Review of Non-Fiction Science Picture Books for Pre-School Children

Esra Doğanay Koç*

Abstract

Science education in the pre-school period can use different methods and techniques. One such method is the Turkish language practice of non-fiction and fiction science picture books for children. It is thought that non-fiction science picture books are important in terms of developing children's scientific vocabulary. This study aimed to examine non-fiction science picture books for children selected from different publishers. The research was carried out using the document analysis method, a descriptive research model. In the study, data on 59 science-themed picture books selected from different publishing houses were collected through the Picture Story Assessment Scale and the Assessment List for Children's Non-Fiction Science Picture Books developed by the researcher. According to the results of the research evaluating non-fiction science picture books for pre-school children using the Assessment Scale for Children's Picture Books, all the books are at an adequate level; the most narrated non-fiction science picture books are preferred; and the problem-solving process is included in most of the books. The most common scientific content among the standard science fields, is life science, especially environmental and weather events. The number of scientific words used is sufficient and most of the books are suitable for science education. It is thought that the science-themed children's picture books selected according to the evaluation list included in this study will be beneficial in terms of realizing science education effectively. Suggestions are made in light of the research results.

Keywords: Pre-school education, early childhood, science education, children's picture books, non-fiction science picture books for children.

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Okul Öncesi Dönem Çocuklarına Yönelik Yayımlanan Fen Temalı Resimli Çocuk Kitaplarının İncelenmesi

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Öz

Okul öncesi dönemde fen eğitimi farklı yöntem ve teknikler kullanılarak yapılabilmektedir. Bu yöntem ve tekniklerden biri de fen temalı bilgi veren resimli çocuk kitapları ve öyküleştirilmiş fen temalı bilgi veren resimli çocuk kitapları ile yapılan Türkçe dil uygulamalarıdır. Fen temalı resimli çocuk kitaplarının çocukların bilimsel kelime dağarcığını geliştirmesi açısından önemli olduğu düşünülmektedir. Bu araştırmada da bu kapsam çerçevesinden yola çıkarak, farklı yayın evlerinden seçilen fen temalı resimli çocuk kitaplarını incelemek amaçlanmıştır. Araştırma betimsel araştırma modellerinden doküman analiz yöntemi kullanılarak gerçekleştirilmiştir. Araştırmada, farklı yayınevlerinden seçilen 59 fen temalı resimli çocuk kitabına ilişkin veriler "Resimli Öykü Kitaplarını Değerlendirme Ölçeği" ve araştırmacı tarafından geliştirilen "Fen Temalı Resimli Çocuk Kitaplarını Değerlendirme Listesi" aracılığıyla toplanmıştır. Araştırmanın sonuçlarına göre; okul öncesi dönem çocuklarına yönelik fen temalı resimli çocuk kitaplarının "Resimli Öykü Kitaplarını Değerlendirme Ölçeği" kullanılarak yapılan değerlendirmelerde tüm kitapların yeterli düzeyde olduğu, en çok öyküleştirilmiş fen temalı bilgi veren resimli çocuk kitaplarına yer verildiği, problem çözme sürecinin çoğu kitapta yer aldığı, bilimsel içeriğe çoğu kitabın sahip olduğu, fen standart alanlarından en çok yaşam bilimine ve konu olarak ise en çok çevre ve hava olaylarına yer verildiği, bilimsel kelime sayısına yeterli düzeyde yer verildiği ve çoğu kitabın fen eğitimi açısından uygun olduğu görülmüştür. Bu araştırmada yer verilen değerlendirme listesine göre seçilen fen temalı resimli çocuk kitaplarının fen eğitimini etkili bir şekilde gerçekleştirme açısından fayda sağlayacağı düşünülmektedir. Araştırma sonuçları ışığında önerilere yer verilmiştir.

Anahtar Sözcükler: Okul öncesi eğitim, erken çocukluk dönemi, fen eğitimi, resimli çocuk kitabı, fen temalı resimli çocuk kitabı.

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Introduction

The pre-school period encompasses the process in which children turn toward socialization, become socialized, and add new information to existing knowledge through their mental development. In short, it can be said that their vocabulary and conceptual development will be strengthened through various interactions with concrete objects in this period (Alptekin, 2018). The pre-school period is considered important in terms of supporting children in the areas of language, motor, and emotional development, as well as cognitive and social development. For children to acquire all areas of development effectively, it is necessary to introduce them to picture books and to gain a love of books. For this, adults need to know the developmental characteristics of children and recognize appropriate, correct, and qualified books (Demircan, 2006; Gönen & Uyanık Balat, 2002; Ural, 2019, p. 35).

