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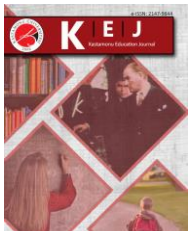

| Research Article / Araştırma Makalesi |

Examining the Reading Comprehension Status of Poor Readers of Turkish Texts and Mathematical Problems

Zayıf Okuyucuların Türkçe Metinleri ve Matematiksel Problemleri Okuduğunu Anlama Durumlarının İncelenmesi

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Keywords
1. Poor reader
2. Reading comprehension
3. Problem solving

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Abstract

Purpose: The purpose of this study is to reveal the poor readers' reading comprehension of texts and mathematical problems.

Design/Methodology/Approach: The exploratory sequential design of the mixed method was used in the study. In order to determine the sample of the study, homogeneous sampling technique was used within the framework of purposive sampling method. The data of the study was collected in two stages; in the first stage, the reading comprehension test and the problem-solving test were applied to the students to identify the poor readers. In the second stage, semi-structured interviews were conducted with poor readers. The data obtained from the interviews were analyzed with a descriptive point of view.

Findings According to the findings of the study, it was determined that poor readers made reading errors by misreading, skipping letter syllable, adding syllable letter, repeating part of the word, and reversing the word. In the reading comprehension process, it was seen that poor readers understood simple comprehension questions better than deep comprehension questions. It has been determined that poor readers have difficulties in all the problem-solving steps of the routine problem-solving process, especially in the steps of understanding the problem and planning. it was seen that poor readers could not write what was given and requested to facilitate the understanding of the problem and could not express the problem in figure. It was concluded that poor readers had more difficulties in solving the initial unknown problems in routine problems, and they could not solve non-routine problems at all.

Highlights: In the light of all these findings, the researchers concluded that increasing the students' reading comprehension would increase their problem-solving success.

Öz

Çalışmanın amacı: Bu araştırmanın amacı zayıf okuyucuların metinleri ve matematiksel problemleri okuduğunu anlama durumlarını ortaya koymaktır.

Materyal ve Yöntem: Araştırmada karma yöntemin açımlayıcı sıralı deseni kullanılmıştır. Çalışmanın örneklemini belirlemek için amaçlı örnekleme yöntemi çerçevesinde homojen (benzeşik) örnekleme tekniğinden yararlanılmıştır. Araştırmanın verileri iki aşamada toplanmış olup birinci aşamada zayıf okuyucuları belirlemek için öğrencilere okuduğunu anlama testi, problem çözme testi uygulanmış bu iki testte de başarısız olan öğrencilere yanlış analiz envanteri uygulanmıştır. Veri toplama işleminin ikinci aşamasında zayıf okuyucularla yarı yapılandırılmış görüşmeler gerçekleştirilmiştir. Yapılan görüşmelerden elde edilen veriler betimleyici bakış açısına göre analiz edilmiştir.

Bulgular: Araştırma bulgularına göre sonucunda zayıf okuyucuların yanlış okuma, harf-hece atlama, harf-hece ekleme, kelimenin bir kısmını tekrarlama ve harfi ters çevirerek okuma hataları yaptıkları tespit edilmiştir. Okuduğunu anlama sürecinde zayıf okuyucuların basit anlama sorularını derinlemesine anlama sorularına göre daha iyi anladığı görülmüştür. Zayıf okuyucuların rutin problem çözme sürecinin özellikle problemi anlama ve plan yapma basamakları başta olmak üzere problem çözme basamaklarının tamamında güçlük yaşadıkları tespit edilmiştir. Zayıf okuyucuların problemin anlaşılmasını kolaylaştırmak için verilen ve istenenleri belirleyemedikleri, problemi şekil/şema ile temsil edemedikleri görülmüştür. Zayıf okuyucuların rutin problemlerde daha çok başlangıç bilinmeyen problemleri çözmekte zorlandıkları, rutin olmayan problemleri ise hiç çözemedikleri sonucuna varılmıştır.

Önemli Vurgular: Tüm bu bulgular ışığında araştırmacılar öğrencilerin okuduklarını anlamalarının arttırılması ile problem çözme başarılarının da artacağı sonucuna varmışlardır.

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INTRODUCTION

Reading skill supports individuals' cognitive, affective, and social development; it is a skill that has a significant impact on their academic achievement. This skill plays a role in the individual's access to information and effective use of the acquired knowledge in his/her life. Reading is a process in which readers analyze the words in the texts by using their appropriate orthographic, phonological, morphological knowledge and skills, then make sense of the analyzed words by associating them with their vocabulary, prior knowledge, and experiences, and then analyze the sentences made up of the words they interpret in terms of their syntactic features and reach the message that is intended to be given in the text. (Güldenoğlu, Kargın, & Miller, 2013). The main purpose of reading is for readers to make sense of the text they read (Akar, Başaran, & Kara, 2016; Akyol, 2010; Block, Gambrell, & Pressley, 2002; Nation, 2005; Pressley, 2006; Topkins, 2010).

