the purposeful sampling methods, was utilized in the selection of the journals to be included in the study. As a criterion, starting from 2016, the year the SDG universal call for action was published, 72 issues, including the December 2021 issue in which the project proposal was submitted, were included in the scope of the research. Activities and games in the journal were not included in the analysis.



## **Data collection**

In this study, all issues (72 issues) of Bilim Çocuk magazines published by TÜBİTAK Popular Science Publications between 2016-2021 were examined and analyzed as data collection tools. The control chart prepared by the researchers to determine the texts containing implicit or direct information sharing regarding the SDG items was submitted to the opinion of two faculty members who are experts in their fields and utilized in the examination of the magazine after the necessary arrangements. The examination of the documents obtained for the Bilim Çocuk magazine examined within the scope of the research in terms of sustainable development goals was carried out in a three-stage process, and in the first stage, all issues of the magazine published between 2016-2021 were obtained. Considering the possibility of not having internet access, it was preferred to obtain all issues of the magazine in printed form, but since the printed issues of the previous years could not be obtained, access was provided via e-journal. In the second stage, the distribution of text types, the distribution of these texts according to the frequency of including sustainable development goals and the change in this frequency according to the years of publication were examined, and in the third stage, the data obtained were analyzed by document analysis method.

## **Data Analysis**

The 72 issues of Bilim Çocuk magazine published in the years 2016-2021, which were determined by the criterion sampling method, were examined separately by the researcher and an academician who is an expert in the field twice at one-month intervals, and the types of texts in the magazines were determined according to the years. Then, the texts were examined one by one in the context of "Sustainable Development Goals and Indicators" on the official page of kureselamaclar.org and the SDGs that were considered to be related were listed, text titles and sample expressions were collected, and the data obtained according to the sub-problem titles were tabulated. In this process, Bilim Çocuk magazine was examined and the data collected were analyzed by document analysis.

## **Validity and reliability**

For the validity and reliability of the analysis conducted by the researchers, the reliability formula determined by Miles and Huberman (1994) was employed and the agreement rate between the opinions was determined. In order to be reliable, the agreement obtained is required to be at least 70% (Yıldırım & Şimşek, 2011). In this direction, as a result of expert evaluations, the percentage of agreement in the analysis was calculated as 95.73%.



The data obtained were analyzed according to which text type, how often and how the sustainable development goals change according to the years of publication.

### Findings and Discussions

The findings obtained within the scope of the aim of the research are presented in this section within the framework of the sub-objectives of the research.

#### Findings related to the first sub-problem

In the first sub-problem of the study, an answer was sought to the question " What is the distribution of text types that include SDGs in Bilim Çocuk magazine?". 2016 is the year in which 193 United Nations member countries published the universal call for action called Sustainable Development Goals (SDGs). For this reason, Bilim Çocuk magazines were analyzed starting from 2016. A total of 1876 texts were included in the 72 issues of Bilim Çocuk magazine. The majority of these texts, 92.59%, belong to the informative text type, while 7.40% belong to the narrative text type. No poetry texts were encountered in the magazines. Information on these values is presented in Table 1.

**Table 1** Distribution of Text Types Including SDG in Bilim Çocuk Magazine

Years	Text Types					
	Informative		Narrative		Poetry	
	SDG	n	SDG	n	SDG	n
2016	24	285	-	37	-	-
2017	12	298	-	25	-	-
2018	21	270	-	17	-	-
2019	20	286	-	12	-	-
2020	13	296	-	23	-	-
2021	22	302	1	25	-	-
Total	112	1737	1	139	-	-