Children are introduced to picture books in which visual elements are at the forefront. These contribute to many fields such as the development of creativity and imagination, development of the child's creativity and imagination, and the development of exploration, questioning, curiosity, and an awareness of writing in the child by becoming accustomed to the book (Alptekin, 2018). Children's picture books for pre-school children are important for future life, and they differ from adult books in many ways. In children's picture books, it is necessary to pay attention to issues such as the use of clear and understandable language, the selection and structuring of the subject, the transfer of social and cultural elements, the appropriateness of the text to the content, and the presence of pictures aimed at children (Bulut & Kuşdemir, 2013). Along with these points to be considered, there are many children's picture books in different genres, one of which is non-fiction science picture books for children.

Children's non-fiction science picture books can bring many things that cannot be done in a classroom environment. Drawings in books can be enlarged so that children can observe a microscopic organism and see it in detail. Rare animals in nature can also be seen in a picture book. Children's picture books can present readers with events that are often invisible even to a careful observer. Explanations accompany the illustrations and the words provide readers with good science content in a structured, easy-to-follow manner. A story allows the reader to follow the life of an animal through the seasons and how it seeks to survive in various weather conditions. In short, a book enables children easily to access events that cannot be observed in the classroom environment and which will take a long time to observe (Pringle & Lamme, 2005).

Two different types of children's non-fiction science picture book present hard-to-reach information to children in a concrete way in the pre-school period. The first of these is non-fiction science picture books. These books aim to give direct information to children and present scientific pictures suited to the information to be given (Günşen, 2021, pp. 146–147). The second is fiction science picture books. In these books, scientific concepts are usually implicit and the concepts are given in a story. For this reason, teachers need to make the concepts clear to children while reading fiction science picture books (Ansberry & Morgan, 2007, pp. 2–6). In the realization of all these situations, science content standards are of great importance, because more systematic learning will be realized with books that are selected and read according to science content standards. Thus, children will be supported to gain the necessary knowledge, skills, and abilities to better understand the world in which they live (Morrison, 2008). However, when the literature examining these two different types of children's non-fiction science picture books was searched, it was seen that there were no comprehensive studies and only two studies were found in terms of basic science concepts (Alptekin, 2018), subjects, and themes (Yılmaz Genç & Özen Uyar, 2016). In addition, when studies on picture books for pre-school children outside the field of science are examined, basic features (Körükçü, 2012), the concepts in the books (Uyanık Balat et al., 2017), content and stylistic features (Bulut & Kuşdemir, 2013; Gönen et al., 2016), some basic values (Çelik & Sezer Arığ, 2022; Dirican & Dağlıoğlu, 2014), psychological resilience (Topçu, 2019), negative elements (Başaran et al., 2021), geographical concepts (Özkan Kılıç et al., 2014), character education (Turan & Ulutaş, 2016), the effect on social problem-solving skills (Atış Akyol & Sunduvaç, 2023), games and toys (Hakkoymaz & Tanju Aslışen, 2022), gender equality (Şahin & Özaydınlı, 2023), and studies examining the suitability of children for their developmental areas (Darga et al., 2021) are observed.

In line with these studies, the basis of this study is an evaluation of children's non-fiction science picture books published for pre-school children and an in-depth examination of their suitability in terms of type, problem-solving status, scientificity, standard science subject areas, subject, number of scientific words, and science education. In light of this scope, the research aims to examine the non-fiction science picture books published for pre-school children.

Method

Research Design

The document analysis method, a descriptive research model, was used in the study to examine the non-fiction science picture books published for pre-school children. Document analysis is a qualitative research method used to analyze the content of written documents rigorously and systematically (Wach & Ward, 2013). Quantitative data were also included in this study.

Study Group

The study sample consisted of pre-school children's non-fiction science picture books published between 2000 and 2010 in Turkey that can be accessed from publishing houses.

Table 1. *Distribution of children's non-fiction science picture books in terms of imprint information*

		f	%
Written and Illustrated	Turkish	8	13.6
	Foreign	51	86.4
	Total	59	100
Published Publisher	Türkiye İş Bankası Kültür Publications	4	6.8
	ABM Publications	8	13.6
	Erdem Çocuk	2	3.4
	Pearson	2	3.4
	Tübitak Publications	33	55.9
	Other	10	16.9
	Total	59	100
Year Published	2012	2	3.4
	2013	2	3.4
	2015	2	3.4
	2017	7	11.9
	2018	11	18.6
	2019	21	35.6
	2020	9	15.3
	2021	5	8.4
	Total	59	100
Number of Edition	1st Edition	37	62.7
	2nd Edition	8	13.6
	3rd Edition	5	8.4
	4th Edition	2	3.4
	5th Edition	1	1.7
	6th Edition	4	6.8
	11th Edition	1	1.7
	29th Edition	1	1.7
	Total	59	100

Research Instruments and Procedures

In the research, the Picture Story Assessment Scale and the Assessment Scale for Children's Picture Books developed by the researcher were used to examine the children's non-fiction science picture books selected from different publishers.