Reading comprehension is a holistic meaning-making process that affects not only the outcome of reading but also all elements that affect the reading process (Kenyon, Palikara, & Lucas, 2018). Snyder, Caccamise, and Wise (2005) defined reading comprehension as a complex, multidimensional and dynamic process, the focus of which is constructing and interpreting the meaning of what is read. Reading comprehension is a dynamic and interactive process that brings together information, reader, context and other resources in the text (Radcliffe, 2010). Factors such as individuals' intelligence level, educational status, accuracy of knowledge and concepts, vocabulary, and processing speed of information affect the reading comprehension process (Güleryüz, 2004). Reading comprehension is a process that requires much more than just the reader's reaction after reading the text. The multi-component and highly complex reading comprehension process requires attention to the interaction between the readers and the meanings they attribute to the text (pre-knowledge, etc.) and also to the variables related to the text (type of text, structure of the text, etc.) (Klingner, Vaughn, & Boardman, 2007). In the process of reading comprehension, mental skills such as thinking about a text or a problem, searching for the causes of the problem, obtaining results, interpreting, analyzing, synthesizing, and evaluating are effective (Güneş, 2013). Students who do not have one or more of these skills cannot understand what they read (Çiftçi & Temiztürk, 2008). Since reading, which is related to cognitive skills, is a skill that affects academic success and learning processes, individuals who do not understand what they read are not expected to be successful in their learning lives (Calhoon, 2005). The reading process has two purposes: the student's recognition of the written word and the student's understanding of the spoken word. The word recognition process, which requires using mental capacity, is quite difficult for beginners to read. However, the person performing the word recognition work can direct their attention towards understanding the word. The reading process is difficult and cumbersome for weak readers (Samuels, 2006).

Poor Readers and Their Features

Poor readers may not have the cognitive strategies necessary to understand the text. These readers cannot control their own comprehension processes, cannot use the necessary cognitive strategies, or even if they know the strategy, they cannot know when and how to use it (Gersten, Fuchs, Williams, & Baker, 2001). In this context, poor readers have some characteristic features in reading. These features can be listed as follows: 1. They cannot transfer the knowledge they have acquired beforehand to the reading environment, 2. They cannot benefit from auxiliary strategies (asking a teacher or an adult, using a dictionary, etc.) when they cannot understand them, 3. They cannot distinguish between pleasure and informational readings in terms of purpose and method, 4. They cannot identify inconsistencies in texts, 5. They do not believe in the benefits of reading, 6. They fail in tests, 7. They vocalize words instead of understanding, 8. Their prediction skills are undeveloped or underdeveloped, and 9. They cannot benefit from clues (Akyol, 2018).

When the relevant literature is examined, some studies on poor readers are encountered. For example, Seçkin Yılmaz and Baydık (2017) compared poor readers with normal readers in their study with third grade students. As a result of the study, the researchers determined that poor readers were more unsuccessful in phonological skills than their normally developing peers. Similarly, Demirtaş (2017) in his research with first grade students with reading difficulties concluded that these students have lower performance in rapid automatic naming and phonological awareness skills compared to their normally developing peers. Sarıpınar and Erden (2010) compared first and fifth grade students with reading difficulties with those with normal development in terms of word decoding skills. Accordingly, the researchers found that students with reading difficulties made more mistakes based on phonological knowledge and skills, such as letter-syllable skipping, misreading words, changing positions, substituting letters, adding letter-syllables, in the word decoding process at all grade levels, compared to their peers. Jenkins et al. (2003) compared the reading speed and accuracy of a total of 109 students, 24 with reading difficulties and 85 with normal development. Accordingly, the researchers determined that the reading speed and accuracy of students with reading difficulties were significantly more limited than their normally developing peers due to their low phonological knowledge and skills. Miller and Schwanenflugel (2006) examined third grade students' reading fluency, reading comprehension, and prosodic reading skills. Accordingly, the researchers found that students with reading difficulties had lower levels of fluency in all three areas than their peers with normal development due to their limited word decoding skills. Akyol and Temur (2006), in their study where they determined the reading errors of third grade students, listed the mistakes made by poor readers while reading the texts as self-correction, repetition, addition, reading by dividing the word, and skipping. In such cases, the reader cannot remember what they read, and it is not possible to understand what they read (Gunning, 2000; Therrien, 2004; Uzunkol, 2013; Wong, Graham, Hoskyn, & Berman, 2008)

Many readers with poor reading skills have reading comprehension problems. Because such readers cannot correctly recognize the words in the text; they pay attention to a direction other than the meaning of the words, that is, to vocalizing the words (Salinger, 2003). Applegate, Applegate, and Modla (2009), in their study, in which they evaluated the reading comprehension skills of poor readers according to the types of questions, stated that they had more difficulty in answering the questions that require inference and that the answer is not clearly included in the text, while answering the questions in the text with a clear answer. The findings of Sarıpınar and Erden (2010) are similar. Accordingly, the researchers found that readers with better fluent reading performance also had better reading comprehension skills. Woonacot, Joseph, Adelman, and Nation (2015), in their study with good and poor readers in order to answer questions belonging to complex sentence groups with syntactically different features, found that poor readers achieved lower results in reading comprehension questions than good readers and that they were more frequent than good readers in answering the questions. Kuhn and Stalh (1998) stated that poor readers approach the reading task with a negative attitude, they cannot analyze their reading, and they have problems in understanding parts of the text or the whole text due to their limited vocabulary.

Problem Solving

Problems are tasks and activities for which the solution is not clearly given (Jones, 2012). Reys, Lindquist, Lambdin, and Smith (2009) defined a problem as a situation in which the individual needs a solution, and the solution is not clearly revealed. Problem solving is a way of thinking. In problem solving, solution and answer are two important concepts. Although these concepts seem the same, they are different from each other. While the solution is a process that continues from the first encounter with the problem until the last moment, the answer is the product obtained as a result of the solution (Posamentier & Krulik, 2016). Verbal problem solving includes not only calculating the correct answer to the question, but also understanding and interpreting the problem information, forming mental images of the problem and developing an applicable solution (Bender, 2010; Montague, 2003; Shalev, Auerbach, Manor, & Gross, 2000). Polyo (1957) stated that the problem-solving process consists of the stages of understanding the problem, planning for the solution, implementing the plan, and controlling the solution.