When Table 1 is examined, it is determined that the issues containing the most texts in terms of including SDGs belong to 2016. In the twelve issues published in 2016, there were a total of (n=322) texts and (n=24) of these texts featured SDGs. After 2016, SDGs were included in 327 texts (n=22) in 2021; 287 texts (n=21) in 2018; 298 texts (n=20) in 2019; and 319 texts (n=13) in 2020. The year 2017 was the year in which the number of texts that

included SDG was the lowest (n=12). As observed in Table 1, it is found that only in the cartoon series titled "Stories of a Scientist with Bagel and Cheese" in 2021 (July issue), the fourteenth SDG goal of "Life in Water" was included. The SDGs were not included in the narrative texts in any other issue. In the cartoon series "Stories of a Scientists with Bagel and Cheese", the life story of a scientist is narrated in each issue. In this episode, which includes the fourteenth purpose, Ruth Deborah Gates, who worked on coral reefs until the end of her life, attempted to comprehend the bleaching process in corals, and sought answers to the question of how to prevent this bleaching caused by the increase in sea water temperatures due to global climate change, was the scientist of this issue.

### Findings related to the second sub-problem

In the second sub-problem of the study, an answer was sought to the question "How are the texts in Bilim Çocuk magazine distributed according to SDGs?". In the 72 issues of Bilim Çocuk magazine examined, there are a total of 1876 informative and narrative texts. Among these texts, 113 texts include sustainable development goals. Information on which goal among the seventeen goals is included in which text type is presented in Table 2.

**Table 2** Distribution of Texts in Bilim Çocuk Magazine according to SDGs

Global Goals for Sustainable Development	Distribution of Texts according to SDGs		
	Informative	Narrative	General Total
1. Ending Poverty	-	-	-
2. Ending Hunger	-	-	-
3. Health and Quality of Life	-	-	-
4. Quality Education	3	-	3
5. Gender Equality	-	-	-
6. Clean Water and Sanitation	2	-	2
7. Accessible and Clean Energy	27	-	27
8. Decent Work and Economic Growth	1	-	1
9. Industry, Innovation and Infrastructure	28	-	28
10. Minimization of Inequalities	-	-	-
11. Sustainable Cities and Communities	6	-	6
12. Responsible Production and Consumption	31	-	31
13. Climate Action	20	-	20
14. Life in Water	12	1	13
15. Life on Land	8	-	8
16. Peace, Justice and Strong Institutions	-	-	-
17. Partnerships for Purposes	3	-	3
Total	141	1	142

When Table 2 is analyzed, among the seventeen global goals, SDG 12 "Responsible Production and Consumption" was mentioned most frequently (n=31). This is followed by SDG 9 "Industry, Innovation and Infrastructure" (n=28), SDG 7 "Accessible and Clean Energy" (n=27), SDG 13 "Climate Action" (n=20), SDG 14 "Life in Water" (n=13), SDG 15 "Life on Land" (n=8), SDG 11 "Sustainable Cities and Communities" (n=6), SDG 4 "Quality Education" (n= 3), SDG 17 "Partnerships for Purposes" (n=3), SDG 6 "Clean Water and Sanitation" (n= 2). It is observed that the least number of texts (n=1) is related to the "Decent Work and Economic Growth" goal. While most of the text types in these global goals (n= 141) are in the informative text type, only (n=1) of the texts related to the SDG 14 "Life in Water" goal are in the narrative text type. On the other hand, none of the texts included SDG 1 "End Poverty", SDG 2 "End Hunger", SDG 3 "Health and Quality of Life", SDG 5 "Gender Equality", SDG 10 "Reducing Inequalities", SDG 16 "Peace, Justice and Strong Institutions".

When the texts containing SDGs in Bilim Çocuk magazine were analyzed, it was determined that some texts included more than one purpose. As presented in Table 3, the text titled "Carbon Dioxide Converted into Stone" in the July 2016 issue contains information on both the SDG 7 and SDG 13. Information on these examples is provided in Table 3.