Picture Story Assessment Scale

Picture Story Assessment Scale was developed by Deniz and Gönen (2020) to evaluate children's picture books in terms of illustrations and content features. The scale was developed to use a three-point Likert-type scale consisting of 21 items graded as inadequate (1), partially adequate (2), and adequate (3). The time taken to complete the scale for a book is an average of 25-30 minutes. The lowest score that can be obtained from this Likert scale is 21 points and the highest score is 63 points. In terms of the quality of children's picture books, 21–34 points is considered insufficient, 35–49 points is partially sufficient, and 50–63 points is considered sufficient. A low score on the scale indicates that the quality of the children's picture book is inadequate, while a high score indicates that the quality of the children's picture book is high.

The validity and reliability of the scale were assessed with 200 books selected by random sampling. It was determined that the scale consisted of one dimension and 21 items. It was revealed that the contribution of the scale to the variance was 48.927 percent. Item factor loads ranged from .414 to .869. The item-total correlation coefficients of the items in the scale range from .379 to .832. Of the 200 books selected for the validity and reliability study, 30 were evaluated by a different pre-school education specialist and the rater reliability was calculated. In this study, the Cronbach's alpha coefficient was .94 for the 21 items. In this case, it can be said that the scale is reliable. In addition, the correlation coefficient between the two raters was calculated as .92: it is therefore seen that there was very good agreement between the two raters. As a result of the analysis, data support that the Picture Story Assessment Scale is a valid and reliable tool for determining the quality of children's fiction picture books (Deniz & Gönen, 2020).

Assessment List for Children's Non-Fiction Science Picture Books

An assessment list for children's non-fiction science picture books was prepared by the researcher to examine the children's non-fiction science picture books selected from different publishers. During the development phase of the Assessment List for Children's Non-Fiction Science Picture Books, the criteria to be considered when choosing children's picture books and the relevant literature were examined. In the first stage, the list consisting of ten items was submitted to the opinion of three experts. In the answers given to the questions, the subject and number of scientific words were prepared as short answers, while the other questions were prepared in a format that could be expressed as "yes", "partially", and "no".

Data Collection and Analysis

The data were collected with the Picture Story Assessment Scale developed by Deniz and Gönen (2020) and the Assessment List for Children's Non-Fiction Science Picture Books consisting of seven items developed by the researcher. In this study, both quantitative and qualitative measurement tools were used by using the Evaluation List of Non-Fiction Science Children's Picture Books prepared by the researcher. A content analysis method was utilized in the evaluation of qualitative data. Content analysis is a systematic technique in which certain words in the text are summarized in smaller content categories with coding based on certain rules (Büyüköztürk et al., 2014, s. 240). In this direction, categories were created in the analysis process carried out for the study. The analysis process was completed by creating appropriate codes for the categories created. In line with the suggestions received, three items were removed and the checklist was finalized. For these books to be used effectively in the science education process, the items in the list were created by taking into account the issues considered important in today's pre-school science education. For this reason, the books were examined according to whether they were designed as informative or narrated, whether they included children in the problem-solving process, whether the content of the books was presented by science, in which group they were included in science standards, and whether they included scientific words. In light of all these items, the usability of these books for science education was determined. While some of the items in the checklist were coded according to the answers given, some were coded as three-point Likert-type answers (yes, partially, no). Each item in the evaluation list was determined by the researcher by examining the book's content three times. After all the items in the evaluation list were answered, the opinions of two field experts were obtained together with the book contents. The similarity of all the reviews positively affected the credibility of the research. Finally, the data were expressed descriptively with percentage and frequency distributions.

Results

To determine the suitability of non-fiction science picture books published for pre-school children, an evaluation of picture story books was carried out, and then of science-themed children's picture books. Type, problem-solving status, scientificity, standard science subject areas, subject, number of scientific words, and appropriateness of items in terms of science education were examined. The findings are presented in the tables below.

Table 2. *Assessment of children's picture books*

Assessment of children's picture books	n	%
21–34 score	0	0.0
35–49 score	0	0.0
50–63 score	59	100.0
Total	59	100

When the findings related to the evaluation of children's picture books in Table 2 are examined, it is seen that 100 percent of the books selected from the children's non-fiction science picture books are suitable for pre-school children.