Many researchers consider the ability to understand the problem, which is one of the problem-solving skills, a little more important than other skills (Bayazit & Aksoy, 2014; Canköy & Darbaz, 2010; Gökkurt & Soylu, 2013; Karataş & Güven, 2004; Polya, 1957). According to Peletier-Leculee and Sayac (2004), understanding the problem is divided into 3 types; understanding as it is, holistic understanding, and clear understanding. In understanding as it is, students understand consecutive words and the specific idea in the text. In holistic understanding, students understand the text as a whole and in detail. Clear understanding includes explaining the content of the text. According to this model, it can be said that understanding the problem will find its healthiest form through clear understanding. Understanding the problem for a student is the process of determining what is required of the given in the problem, determining the missing or excess, knowing what kind of information will be obtained from the problem and breaking the problem into parts (Erümit, 2015). People who do not understand the problem cannot use the strategies necessary to solve the problem, cannot solve the problem, cannot explain what they are doing and why; even they do not make an effort to solve the problem (Canköy & Darbaz, 2010). In her study, Tertemiz (1994) stated that students with medium and high level of problem-solving skills have high levels of both four-operation skills and problem understanding, and that students with low success only have a sufficient level of four-operation skills. On the other hand, Gooding (2009) classified the reasons why students have difficulties in verbal problems under five headings as students' inability to read and understand the language used in the problems, not being able to make sense of the given situation / not being able to create it in their mind, not putting the problems into mathematical sentences, not performing the mathematical solution, and not interpreting the answer. Ulu, Tertemiz, and Peker (2016) determined that the reason for mistakes made in non-routine problems is mostly due to reading comprehension. As a result of the studies mentioned above, it is seen that reading comprehension is an important element in order to understand and solve the problem.

The Importance of Study

When the studies with students with reading failure are examined, there are studies examining the reading and reading comprehension skills of poor readers (Alatlı, 2020; Arabacı, 2021; Beşgül, 2015; Çaycı & Demir, 2006; Fırat & Koçak, 2019; Güldenoğlu, Kargın, & Miller, 2012; 2015; Kocaarslan, 2019; Kuruyer & Özsoy, 2015; Seçkin-Yılmaz & Baydık, 2017; Uzunkol, 2013) and studies using various methods to improve poor readers' reading comprehension (Akın, 2020; Çeliktürk-Sezgin & Akyol, 2015; Dağ, 2010; Dündar & Akyol, 2014; Ege, 2019; Ekiz, Erdoğan & Uzuner, 2012; Faulhaber, 2016; İlter, 2018; Güldenoğlu, Kargın & Ergül, 2016; Kodan, 2015; Sedekle, 2010; Therrien & Hughes, 2008; Yılmaz, 2008; Yüksel, 2010) are encountered. However, when the relevant literature is examined, there is not enough study that examines both reading comprehension and problem comprehension of poor readers. In addition, it is seen that the number of qualitative studies that examine the poor readers' inability to understand what they read is not sufficient in the studies conducted. For these reasons, this study examines poor readers' reading comprehension in Turkish texts and mathematical problems.

The Purpose of Study and Research Questions

The purpose of this research is to examine the reading comprehension of texts and mathematical problems of poor readers. In this context, the researchers addressed the following research questions throughout the study.

Elementary school fourth grade weak readers;

1. What are their reading comprehension levels?
2. What are the levels of problem solving?
3. What is the level of error-free reading aloud skills and reading aloud errors?
4. What kind of problems do they encounter in the process of reading comprehension?
5. What kind of problems do they encounter in the problem-solving process?

METHOD

Under this title, the sub-titles of the research model, study group, data collection tools and data analysis are mentioned.

Research Model

Mixed method was used in this study to examine the reading comprehension of texts and mathematical problems of poor readers. According to Onwuegbuzie and Leech (2004), the mixed method is a bridge between qualitative and quantitative research approaches. In other words, mixed method can be explained as a researcher combining the concepts of qualitative and quantitative research approaches (Tashakkori & Teddlie, 1998). The mixed method research approach covers the collection and analysis of quantitative and qualitative data in line with a certain plan (Creswell, 2006). Many researchers have categorized the patterns of the mixed method differently. For example, Creswell and Clark (2014) explained the patterns of the mixed method as proximal parallel design, exploratory sequential design, discovering sequential design, nested mixed design, transformative design, and multi-stage design. In this study, firstly, quantitative data was obtained. Afterwards, qualitative data was obtained to examine the obtained quantitative data in depth. In this study, the explanatory sequential design of the mixed method was prepared appropriately since it collected and interpreted the quantitative and qualitative data respectively. The explanatory pattern is performed in two steps. Accordingly, firstly, the data is obtained and analyzed with a quantitative research approach. Afterwards, the collected qualitative data are analyzed in order to explain and analyze the findings related to the quantitative data in more detail (Fraenkel, Wallen, & Hyun, 2012).

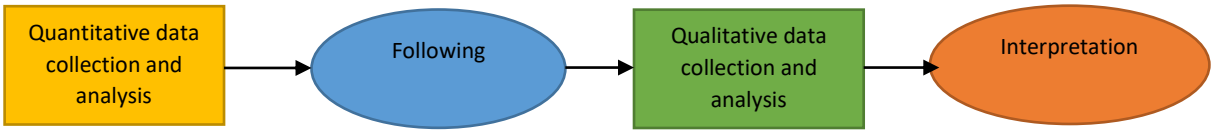

Figure 1. Visual expression of the explanatory sequence pattern (Creswell and Clark, 2014;77)

Study Group

Purposeful sampling method was used in this study. Purposeful sampling method is a sampling method created with people who have some predetermined features. The main aim of purposeful sampling method is to reach individuals with characteristics related to research (Erkuş, 2013). This study was carried out with 3 students who were determined by the homogeneous (similar) sampling technique within the framework of the purposeful sampling method. In the homogeneous sampling technique, a homogeneous and small group of participants and individuals in similar conditions are examined and investigated in detail (Christensen, Johnson, & Turner, 2015).