**Table 3** Examples of Texts Including more than one SDG

Text Title	Included SDGs	Quote
Carbon Dioxide Converted into Stone	SDG 13: Climate Action SDG 7: Affordable and Clean Energy	"Scientists in Iceland have succeeded in turning carbon dioxide into stone at a low cost in a project called CarbFix. In the experiments, carbon dioxide and water were pumped into volcanic rock hundreds of meters underground. Scientists discovered that ninety-five percent of the pumped carbon dioxide reacted with minerals in the volcanic rocks and petrified in less than two years. Increasing carbon dioxide in the atmosphere is leading to climate change. By utilizing this method, it is believed that the amount of carbon dioxide released into the atmosphere can be reduced." (Bilim Çocuk, 2016, July, p. 5.)
Renewable Energy is Number One	SDG 7: Affordable and Clean Energy SDG 9: Industry, Innovation and Infrastructure	"The World Economic Forum recently published a report. According to this report, obtaining solar and wind energy is now as affordable as obtaining energy from fossil fuels. ... It is important that renewable energy sources are economical in order to prevent global warming in the future." (Bilim Çocuk, 2017, January, p.7.)
Old Clothes Can be Turned into Building Materials	SDG 9: Industry, Innovation and Infrastructure SDG 12: Responsible Production and Consumption	"When worn out or shrunken clothes are not recycled, they are thrown away. That's millions of tons of waste clothing around the world. Australian researchers have discovered a way to recycle this waste. After removing parts such as buttons and zippers, the garments were put through a shredder. A chemical substance was added to make the milled fibres of different types of fabrics stick together. This mixture was heated, compressed and shaped. Thus, low-flammable, water-resistant and robust panels that can be utilized as floor and wall coverings were obtained." (Bilim Çocuk, 2018, December, p. 4.)
Bioenergy is Produced from Wastewater	SDG 6: Clean Water and Sanitation	"Blue-green algae are considered a great source of bioenergy, but their cultivation requires a lot of water and nutrients. To solve this nutrient problem, the researchers attempted to grow blue-green algae in wastewater from a treatment plant. The blue-green algae utilized the phosphorus and nitrogen in

at the Treatment Facility	SDG 7: Affordable and Clean Energy	the wastewater as nutrients. Thus, the water was cleaned with less energy and bioenergy was obtained from the algae." (Bilim Çocuk, 2019, September, p. 6.)
Edible Packaging Made from Whey	SDG 9: Industry, Innovation and Infrastructure SDG 12: Responsible Production and Consumption	"Bioplastics are plastics derived from renewable biological resources such as vegetable oils or microorganisms. Altinkaya and her team developed a flexible, durable and edible bioplastic packaging by combining whey powder and corn protein. The product, which successfully passed the tests conducted by international organizations, was also protected by a patent. Altinkaya stated that this new packaging is of great importance as an alternative to petroleum-based plastic products that harm nature." (Bilim Çocuk, 2020, February, p. 5.)
Next Generation Technology Hybrid Cars	SDG 7: Affordable and Clean Energy SDG 11: Sustainable Cities and Communities	"Hybrid cars have the technology to overcome many of these problems because they reduce the use of fossil fuels thanks to their electric systems. These systems use electricity when needed and fossil fuels when needed. In addition to using energy more efficiently, hybrid cars also generate their own electricity. They therefore operate at a much lower cost than fossil fuel-only cars. Of course, since fossil fuel consumption is reduced in these cars, harmful gases emitted from the exhaust are also reduced." (Bilim Çocuk, 2021, February, p. 13.)

Two visuals of the texts in Bilim Çocuk magazine that include SDGs, examples of which are presented in Table 3, are provided in Figure 1 and Figure 2 below.



**Figure 1** Bioenergy is Produced from Wastewater at the Treatment Facility (Bilim Çocuk, September 2019, p.6)



**Figure 2** Edible Packaging Made from Whey (Bilim Çocuk, February 2020, p.5)

### Findings related to the third sub-problem

In the third sub-problem of the study, an answer was sought for the question "Does the frequency of the texts in Bilim Çocuk magazine to include SDGs differ according to the years of publication?". The findings indicate that the frequency of the texts in the magazine to include sustainable development goals differs according to the years of publication and each goal. Information on this objective is presented in Table 4.