Table 3. *Findings for the genre of children's non-fiction science picture books*

The genre of non-fiction science children's picture books	n	%
Children's fiction science picture books	38	64.4
Children's non-fiction science picture books	21	35.6
Total	59	100

In Table 3, concerning types of science-themed children's picture book, it is observed that children's picture books that give science-themed information were the more common type (64.4%) and narrated children's non-fiction science picture books the less (35.6%).

Table 4. *Findings regarding the inclusion of problem-solving processes in children's non-fiction science picture books*

Cases involving the problem-solving process	n	%
Yes	42	71.2
No	17	28.8
Total	59	100

In Table 4, looking at whether the children's non-fiction science picture books include the problem-solving process, 71.2 percent included the problem-solving process and 28.8 percent did not.

Table 5. *Findings regarding the scientific content of children's non-fiction science picture books*

Scientific content of children's non-fiction science picture books	n	%
Yes	52	88.1
No	7	11.9
Total	59	100

Regarding the scientific content of science children's picture books, Table 5 shows that 88.1 percent included scientific content and 11.9 percent did not.

Table 6. *Findings on standard science fields and topics of children's non-fiction science picture books*

Standard science fields	Subjects	n	%
Life Science	Environment	6	25.0
	Viruses	1	4.17
	Wounds	1	4.17
	Slime	1	4.17
	Animals	3	12.5
	Seed	3	12.5
	Germ	2	8.4
	Compost	1	4.17
	Digestion	1	4.17
	Plants	3	12.5
	Recycling	1	4.17
	Cleaning	1	4.17
	Total	24	100
Earth and Space Science	Water cycle	2	10.5
	Weather events	6	31.6
	Space	4	21.0
	Planets	1	5.3
	Night and day	2	10.5
	Rocks	1	5.3
	Soil	2	10.5
	Stones	1	5.3
	Total	19	100
Physical Science	Electric	1	7.1
	Voice	2	14.8
	Light	1	7.1
	Ascending force	1	7.1
	Technology	1	7.1
	Balance	1	7.1
	Suspension	1	7.1
	Magnet	1	7.1
	Solution	1	7.1
	Rustiness	1	7.1
	Ascending force	1	7.1
	Static	1	7.1
	Inertia	1	7.1
	Total	14	100
Engineering	Design	2	100.0
	Total	2	100

In the question of the inclusion of standard science fields and subjects in children's non-fiction science picture books, Table 6 shows that the field of life science was mostly included, particularly the subjects of the environment (25.0%) and weather events (31.6%).

Table 7. *Findings regarding the scientific vocabulary in children's non-fiction science picture books*

Scientific vocabulary in children's non-fiction science picture books	n	%
Zero to four scientific words	16	27.1
Five to eight scientific words	24	40.7
Nine to twelve scientific words	9	15.2
Thirteen to sixteen scientific words	5	8.5
Seventeen and above scientific words	5	8.5
Total	59	100

Table 7, showing the scientific vocabulary used in children's non-fiction science picture books, reveals that while 40.7 percent used between five and eight scientific words, 27.1 percent used between zero and four, 15.2 percent used nine to twelve, and 8.5 percent used between thirteen and sixteen and seventeen and above.

Table 8. *Findings regarding the suitability of children's non-fiction science picture books for science education*

Suitability of children's non-fiction science picture books for science education	n	%
Suitable	35	59.3
Not suitable	24	40.7
Total	59	100

In Table 8, related to the question of the suitability of children's non-fiction science picture books for science education, it is seen that 59.3 percent were 40.7 percent were not.

Discussion, Conclusion and Recommendations

This study aimed to examine non-fiction science picture books for pre-school children. First of all, the results of all the selected books on the Picture Story Assessment Scale were examined and it was determined that all books were adequate. After it was seen that all the books were adequate, the conclusions related to science education were examined. As a first result, it was observed that sales of children's non-fiction science picture books mostly included narrated books (64.4%, n=38). It is thought that this may be because children are more interested in narrative books in the pre-school period. Ansberry and Morgan (2007) and Günşen and Uyanık (2021) defined narrated non-fiction science picture books for children as children's picture books in which scientific concepts and science events are explained in a language that will attract children's attention and attention by using storytelling. Barone (2011) stated that when presented effectively, children's fiction science picture books will enable children to participate actively in the learning process and to ask questions, and guide them to find answers to their questions. An examination of the literature on this subject shows that parents and teachers mostly read children's fiction science picture books to pre-school children (Clark & Foster, 2005; Price et al., 2009; Robertson & Reese, 2017). When the conclusions obtained from these studies are examined, it is thought that the publishing houses include these kinds of books because parents and teachers prefer non-fiction science picture books for children.

