

# Teaching money recognition and handling skills to a student at risk of dyscalculia: An action research\*

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## Abstract

The study aimed to teach money recognition and handling skills to a second-grade primary student at risk for dyscalculia. In line with this purpose, the problem of the study was defined as 'how to teach money recognition and handling skills to a second-grade primary student at risk of dyscalculia'. Action research, one of the qualitative research designs, was used in the study. The research was conducted with a second-grade student in a primary school in the Iskenderun district of Hatay who was suspected of having dyscalculia. The participants in the research were determined using the appropriate sampling method. The data collection tools for the research consist of a mathematics achievement test, observation notes, and records used during the action plan implementation. The data obtained were analysed using the descriptive analysis technique. A pre-test prepared by the researcher measured the student's level of knowledge about coins. The student achieved 20% success in the pre-test. The teaching process was carried out within the action plan framework prepared based on the pre-test. The teaching was carried out for 5 weeks. The teaching process was supported by concrete materials, worksheets, and Web 2.0 tools. The student achieved great success (at least %60%) in the post-test applied at the end of the process. This action research suggests that with appropriate support and interventions, students with dyscalculia can improve basic money management skills. Future research could investigate the long-term effects of these interventions and their applicability to a broader group of students with learning difficulties.

**Keywords:** Action Research, Dyscalculia, Mathematics, Money Recognition, Primary School.

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## INTRODUCTION

Learning disabilities are defined as a condition that occurs due to the interaction of hereditary and environmental factors in the ability to process verbal and nonverbal information, which refers to the difficulties experienced by individuals in their academic skills and is generally associated with neurodevelopmental disorders (Aksoy, 2019). Learning disabilities negatively affect the learning and application of literacy and numeracy skills for at least six months. Individuals with learning disabilities may perform significantly lower than their peers in reading, writing, and mathematics despite having standard or superior intelligence (Topal, 2024). Children with learning disabilities struggle to perform mathematical operations, counting, and problem solving skills, especially at the primary school level (Ekinci et al., 2022; Gülhan, 2023).

Since dyscalculia leads students to face significant challenges in daily living and independent living skills, effective math instruction is essential for developing these abilities. This study aims to enhance students' self-efficacy, self-confidence, and mathematical skills by offering individualized, dyscalculia-specific instructional strategies supported by concrete materials. The potential to create a model applicable to students from various economic and cultural backgrounds reinforces the study's rationale. It is crucial to consider individual differences when educating individuals with learning disabilities. Instructional interventions have proven effective in boosting students' academic achievement (Balıkçı & Görgün, 2021; Filiz, 2021). Furthermore, the role of families in this process is significant; their support can positively impact children's learning experiences (Temur & Korkmaz, 2021). Special education programs and support services tailored to the needs of individuals with learning disabilities are essential for fostering these students' academic and social development (Nas et al., 2022; Sarı & Biçer, 2020).

Learning disabilities have negative effects on social and academic life. Low self-esteem, anxiety, school phobia, and inappropriate behavior leading to exclusion from peers can negatively affect an individual's social life; this situation can be further complicated by concurrent psychiatric problems (Koç Büyükacaroğlu, 2019). Learning disabilities can be classified into three different types according to the areas they affect: reading disability (dyslexia), written expression disability (dysgraphia), and mathematical learning disability (dyscalculia) (Görgün & Melekoğlu, 2019). Dyslexia is a learning disability in which an individual's ability to read and write is impaired and is usually of neurological origin (Salman et al., 2016). Dysgraphia is a difficulty in writing and is usually recognized at the beginning of the literacy process. This difficulty can manifest with symptoms such as illegible handwriting, writing letters and numbers upside down, not writing some sounds, using capital letters randomly in words, punctuation errors, and not leaving spaces between words (Başar & Alkan, 2020).