**Table 4** The Relationship between the Frequency of SDG Inclusion in the Texts in Bilim Çocuk Magazine and Years of Publication

Global Goals for Sustainable Development	Number of Texts with SDGs in Journals by Years						
	2016	2017	2018	2019	2020	2021	General
1. End Poverty	-	-	-	-	-	-	-
2. End Hunger	-	-	-	-	-	-	-
3. Health and Quality of Life	-	-	-	-	-	-	-
4. Quality Education	1	-	-	2	-	-	3
5. Gender Equality	-	-	-	-	-	-	-
6. Clean Water and Sanitation	-	1	-	1	-	-	2
7. Accessible and Clean Energy	8	3	4	2	3	7	27
8. Decent Work and Economic Growth	-	-	1	-	-	-	1
9. Industry, Innovation and Infrastructure	5	4	4	1	7	7	28
10. Minimization of Inequalities	-	-	-	-	-	-	-
11. Sustainable Cities and Communities	-	-	1	2	2	1	6
12. Responsible Production and Consumption	3	4	11	5	6	2	31
13. Climate Action	4	2	1	3	1	9	20
14. Life in Water	2	3	3	2	-	3	13
15. Life on Land	4	-	-	3	1	-	8
16. Peace, Justice and Strong Institutions	-	-	-	-	-	-	-
17. Partnerships for Purposes	3	-	-	-	-	-	3
Total	30	17	25	21	20	29	142

When Table 4 is analyzed, it is observed that SDGs were included in a total of 24 texts in 2016, but a few of these texts were related to more than one global purpose. Therefore, the number of texts related to the goals in 2016 was determined as (n=30). In 2016, the most (n=8) texts related to SDG 7 "Accessible and Clean Energy", the least (n=1) texts related to SDG 4. "Quality Education", and a total of eight texts related to different goals.

In 2017, SDGs were included in a total of 12 texts, and a few of these texts were identified to be related to more than one purpose. Therefore, there were (n=17) texts related to the goals in 2017. In 2017, the most (n=4) texts related to SDG 9 "Industry, Innovation and Infrastructure" and (n=4) texts related to SDG 12 "Responsible Production and

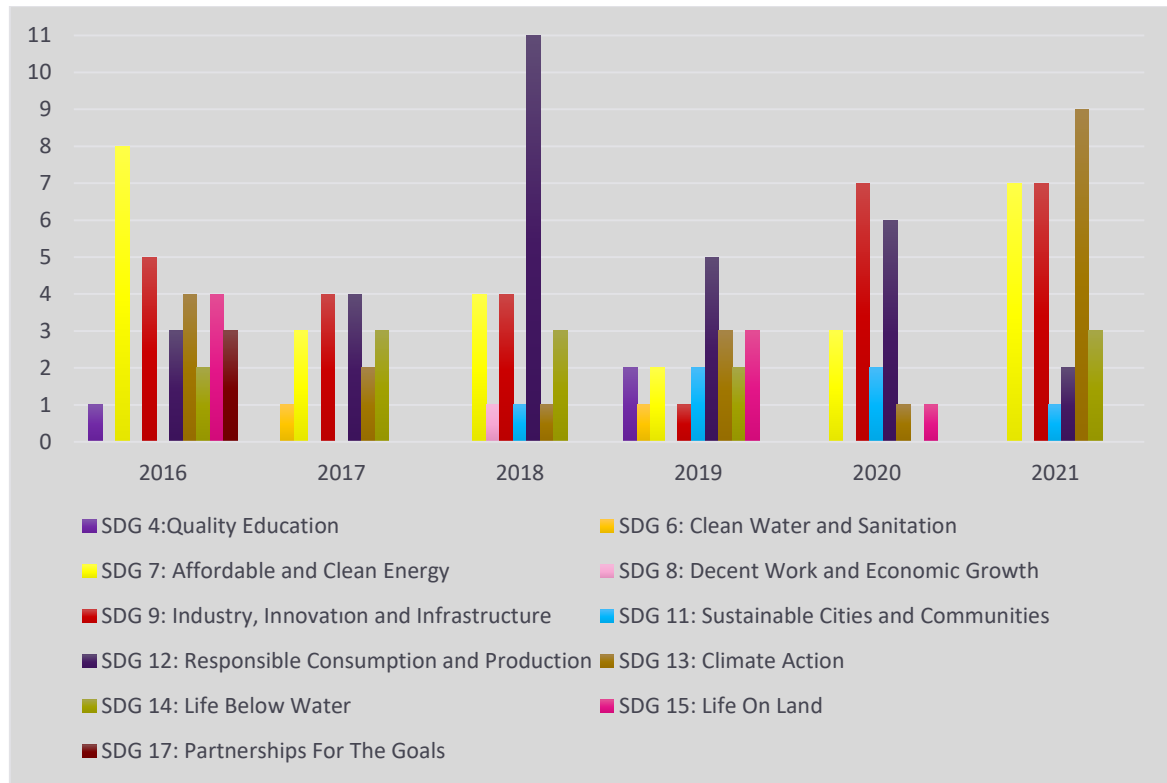
Consumption", the least (n=1) text related to SDG 6 "Clean Water and Sanitation", and a total of six texts related to different goals.