Regarding the situation of children's non-fiction science picture books including the problem-solving process, it was determined that the books mostly included the process (71.2%, n=42). Children's non-fiction science picture books make a great contribution to children's positive attitude toward science, helping them to establish cause-effect relationships, make comparisons, and develop problem-solving skills in the pre-school period (Alptekin, 2018). In light of this information, it is important to ensure that problem-solving is included in the preparation of children's picture books for the pre-school period. While it is observed that this situation is taken into account in most of the books examined, the problem-solving process is not taken into account in some books. However, it is thought that this process, which is important for pre-school children, should be included in all books.

The research also determined that scientific content (88.1% n=52) was mostly included in children's non-fiction science picture books. Children's picture books in the pre-school period are a very good resource for children's development and learning because they learn new information from this source. Thus, by learning new information through books, they are supported to make sense of the world in which they live (Horst & Houston Price, 2015). For this reason, children's non-fiction science picture books should have clear, understandable, and scientific content.

The children's non-fiction science picture books in this study included standard science fields and subjects, and especially life science field. In addition, it was observed that environmental issues (25.0%, n=6) and weather events (31.6% n=6) were particularly common in the content. In the pre-school period, new concepts and subjects are taught through non-fiction science picture books. In another study, it was seen that the children's non-fiction science picture books prepared for pre-school children mostly included the field of life science, and especially concepts related to animals and plants (Alptekin, 2018). In addition, it has been determined in other studies that children's non-fiction science picture books related to the field of physical science are limited in number (Saçkes et al., 2009) and that pre-school teachers think that the field of physical science should be included more frequently (Dağlı, 2014).

The results regarding the number of scientific words in children's non-fiction science picture books determined that five to eight scientific words was the most common (40.7%, n=24). Since the language structures and word variety used in children's picture books are more systematic than everyday spoken language, they have positive effects on pre-school children in terms of improving their vocabulary (Cameron Faulkner & Noble, 2013; Crain Thoreson et al., 2001; Doğanay Koç, 2022; Hayes & Ahrens, 1988; McGee & Schickedanz, 2007; Montag et al., 2015; Okyay & Kandır, 2019; Parsons & Bryant, 2016). For this reason, it is important to have several scientific words that children can learn in non-fiction science picture books. It is seen that five to eight scientific words is a sufficient level. While it can be said that books with fewer scientific words will be inadequate in terms of vocabulary, it is thought that it may be difficult for children to learn new words in books with a higher scientific word count.

In the last finding of the study, it was seen that children's non-fiction science picture books were mostly suitable for science education (59.3% n=35). In other studies, it has been determined that the children's picture books published by Tübitak are suitable for the development of children in terms of theme, subject, and language expression (Bulut & Kuşdemir, 2013; Demircan, 2006). In another study, it was determined that, contrary to these studies, children's picture books have a knowledge level above average in terms of external structure, but they do not have a sufficient knowledge level in terms of content, language, and expression features (Temizkan, 2011).

According to the results of the research, the children's non-fiction science picture books for pre-school evaluated are adequate. Most of the books include a narrator, along with the problem-solving process, and scientific content from standard science fields, especially life science. The environment and weather events are the most popular scientific subjects. The number of scientific words used is adequate, and most of the books are suitable for science education. In the research, the study group was formed by scanning publishing houses that sell children's fiction picture books. For this reason, currently available books were included in the data collection process, but books that were available in libraries and schools but were out of print or in the printing stage were not included. This is a limitation of the research. By considering during the data collection process books that are currently on sale, publishing houses can be made aware of the issues they should pay attention to in the process of preparing science-themed picture books for children. Information can be given to publishers to include both non-fiction science picture books and fiction science picture books for children. It has been observed that the majority of children's non-fiction science picture books are translations. The publication of non-fiction science picture books for children by Turkish authors can also be encouraged. In addition, this research was carried out on non-fiction science picture books for children in the pre-school period. Another limitation of the study is that only the suitability of these books to the field of science education was taken into consideration when selecting these books. In other research, children's picture books belonging to other fields can be examined. Another limitation is that the analyses were conducted according to the evaluation list created by the researcher. In other studies, the scope of this research can be expanded by determining different evaluation criteria. Qualitative studies can be included to measure pre-school teachers' knowledge of non-fiction science picture books for children.

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