Dyscalculia is a learning disability that affects an individual's ability to learn and apply mathematical operations. This leads to difficulty understanding numbers, calculating, and grasping mathematical concepts. Dyscalculia can occur regardless of intelligence level. Examples of dyscalculia include difficulties with mathematical symbols, steps in the process, using and understanding intuition about problems and tasks, and remembering abstract concepts and formulas (Sezgin, 2023). Common characteristics of dyscalculic individuals can be listed as follows:

- Miscalculations due to poor memory,
- Difficulty demonstrating the steps and operations used in math problems,
- Making mistakes due to carelessness,
- Constant use of ten fingers in transactions,
- Inability to understand and remember general math concepts,
- Poor mathematical memory,
- Difficulty understanding daily life problems,
- Failure to demonstrate functional academic skills such as calculating change, telling time, and finding place and direction (Akin & Sezer, 2010).

Functional academic skills are basic skills such as literacy, language, and mathematics that individuals can use in their daily lives, at home, at work, and in society. Mathematics is an important skill that facilitates the lives of both typically developing children and individuals with special needs (Karabulut & Yıkmiş, 2010). The functionality of mathematics in our lives plays an important role in both the personal and professional lives of individuals. If difficulties in learning mathematics are detected in students, they should be supported by implementing appropriate plans and programs. Otherwise, these difficulties may persist into adulthood and cause the individual to have difficulty with daily life skills. This may lead to a loss of self-confidence, especially in social life (Koç & Korkmaz, 2019). Functional academic skills are basic skills such as recognizing numbers, using money, and reading a clock. Among functional academic skills, the purpose of teaching how to use money is to teach individuals how to carry out shopping transactions. Situations such as buying the desired product from a store, buying food from a restaurant, and buying lunch at school are among the possible shopping situations that students may encounter in their daily lives (Erbaş, 2008).

Dyscalculia can make it difficult for individuals to understand concepts related to numbers, which can lead to difficulties with everyday math skills such as money management (Bird & Butterworth, 2016). Money management is a comprehensive process that requires the application of various skills. In general, these skills include:

- ❖ Calculating and recording the amount of money a person has,
- ❖ Knowing how to save money, for example by putting money in a bank account,
- ❖ Being able to plan their spending through the budgeting process,
- ❖ Understanding how to invest their money, i.e. having the skills to save and invest,
- ❖ Identify and count money,
- ❖ Being able to add and subtract with money as part of mathematical operations, and
- ❖ Being able to shop effectively (Yıkmiş, et al., 2016).

In particular, teaching the concept of money and how to manage it is essential for these individuals to sustain their lives independently (Yenioğlu et al., 2022). In the primary school mathematics curriculum, the sub-learning area of currency appears for the first time at the 1st-grade level. The goal of the currency sub-learning area in 1st grade is to help students recognize our currency. At the 2nd-grade level, the focus is on recognizing and comparing the relationship between the lira and the kuruş, while at the 3rd-grade level, students learn to demonstrate this relationship and solve problems related to it (MoNE, 2018). The currency sub-learning area progresses from the concrete to the abstract. Initially, students explore the sizes and types of coins and their usage, followed by the introduction of larger denominations (Özkale & Memiş, 2022).

In Turkey, academic research on teaching money management to individuals with special needs is limited. Studies investigating money recognition and usage skills evaluate the effectiveness of various teaching methods. Several studies (Akgün & Gürsel, 2022; Aydın, 2021; Çiftçi, 2022; Erbaş, 2008; Kalaycı et al., 2015; Kurtoğlu et al., 2017; Tümeğ & Sazak-Pınar, 2016; Yenioğlu et al., 2022; Yıkmiş et al., 2016; Yüksel Akgün, 2012) have examined the money recognition and usage skills of students with special needs in Turkey. Aydın (2021) emphasized the applicability of innovative methods in teaching money. Kalaycı et al. (2015) found that instruction delivered using the next lira strategy effectively enhances the money usage skills of individuals with developmental disabilities. Another study by Kurtoğlu et al. (2017) indicated that technology-assisted teaching methods can benefit individuals with special needs. Yenioğlu et al. (2022) showed that the direct instruction increased students' ability to use mathematical operations in everyday shopping. In the study conducted by Çiftçi (2022), the effect of teaching the sub-learning area "Our Currency" with the Scratch-based Realistic Mathematics Education (RME) approach on students' academic achievement and retention was investigated. RME is based on the belief that