In 2018, SDGs were included in a total of 21 texts, and a few of these texts were identified to be related to more than one purpose. Therefore, it was stated that there were (n=25) texts related to the goals in 2018. In 2018, most (n=11) texts related to SDG 12 "Responsible Production and Consumption", least (n=1) texts related to SDG 8 "Decent Work and Economic Growth", least (n=1) texts related to SDG 11 "Sustainable Cities and Communities", least (n=1) texts related to SDG 13 "Climate Action", and a total of seven texts related to different goals.

In 2019, SDGs were included in a total of 20 texts, and one of these texts was identified to be related to more than one purpose. Therefore, it was stated that there were (n=21) texts related to the purposes in 2019. In 2019, the most (n=5) texts related to SDG 12 "Responsible Production and Consumption", the least (n=1) texts related to SDG 6 "Clean Water and Sanitation" and the least (n=1) texts related to SDG 9 "Industry, Innovation and Infrastructure", in total nine texts related to different goals.

In 2020, SDGs were included in a total of 13 texts, and it was identified that a few of these texts were related to more than one purpose. Therefore, it was stated that there were (n=20) texts related to the goals in 2020. In 2020, the most (n=7) texts related to SDG 9 "Industry, Innovation and Infrastructure", the least (n=1) texts related to SDG 13 "Climate Action" and the least (n=1) texts related to SDG 15 "Life on Land", and a total of six texts related to different goals.

In 2021, SDGs were included in a total of 23 texts, and it was identified that a few of these texts were related to more than one purpose. Therefore, it was stated that there were (n=29) texts related to the goals in 2021. In 2021, the most (n=9) texts related to the SDG 13 "Climate Action" purpose, the least (n=1) texts related to the SDG 11 "Sustainable Cities and Communities" purpose, and a total of six texts related to different purposes were included. Figure 1 presents a graph illustrating the relationship between the frequency of SDG-related texts in Bilim Çocuk magazine and the years of publication.



**Figure 3** The Relationship between the Frequency of SDG Inclusion in Texts and Years of Publication

The ratio of the texts related to sustainable development goals in *Bilim Çocuk* magazine to the total number of texts in the magazine was compared according to the years of publication, from 2016, the year in which the universal call for action on sustainable development goals was published, to December 2021, including the December 2021 issue. This information is presented in Table 5.