This study was carried out with 4th grade students in a public primary school in the central district of Amasya province in the 2021-2022 academic year. In order to identify poor readers, 4th grade teachers were interviewed and they were asked to identify students who had problems in reading comprehension and problem solving compared to their peers. Reading comprehension achievement test and problem-solving achievement test were applied respectively to 12 students whose teachers were determined. False Analysis Inventory was applied to students who failed both reading comprehension and problem-solving achievement tests. According to the results of the False Analysis Inventory, three students who were at the level of anxiety were included in the study. When these students have been selected the researchers have considered some criteria. These are they did not have any intellectual disabilities, were not foreign nationals, and had no learning difficulties. The names of the students were hidden due to ethical rules. By doing so, the participant students were coded as S1, S2, and S3. The characteristics of the participants are given in Table 1.

Table 1. The characteristics of the participants

S1	The economic level of his/her family is low. His/Her mother is a housewife and father works in a minimum wage job. The family has come to the stage of divorce, but last year the family reunited. The student is an only child. Even though the student has no physical or mental problems, he/she has difficulty in reading and reads by spelling. He/She has trouble paying attention to the lesson. Since he/she is not successful in reading, he/she has problems in all lessons, especially in mathematics. Four operation skills are weak.

S2	The economic level of his/her family is low. His/Her mother is a housewife and father works in a minimum wage job. The family has just moved from the village to the city. The student has two more siblings besides himself/herself. Even though the student has no physical or mental problems, he/she has problems in reading. He/She is slow to read compared to his/her peers. Since he/she is not successful in reading, he/she has problems in all lessons, especially in mathematics. He/She gained four operating skills. It easily solves simple problems.
S3	The economic level of his/her family is low. His/Her mother is a housewife and father works in a minimum wage job. The family has just moved from another city. The student has three other siblings besides himself/herself. Even though the student has no physical or mental problems, he/she has problems in reading. His/Her reading is slow compared to his/her peers and he/she reads by spelling. Since he/she is not successful in reading, he/she has problems in all lessons, especially in mathematics. The four operation skills are weak. He/She has difficulty solving problems.

Data Collection Tools

The data of this study has been collected by "Reading Comprehension Achievement Test" developed by Kocaarslan (2015), "Problem Solving Achievement Test" developed by Yılmaz (2019), "False Analysis Inventory" developed by Ekwall and Shanker (1988) and adapted into Turkish by Akyol (2010), and a semi-structured interview form.

Quantitative Data Collection Tools of the Study (Phase 1)

1. Reading Comprehension Test

The Reading Comprehension Test (RCT), developed by Kocaarslan (2015), was prepared to determine students' reading comprehension skills for narrative and informative texts. When the literature is examined, it is seen that poor readers have difficulties in understanding what they read in informative texts (Baydik & Seçkin, 2012). For this reason, only the part of the RCT for the narrative text was used in the study. In the narrative text part of the RCT, there are 10 questions about the text called "Goodness" and simple and deep understanding of the text. It was determined that the Content Validity Ratio (CVR) value of the items for the narrative text of the RCT varied between 0.75 and 1.00 and the Content Validity Index (CVI) was 0.95. The scoring key developed by Akyol (2010) was used to convert the answers into standard scores. The scoring key developed by Akyol (2010) is given in Table 2.

Table 2. Scoring key

Scoring System for Simple Comprehension Questions	Scoring System for Deep Comprehension Questions
0= Never Answered Questions	0= Never Answered Questions
1= Half Answered Questions	1= Half Answered Questions
2= Fully Answered Questions	2= Expected but Missing Answers
	3= Complete and Effective Answers

2. Problem Solving Achievement Test

The Problem Solving Achievement Test (PSAT) developed by Yılmaz (2019) was prepared to determine students' problem solving success. In the Problem Solving Achievement Test, there are 20 problems suitable for addition, subtraction, multiplication, and division gains. The distribution of the items in the Problem Solving Achievement Test according to the gains is given in Table 3.

Table 3. The distribution of the items in the problem achievement test by acquisitions

Acquisitions	Items
1. Solves problems that require addition with natural numbers.	1,2,3,4,5
2. Solves problems that require addition and subtraction with natural numbers.	6,7,8,9,10
3. Solves problems that require multiplication with natural numbers.	11,12,13,14,15
4. Solves problems that require at least one division operation with natural numbers.	16,17,18,19,20

In order to develop PSAT, 110 students from the 5th grade and 100 students from the 6th grade were applied. The collected data was analyzed by using the Test Analysis Program (TAP). As a result of the analysis, the reliability coefficient KR20 of PSAT was calculated as 0.909. As a result of the analyzes, it was determined that the item difficulty level and item discrimination indexes of PSAT were at an acceptable level. It was statistically understood that the item analysis PSAT was reliable (KR20-=0.909); thus, PSAT is ready for actual application.

3. False Analysis Inventory

In order to determine poor readers in the study, False Analysis Inventory was used to collect data on students' text reading errors, word recognition, sound awareness, and reading aloud performances. In this study, the False Analysis Inventory developed by Ekwall and Shanker (1988) and adapted into Turkish by Akyol (2010) was used. In order to determine the students' reading aloud performances, a 90-word part of a narrative text (The Miller and the Owl) and an informative text (What's Bigger Than a Blue Whale?) were read aloud to the students once. The researchers recorded the reading time of the students. The words that the students misread, skipped, added, repeated, and reversed during reading were marked on the text and notes were taken regarding their reading levels. According to the False Analysis Inventory, reading levels are evaluated under three headings as free level, teaching level and anxiety level. These titles are given below:

1. Free Level: It refers to the child's reading and understanding of materials suitable for his/her level without the need for the help of a teacher or another adult.