every child can learn mathematics. The program aims to help students develop mathematical understanding based on meaningful and logical experiences. Such innovative teaching methods can have a positive impact on students' learning processes. Erbaş (2008) presented important findings on the development of money management skills of students with special needs by addressing the general use of money. In their study, Tümeğ and Sazak-Pınar (2016) showed that students exhibited the behaviors they learned while teaching coin recognition skills with the simultaneous prompting method in subsequent lessons. Yıkmiş et al. (2016) investigated the interaction unit method used to teach currencies and values to students with intellectual disabilities. The method used in the study stood out as an effective teaching strategy for students with intellectual disabilities and was found to be a successful tool for teaching currencies. Yüksel Akgün (2012) investigated the effectiveness of fixed waiting period teaching method in teaching money recognition skills to children with intellectual disabilities. They concluded that fixed waiting period teaching effectively teaches money recognition skills to children with intellectual disabilities. Akgün and Gürsel (2022) concluded that the direct instruction effectively teaches functional mathematics skills, such as telling half hours and the total amount of equal coins and fractions to students with developmental disabilities.

There are several studies in the foreign literature (Barros dos Passos & Menduni-Bortoloti, 2024; Browder et al., 2008; Castro et al., 2014; Cihak & Grim, 2008; Colyer & Collins, 1996; Elbogen et al., 2016; Lee & Kwon, 2016; Wehman, 2000) regarding the money recognition and use skills of students with special needs. Barros dos Passos and Menduni-Bortoloti (2024), in their examination of the Brazilian monetary system, demonstrated that teachers and students with developmental dyscalculia acquired important knowledge and skills related to the monetary system and mathematical operations. Castro et al. (2014) administered an arithmetic pre-test that was part of the Scholastic Performance Test to 300 children aged 7 to 10 years, which included 162 males and 138 females, in the second grade of primary school. They highlighted the effectiveness of an online environment that enables players to engage with mathematical topics in a gaming context. Lee and Kwon (2016) explored the effectiveness of a smartphone simulation application designed to enhance monetary payment skills in individuals with intellectual disabilities. They found that the simulation application improved participants' monetary transaction abilities.

Browder and colleagues (2008) aimed to synthesize findings from 68 experiments focused on teaching mathematics to individuals with significant cognitive disabilities. In their study, Browder et al. concluded that systematic teaching methods and realistic, hands-on environments effectively teach mathematics to students with cognitive disabilities. Colyer and Collins (1996) reported that the "Next Dollar Strategy" method helped students gain more confidence in calculating while shopping. Cihak and Grim (2008) investigated teaching counting strategies to develop independent purchasing skills for students with autism spectrum disorder and moderate intellectual disability. Wehman (2000) highlighted the importance of money management and independent living skills in transitioning from school to work for students with disabilities. Elbogen et al. (2016) found that students' active participation in money management education positively influenced learning. Additionally, students were encouraged to practice in real-life scenarios. In line with these studies, it is evident that there is a need for more action research on money education for individuals with special needs in Türkiye.

Research on money management skills generally focuses on the methods and strategies used in the education of people with developmental disabilities (Akgün & Gürsel, 2022; Odlyurt & Şentürk, 2019). However, it has been found that the number of action research studies conducted in this area is limited (Kankanat, 2023). Action research is a method that allows teachers to examine and improve their classroom practices systematically. Therefore, the lack of such studies represents an important gap in evaluating and improving the effectiveness of teaching strategies. This study is important to show that children not diagnosed with dyscalculia can learn mathematics with a curriculum and enriched classroom activities prepared according to their characteristics, thus leading a more independent life from their



environment. The study is expected to provide a road map to guide teachers of students with math learning difficulties.

This study aimed to teach money recognition and management skills to a second-grade primary school student at risk for dyscalculia. In the interview with the participating student's family, it was learned that the student had difficulty with money calculations, one of the functional academic skills, compared to his siblings and peers. Accordingly, the research addresses the following problem: How can we teach money recognition and handling skills to a second-grade primary school student at risk of dyscalculia? In this context, the goal was to use specially developed lesson plans and enriched classroom activities to help the student grasp mathematical concepts and function as a more independent individual in his or her daily life. Designed to guide teachers, this research aims to provide a strategic approach for educating students at risk of dyscalculia.