**Table 5** Ratio of the Number of SDG-Related Texts to the Total Number of Texts in the Journal by Year of Publication

Year of publication	Number of SDG-related texts	Total number of texts in the journal	%
2016	30	322	9.31
2017	12	323	3.71
2018	21	287	7.31
2019	20	298	6.71
2020	13	319	4.07
2021	23	327	7.03
Total	113	1876	6.02

When the ratio of the number of SDG-related texts to the total number of texts in the journal is analyzed according to the distribution of the years; there are a total of (n= 322) texts



in the journal published in 2016, and 9.31% (n= 30) of these texts are SDG-related texts. In the journal published in 2017, there were a total of (n= 323) texts, and 3.71% (n= 12) of these texts were SDG texts. In the journal published in 2018, there were a total of (n= 287) texts, and 7.31% (n= 21) of these texts were SDG texts. In the journal published in 2019, there were a total of (n= 298) texts, and 6.71% (n= 20) of these texts were SDG texts. In the journal published in 2020, there were a total of (n= 319) texts, and 4.07% (n= 13) of these texts were SDG texts. The journal published in 2021 contains a total of (n= 327) texts, 7.03% (n= 23) of which are SDG texts. In general, 72 issues published in six years contain a total of (n= 1876) texts, and 6.02% (n= 113) of these texts are SDG texts.

### Conclusions and Suggestions

The American Association of School Libraries (2018) discussed the need for reform in schools and education in the 21<sup>st</sup> century, with teachers and educational researchers as well as policy makers considering both the social and economic necessities of students and society (Ananiadou & Claro, 2009). In the "Key Competences for Lifelong Learning-A European Reference Framework" published by the European Union, eight key competencies for lifelong learning are identified. These competencies are literacy competence, multilingual competence, mathematical competence and competence in science, technology and engineering, digital competence, personal, social and learning to learn competence, citizenship competence, entrepreneurship competence, cultural awareness and expression competence. Core competences are developed throughout life through formal, non-formal and informal learning in different settings, including family, school, workplace and other communities (European Union, 2007). In addition to the family and immediate environment, these core competencies are developed in schools, which are the formal education institutions where children spend most of their time. Therefore, reading materials are also utilized in schools to support these competencies. One of these materials, Bilim Çocuk magazine, which is one of the children's literature products and constitutes the subject of this study, is valuable both in terms of the development of the 8 basic competencies mentioned above and because it deals with the issue of sustainability, a universal problem that is on the agenda of the world.

When the literature on the subject is examined, it is concluded that teachers do not have sufficient knowledge about the economic elements related to sustainable development issues (Borg et al., 2014), generally have a shallow and oversimplified understanding of sustainability (Birdsall, 2014) or have misconceptions about the concept of sustainable

development (Spiropoulou et al., 2007). Therefore, it is evident that when teaching sustainable development goals, they fail to assist students to develop a holistic view of the concept (Borg et al., 2014).

Borg et al. (2012; 2014) and Boeve-de Pauw and Van Petegem (2011) reported that there is a lack of good practices to inspire students and a lack of expertise on sustainable development. Therefore, the children's magazine examined in this study is an educational material that teachers can benefit from even if they lack expertise in sustainable development. However, it is also suggested that it may be appropriate to include diversity in the text types in the magazine at the point of bringing children together with universal knowledge. Because children like to read different types of texts. The cartoon series in the magazine are texts that attract children's attention and are suitable for their age and learning levels, both in terms of fiction and in terms of presenting sections from the life stories of scientists. However, there are very few of them in the magazine. It is believed that texts in this genre, which can attract the attention of children who like to read works in the cartoon series genre, can appeal to a larger number of child readers when they are associated with the SDGs.