2. Instructional Level: It refers to the child's ability to read and understand as desired with the support of a teacher or an adult.

3. Anxiety Level: It determines the level at which the child understands very little of what he/she reads and/or makes many reading mistakes (Akyol, 2010).

In the study, students who performed at the free reading level were evaluated as good, while those who performed at the anxiety level were evaluated as poor readers. Since the aim of this study is to examine the poor readers' reading comprehension and mathematical problem reading comprehension, only the results of poor readers were included in the study.

Qualitative Data Collection Tools of the Study (Phase 2)

A semi-structured interview form was used as a qualitative data collection tool in order to explain the findings obtained from the quantitative data in more depth. The purpose of the interviews is to learn the judgments, individual perspectives and experiences of the individuals interviewed (Patton, 2014). Interviews are expressed in three types as structured, unstructured and semi-structured interviews according to the purpose of the research (Berg & Lune, 2015). In semi-structured interviews, some questions are prepared in advance and some questions are shaped according to what the participants say during the interview (Patton, 2010). In this interview technique, there are some advantages such as examining the opinions of the participants about the research topic in depth, asking (additional) questions at the end if necessary, and allowing the participants to express their answers with their own experiences (Bogdan & Biklen, 2007; Marshall & Rosman, 1999).

In the first of these forms, there are 7 problems which are two result unknowns (eg, 3+2=?), two changing unknowns (eg,3+?=5), two initial unknowns (eg, ? + 2=5), and a non-routine problem. Polyo's problem solving steps (understanding, planning for the solution, applying and controlling the solution) were used to determine at what stage these students had difficulty in understanding the problem. Face-to-face interviews were conducted with these students one by one to determine the reasons for their comprehension problems for each problem. As the second form, the Sand Lily text, which received expert opinion, was chosen in order to determine the reading comprehension status of poor readers. A total of eight questions were prepared for five basic understandings and three deep understandings of this text. After the students filled out the form, face-to-face interviews were conducted one by one to determine the reasons for not understanding each reading comprehension question. Each interview at school lasted approximately 15 to 25 minutes. During the interview, the researchers paid attention to make the students feel comfortable. The interviews were recorded with voice recorders with the permission of the participants. The recorded data was written in a computer environment and made suitable for analysis.

Data Analysis

The quantitative data obtained was analyzed using the statistical package program. After taking the necessary expert opinions, the prepared interview forms were applied to two participants, and the clarity of the questions was checked, and their final form was given. The interviews were held at the place (school, cafeteria, etc.) and time determined by taking into account the wishes of the participants. Each interview lasted between 15 and 25 minutes. With the permission of the participants, the duration of the interview was recorded with a voice recorder. The words of the participants whose voice was recorded were transferred to a Word document and converted into written text. The written data was numbered and sorted. The raw data obtained was analyzed from a descriptive point of view. In the analysis of the collected data, the researchers resorted to the descriptive analysis technique, as it gives the opportunity to summarize and interpret according to the previously determined themes (Yıldırım & Şimşek, 2011).

FINDINGS

The collected data was handled in two stages. Accordingly, under the title of "Stage 1", the participants' reading comprehension levels, mathematical problem-solving levels, poor readers' reading levels and reading errors are included. Under the heading "Stage 2", the weak readers (three students with low scores) were first read the Sand Lily text; afterwards, the students were asked questions about the text. In addition, these students were asked routine and non-routine problems in order to identify the problems they experienced during the problem-solving process. In order to better understand both the

reading comprehension process and the problem-solving process, the findings obtained from the semi-structured interview with poor readers are included.

Stage 1

The first research question of the study is "What are the reading comprehension levels of poor fourth grade elementary school readers?". In this context, a reading comprehension test was applied to determine the reading comprehension levels of poor readers. The findings regarding the reading comprehension levels of poor readers are given in Table 4.

Table 4. Findings regarding the reading comprehension levels of the participants

Participant	Score	Participant	Score
P1	18	P7	13
P2	18	P8	12
P3	17	P9	9
P4	17	P10	8
P5	16	P11	6
P6	14	P12	6
Minimum and maximum possible points: 0-20			

When Table 4 is examined, it is seen that the scores of the students in the reading comprehension achievement test are at least 6 and the highest is 18.

The second research question of the study is "What are the problem-solving levels of the poor fourth grade readers in elementary school?". In this context, a problem-solving achievement test was applied to determine the reading comprehension levels of poor readers. The findings regarding the problem-solving levels of poor readers are given in Table 5.

Table 5. Findings regarding the problem-solving levels of the participants

Participant	Score	Participant	Score
P1	12	P7	8
P2	12	P8	7
P3	11	P9	6
P4	10	P10	6
P5	9	P11	3
P6	9	P12	3
Minimum and maximum possible points: 0-20			

When Table 5 is examined, it is seen that the scores of the students in the problem-solving achievement test are at least 3 and the highest is 12.

Among the students participating in the study, four students who scored below 50% in both reading comprehension and problem-solving achievement tests were determined, but one student could not participate in the interviews due to his/her illness and his/her reading level could not be determined. As a result, three students with low reading comprehension and problem-solving scores were coded as S1, S2, and S3. The results of the False Analysis Inventory belonging to these students are given below.

The third research question of the study is "What are the level of correct reading aloud skills and reading aloud errors of poor readers in the fourth grade of elementary school?". In order to determine the reading aloud skill level of poor readers, an informative and a narrative text were read to the students. Subsequently, the False Analysis Inventory was used to determine the reading skill levels and reading aloud errors of poor readers. The findings regarding the reading levels of poor readers are given in Table 6 and the findings regarding reading errors of poor readers are given in Table 7.

Table 6. Findings regarding the reading levels of poor readers

Text	Student	Level of Text	Word Count of the Text	Reading Time	Number of Words Read Per Minute	Number of Errors	Word Recognition Percentage
Narrative	S1	4. grade	349	2 min 55	28	31	%65.5
	S2			2 min 10	37	30	%66.7
	S3			3 min 30	33	36	%60
Informative	S1		311	3 min 30	24	36	%60
	S2			2 min 30	30	33	%63.4
	S3			3 min 50	31	39	%56.7

When Table 6 is examined, it was seen that S1, S2, and S3 were at the anxiety level as a result of reading-diagnosis studies. S1's reading speed for the given part of the text was 2 minutes 55 seconds for the narrative text and 3 minutes 30 seconds for the informative text, the number of words he/she reads per minute was 28 for the narrative text and 24 for the informative text, the number of errors was 31 for the narrative text and 36 for the informative text. It is seen that the percentage of word recognition is 65.5% for narrative text and 60% for informative text. S2's reading speed for the given part of the text was 2

minutes 10 seconds for the narrative text and 2 minutes 30 seconds for the informative text, the number of words he/she reads per minute was 37 for the narrative text and 30 for the informative text, the number of errors was 30 for the narrative text and 33 for the informative text. It is seen that the percentage of word recognition is 66.7% for narrative text and 63.4% for informative text. S3's reading speed for the given part of the text was 2 minutes 30 seconds for the narrative text and 2 minutes 40 seconds for the informative text, the number of words he/she reads per minute was 33 for the narrative text and 31 for the informative text, the number of errors was 36 for the narrative text and 39 for the informative text. It is seen that the percentage of word recognition is 60% for the narrative text and 56.7% for the informative text.

Table 7. Poor readers' reading errors

Text	Student	Misreading	Skipping	Adding	Repeating	Reversing	Total
Narrative	S1	16	7	8			31
	S2	14	12	2			30
	S3	12	8	6	6	4	36
Informative	S1	12	8	10	6		36
	S2	16	11	6			33
	S3	14	10	9	4	2	39

When Table 7 is examined, it is seen that poor readers make mistakes in skipping, adding, repeating, and reversing, respectively. It is seen that S1 made a total of 31 errors in the 90-word part of the narrative text, including 16 misreading errors, 7 skipping and 8 adding. It is understood that S1 made a total of 36 errors in the 90-word part of the informative text, including 12 misreading, 8 skipping, 10 adding, and 6 repeating. It is seen that S2 made a total of 30 errors in the 90-word part of the narrative text, including 14 misreading errors, 12 skipping and 2 adding. It is understood that S2 made a total of 33 errors in the 90-word part of the informative text, including 16 misreading, 11 skipping and 6 adding. It is seen that S3 made a total of 36 errors in the 90-word part of the narrative text, including 12 misreading errors, 8 skipping, 6 adding, 6 repeating, and 4 reversing. It is understood that T3 made a total of 39 errors in the 90-word part of the informative text, including 14 misreading, 10 skipping, 9 adding, 4 repeating, and 2 reversing.

When the students' False Analysis Inventory results are examined, it is seen that all three students are at the level of anxiety. In the second stage of the study, semi-structured interviews were conducted with three students who were determined as poor readers.

3.2. Stage 2

The fourth research question of the study is “What kind of problems do poor fourth-grade readers encounter in the process of reading comprehension?”. In order to determine the problems experienced by the students in the reading comprehension process; the researchers have wanted students to read The Sand Lily text, asked them five simple comprehension questions (Q1, Q2, Q3, Q4, and Q5) and three deep comprehension questions (Q6, Q7, and Q8). The findings regarding the reading comprehension status of poor readers are given in Table 8.

Table 8. Findings regarding the reading comprehension of poor readers

Poor Reader	Simple Comprehension Questions	Deep Comprehension Questions	Percentage
S1	5/3	3/0	%37.5 -Anxiety
S2	5/4	3/1	%62.5-Anxiety
S3	5/2	3/0	%25-Anxiety

When Table 8 is examined, it is seen that weak readers could not answer the in-depth comprehension questions, or they answered very little. In this context, it is seen that S1's reading comprehension percentage is 37.5%, S2's reading comprehension level is 62.5%, and S3's reading comprehension percentage is 25%.

When the answer sheets of the students in the study were examined in detail, it was seen that S1 answered the questions of what, when, and why by finding the answers from the text. However, it was determined that the student did not answer the question of how, did not establish a cause-effect relationship, could not determine the main idea, and could not produce possible solutions. In the interviews with S1, the student stated that questions based on simple comprehension were easy, while questions on in-depth comprehension were difficult. In addition, the student said that he/she was sure that he/she had solved the questions based on simple comprehension correctly, since he/she looked at his/her answer from the text. However, when the relevant document was examined, it was seen that the student did not correctly solve all of the questions based on simple comprehension. In addition, S1 said that he/she knew that the answers he/she gave to the in-depth comprehension questions were not correct or sufficient, but nothing came to his/her mind. When asked why no answer was given to the question of determining the main idea in the interviews with S1, he/she stated that he/she did not know the meaning of the word main idea and did not know how to write the main idea.