The Global Goals for Sustainable Development are based on seventeen goals. It is observed that Bilim Çocuk magazine contains texts related to eleven of these goals. It is believed that this magazine, which is widely followed by children, adults and educators, is an exemplary publication in terms of raising awareness about the SDGs, raising sensitivity, and motivating individuals and institutions to take action. For this reason, it is recommended that other goals that are not included should be included in subsequent issues. When analyzed in terms of years, the SDGs were officially adopted with the call for action signed in 2016. From 2016 onwards, it was predicted before the study that the texts including SDGs would continue to increase in each issue. However, the findings and the predicted results were different. While in 2016, the number of texts that included the SDGs was (n= 30), this number first declined in the following years, but showed an upward trend again in 2021 (n= 29). Therefore, the increase in the number of texts that include SDGs in the magazine in the following issues brings with it the idea that Bilim Çocuk magazine will be an exemplary publication for raising awareness on this issue.

## Compliance with Ethical Standards

### *Disclosure of potential conflicts of interest*

We declare that there is no material conflict of interest between any institution, organization, person and authors during the preparation of the research, collection and evaluation of data, interpretation of the results and finalization of the writing process of the article.

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### *CRedit author statement*

The researchers contributed equally to the study.

### *Research involving Human Participants and/or Animals*

In the writing of the study titled "In the Light of Current Problems in Education: TÜBİTAK Science Child Magazine and Building a Sustainable Future", scientific rules, citation and ethical rules were adhered to, no changes were carried out on the data obtained from the magazines examined, and the necessary permission was obtained by TÜBİTAK Popular Science Publications to examine all the issues of the magazine between 2016-2021. The research data were published as an abstract in "IPTES 2022, 20<sup>th</sup> International Primary Teacher Education Symposium". The research results were not submitted to another academic publication environment for evaluation in an expanded and comprehensive manner. Ethical permission was obtained from Balıkesir University Social Sciences and Humanities Ethics Commission (Date: 07.07.2022, Number: 19928322/605.01/159185).

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## Eğitimde Güncel Sorunların Aydınlightında: TÜBİTAK Bilim Çocuk Dergisi ve Sürdürülebilir Geleceğin İnşası\*\*

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### Özet:

Araştırma, eğitimin güncel sorunlarından biri olan 21. yüzyıl becerilerinin geliştirilmesine destek sağladığı ve dünyanın ortak gündemi olan sürdürülebilir kalkınma amaçlarına yer verdiği ön görülen, çocukların eğitim sürecinde kullanabilecekleri, bilimsel anlamda gelişimlerine katkı sağlamayı amaçlayan Bilim Çocuk dergisindeki metinlerin, sürdürülebilir kalkınma amaçlarını ne ölçüde desteklediğini belirlemektir. Nitel araştırma deseninin kullanıldığı bu çalışmada veriler doküman incelemesi yolu ile toplanmış, elde edilen veriler, yüzde ve frekans ile tablolaştırılarak yorumlanmıştır. Araştırmada kullanılacak dergilerin seçiminde amaçlı örnekleme yöntemlerinden ölçüt örnekleme yöntemiyle belirlenen, 2016-2021 yıllarında yayımlanan 72 sayısı incelenmiştir. Araştırma bulgularına göre Bilim Çocuk dergisindeki metinlerin %92,59'unun bilgilendirici metin türüne, %7,40'nun hikâye edici metin türüne ait olduğu, dergideki metinlerin; on yedi küresel amaç arasından en çok (n=31) "12. Sorumlu Üretim ve Tüketim", en az (n=1) "8. İnsana Yakışır İş ve Ekonomik Büyüme" amacıyla ilişkili olduğu belirlenmiştir. Dergideki metin türlerinde çeşitliliğe yer verilmesi, sürdürülebilir kalkınma amaçları konusunda farkındalık oluşturması ve kişi ile kurumları harekete geçirmesi bağlamında henüz yer verilmeyen diğer amaçlara da yer verilmesi önerilmektedir.

Anahtar kelimeler: Sürdürülebilirlik, sürdürülebilir kalkınma amaçları, çocuk edebiyatı, 21. yüzyıl becerileri.

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