When the answer sheet of S2 was examined, it was seen that S2 answered 4 of the simple comprehension questions and gave an incomplete answer to one of them. It was observed that the student correctly answered only the main idea determination question, which is one of the deep comprehension questions. In the interviews with S2, the student stated that

questions based on simple comprehension were easy, while questions on in-depth comprehension were difficult. In addition, S2 said that he/she found the answer to the simple comprehension question when he/she reads the text a few times and understood it better when he/she reads it again. One of the in-depth comprehension questions of S2 was “What would you like to do to protect endangered animals?”. He stated that he has difficulties to answer this question; there are many things that need to be done, but there is nothing come to his/her mind.

When the answer sheet of S3 was examined, it was seen that S3 did not answer most of the simple comprehension questions and none of the in-depth comprehension questions. In the interviews with S3, the student said that simple comprehension questions were easy and answered them correctly. However, the researchers have warned him/her by saying, “Are you sure?”. When S3 checked the correctness of the answers he/she gave, he/she noticed that he got it wrong. When S3 was asked why he answered the questions incorrectly, S3 replied that he/she either misread or could not understand this question.

In addition, the last research question of the study is "What kind of problems do the poor elementary school fourth grade readers encounter in the problem-solving process?". In order to determine the problems experienced by the students in the problem-solving process, the researchers have asked them in total 7 problems which are two result unknowns (P1 and P2), two changing unknowns (P3 and P4), two initial unknowns (P5 and P6), and a non-routine problem (P7). The findings regarding the problems faced by poor readers in the problem-solving process are given in Table 9.

Table 9. Findings regarding the problems poor readers encounter in the problem-solving process

Problems	Unanswered Problems	Understanding the Problem		Planning	Implementing the Plan	Evaluation
		Not understanding	Poor understanding			
P1				S1, S3	S2	
P2		S3		S1	S2	
P3		S1, S2, S3				
P4		S3	S1		S2	
P5	S1, S2, S3					
P6	S1, S2, S3					
P7	S1, S2, S3					

When Table 9 is examined, it is seen that poor readers have problems in the comprehension and planning stages. When the answer sheets of the students in the study were examined in detail, it was determined that the students who had problems in understanding the problem had difficulties in determining what was given and what was requested, and in showing the problem with a figure. It was seen that S1 understood the first problem, made a solution plan, but did not do the division while solving the problem. In the interviews with the student, the student stated that he had difficulties in multiplication and division operations. It was seen that S2 understood the first problem, made the solution plan of the problem, applied it and was able to show the problem in a figure. However, it was determined that he/she did not check the correctness of the answer. When the researchers asked S2 why he/she did not check the accuracy of the result, he/she stated that he/she did not know how to do it. It was observed that S3 understood the first problem and made a solution plan but did not do the division while solving the problem. It was determined that S1 and S3 students had problems with the four operations, especially multiplication and division, and they could not show the problems with figures. It was seen that S1 understood the second problem, made a solution plan, but did not do the division while solving the problem. It was seen that S2 understood the second problem, made the solution plan of the problem, and applied it. In addition, it was seen that S2 was able to write what was given and what was requested, and to express the problem with a figure. It was seen that S3 did not do it correctly because he did not understand the second problem. It was seen that all students did not understand the third problem, and they did not write what was given and requested correctly. It was observed that S1 misunderstood the fourth problem, did the first operation correctly, and made a wrong decision about the other operations that he/she should have done. It was seen that S2 understood the fourth problem, made the solution plan of the problem, and applied it. It was observed that S2 could write what was given and what was requested but could not express the problem in a figure. It was observed that S3 did not understand the fourth problem at all. It was observed that poor readers could not answer the initial unknown and non-routine problems while answering the result unknown and changing unknown routine problems. When the researchers asked the students why they did not answer these questions in the interviews; the students stated that they did not understand the questions and that the questions were difficult. In addition, it was observed that poor readers could not perform the problem evaluation step.

The researchers asked S1 the reason why he/she did wrong the cause-and-effect question, which is one of the questions he/she got wrong in the reading comprehension process. S1 stated that he/she did not understand the question. In addition, the researchers asked S2 why he/she could not solve the non-routine problem in the problem-solving process. S2 stated that he/she did not understand the problem. In addition to the above, the researchers asked S3 the reason why he/she did not answer the cause-and-effect question wrong. S3 stated that he/she misread the question. Similarly, the researchers asked S1 why he/she answered the changing unknown problem incorrectly. S1 said that he/she misread the problem. As can be seen from these examples, the poor readers stated that they mostly did not understand or misread the questions they answered incorrectly in both reading comprehension and problem-solving processes. In addition, when the answer sheets of these students were

examined in detail, it was seen that they could not answer both in-depth comprehension questions (S6, S7, and S8) and high-level problems (P5, P6, and P7).

In addition to the above findings, the researchers witnessed that students read the text more than once to find answers to simple comprehension questions. Among the students, it was found that S1 took out the words at once, but his/her reading speed was not enough, S2's reading speed was not enough, and S3 read by spelling and his/her reading speed was very slow. In addition, it was understood that none of these students, who are poor readers, could read fluently. Finally, it was seen that while they were trying to read the text, they got away from the questions that they needed to find answers to.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This study aimed to examine the poor readers' reading comprehension and mathematical problems understanding. For this aim, the researchers applied "Reading Comprehension Achievement Test", "Problem Solving Achievement Test", and "False Analysis Inventory". As a result of these applications, three students whose reading comprehension and problem-solving scores were low and reading aloud level were at the anxiety level according to the False Analysis Inventory were determined. After that, the researchers conducted semi-structured interviews with these poor reader students.

In line with the findings, the researchers figured out that the poor readers participating in the study made some mistakes such as misreading the word, skipping letter-syllable, adding letter-syllable, repeating part of the word and reading the letter by reversing. Similarly, Seçkin-Yılmaz and Baydık (2017) examined the reading fluency of students with and without low reading performance. When they made the error analyses, they found that the students of the group with low reading performance made mistakes such as misreading the word, repeating part of the word, self-correcting, skipping letter-syllable, adding letter-syllable, changing letter, changing position, and reading by reversing the letter. In a study conducted by Sedekle (2010) to solve the reading and comprehension difficulties of primary school fourth grade students, it was stated that primary school fourth grade students often make mistakes in reading aloud, not pronouncing the word correctly, reading by skipping syllables, missing letters in the word, spelling and adding letters. Similarly, Yılmaz (2008) stated that eighth grade students made a total of three reading errors: skipping, adding, and misreading.

In the current study, the researchers came to know that poor readers understood simple comprehension questions better than deep comprehension questions in the reading comprehension process. In addition, the researchers ascertained poor readers were not able to answer high-level questions that require inference, especially in the process of reading comprehension and problem solving. Similarly, Ataş (2021) concluded that while poor readers can achieve superficial interpretation, they cannot achieve the desired level of in-depth interpretation. In addition, it was stated in the research that poor readers lag behind good readers in complex thinking and analysis. Kudret and Baydik (2016) stated that students with reading failure performed lower than their peers in answering all kinds of questions and main idea questions. In addition, the researchers concluded that the most challenging questions of successful and unsuccessful students in reading are those that require making inferences using the main idea and prior knowledge.

The researchers determined that poor readers have problems in all steps of the routine problem-solving process, especially in understanding the problem and planning. Similarly, Sezgin-Memnun and İlksen-Kanbur (2020) concluded in their research that students with low reading comprehension levels have problems in all steps of problem solving, while students with high reading comprehension level are successful in problem solving steps, but they have problems in problem evaluation and problem posing phases. In addition, it was stated in the study that students with low reading skills mostly had difficulties in understanding the problem. Sezgin-Memnun (2014) stated that fifth and sixth grade students generally have inadequacies and mistakes in understanding the problem and planning for the solution in the process of solving verbal problems. Taşpınar-Şener and Bulut (2015) concluded in their research that students who cannot solve problems have issues in choosing appropriate strategies and applying strategies. In addition, the researchers assumed that the students had difficulties in understanding the problem of non-routine problems. Umurbek (2020) stated that when students perform critical behaviors at the stage of understanding the problem in the process of solving verbal problems, they do not have any problems in planning and implementing the plan, and they terminate the problem-solving process before completing the control stage. Göktürk, Örnek, Hayat, and Soylu (2015) found that students showed the highest performance at the stages of understanding the problem, preparing the plan, and implementing the plan, while they showed the lowest performance at the evaluation stage. Similarly, Deringöl (2006) stated that students showed the highest performance at the problem understanding level and the lowest performance at the evaluation level.

The researchers concluded that poor readers could not write what was given and requested in order to facilitate the understanding of the problem and could not express the problem in figure. Sezgin-Memnun and İlksen-Kanbur (2020) found that students with low reading comprehension skills had difficulty in writing the problem in their own sentences and deciding whether missing or excess information in the problem is necessary for the problem. In addition, the researchers noticed that poor reader students had problems in the problem-solving process because they could not identify what was given and what was requested, and they generally wrote the same problem. Similarly, Sezgin-Memnun (2014) infered that secondary school students were unable to show many verbal problems in the figure necessary to understand them. The researcher also determined that the students could not write what was given and requested in order to make the problem easier to understand.

Finally, in the related study, the researchers concluded that poor readers have difficulty solving routine problems, and they cannot solve initial unknown problems and non-routine problems at all. This result is consistent with the findings of Soylu and Soylu (2006). They concluded that primary school students did not have difficulty in doing exercises on addition-subtraction-multiplication operations, but they had difficulty in solving problems that require using conceptual and procedural knowledge. Besides, Çelik and Güler (2013) found that 6th grade students' success in solving non-routine problems was lower than their success in solving routine problems. Likewise, Dinç-Artut and Tarım (2006) concluded that secondary school students were not successful in non-routine verbal problems. Ulu, Tertemiz, and Peker (2016) stated that the rate of correct answers to non-routine problems of 5th grade students varies between 37.9% (177) and 9.3% (43) and the rate of correct answers to the overall test is 25.07% (1405). This result shows that most of the students cannot solve non-routine problems correctly.

Poor readers stated that they mostly did not understand or misread the questions they answered incorrectly in both reading comprehension and problem-solving processes. Based on this finding, when poor readers' reading comprehension and problems comprehension are evaluated, it can be shown that students misread the questions and cannot understand the questions as the reason for their incorrect answers. In support of this, Olkun et al. (2009) found that students misinterpreted what they read as the reason for their incorrect answers to the problem. The researchers also stated that students made mistakes in interpretation because they did not understand the problem.

Based on the findings of the research, the researchers offered some suggestions. These are

- Teachers should be informed about the methods and techniques to be used to detect weak readers at an early age and to eliminate these situations,
- More research can be conducted to overcome the difficulties of students who have difficulties in reading and reading comprehension,
- Critical interviews can be conducted to delve deeper into the comprehension problems of poor readers, and
- In order to improve the comprehension skills of weak reader students, these students can be exposed to more comprehension-based activities.

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We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Examples of author contribution statements

Mine Bayar planned the study, collected and analyzed the data, and reported it.

Neşe Işık Tertemiz, as her advisor, helped, encouraged, and gave feedback to Mine Bayar at each stage of the study.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

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This research was conducted with the "Ethics Committee Permission" of Gazi University Ethics Committee, dated 27/12/2021 and numbered E.247486.

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