## **METHOD**

### **Research Design**

This study used the action research model, one of the qualitative research designs. Action research is a methodology that involves collecting and analyzing data to identify problems related to the implementation process or to understand and solve an existing issue (Yıldırım & Şimşek, 2008). It is a collaborative approach involving teachers and researchers (Creswell et al., 2007). Another advantage of action research is its flexibility, allowing for adaptation to students' individual needs during the teaching process. This way, the most suitable teaching methods are determined by considering specific conditions of students, such as learning disabilities (Yıldırım & Şimşek, 2008). This study chose action research due to its flexibility and practical approach, which is sensitive to the individual learning needs of students at risk of dyscalculia. This method enables systematic observation, evaluation, and adaptation of the teaching process, with immediate interventions when necessary. Thus, action research was deemed the most appropriate method for the study's purpose because of its practical and dynamic structure for developing real-life skills.

### **Research Group**

This study used a convenience sampling method to select the participants. Convenience sampling is commonly used in experimental research (Büyüköztürk et al., 2022). The participant is pursuing her education at the elementary school level and does not have any mental or physical disabilities. Although the student has not been diagnosed with a learning disability, there are suspicions of dyscalculia. Based on the interviews and observations conducted with the family, it is known that the participant frequently makes mistakes in addition and subtraction operations and struggles to recognize these errors. She also experiences difficulty in remembering mathematical concepts, often feels confused during numerical calculations, spends more time than her peers learning mathematical concepts, and has trouble performing money calculations in everyday life. For these reasons, the participant was deemed at risk for dyscalculia and was included in the study. The researcher assessed the personal and academic conditions of the student through individual interviews with the student, the classroom teacher, and the parents. Additionally, the student was observed in a grocery store to evaluate her competency in handling money, shopping simulations were conducted, and real-life scenarios were examined through various examples. Several math tests were administered to assess the student's money calculation skills, covering topics such as calculating change and totaling amounts. Comprehension tests were also conducted to determine whether the student understood the values and uses of coins. Since the student's real name was not included in the study, she was given the pseudonym "Ceren."

Participant characteristics: A second-grade student from a primary school affiliated with the Ministry of National Education in the Iskenderun district of Hatay province was selected for the study. The student has no history of accidents or diseases, and she has no issues with vision or hearing. She does not have

any orthopedic disabilities. The student has no siblings with physical or mental disabilities. It is noted that she started speaking quite late. She received preschool education and began primary school at the age of 7. For the past two years, she has been attending primary school with the same class teacher. The student has not been absent from school for an extended period. She exhibits low levels of math anxiety and moderate levels of math self-confidence. Her reading speed is significantly slower than her peers'. Her slow reading is believed to pose challenges during the problem-solving phase related to money. Although the student's sustained attention level is low, making it difficult for her to complete activities, she tends to respond quickly and without much thought.

### **Data Collection Tool**

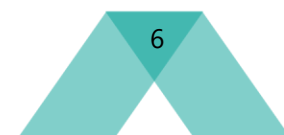
In action research, data can be collected using both quantitative and qualitative methods. Qualitative data collection methods, such as interviews, think-alouds, and open-ended exams, alongside quantitative data collection tools like questionnaires, scales, and multiple-choice exams, can be used together or separately (Büyüköztürk et al., 2022). In this study, a mathematics achievement test and the records made during the implementation of lesson plans—created within the framework of the acquisition of the sub-learning area regarding our money and considering the students' knowledge level—were used as data collection tools. The achievement test and lesson plans were developed by two field experts: one with a Ph.D. in elementary mathematics education and the other a classroom teacher. The achievement test was prepared based on the learning outcomes for the topic of money in the 2nd grade mathematics curriculum for primary school. The achievement test consists of 20 questions that include open-ended, matching, and multiple-choice formats.

### **Validity, Reliability and Ethical Considerations**

Evaluating tests and curricula by subject matter experts is critical for ensuring content validity in education. Experts review tests and lesson plans in detail to determine the scope of the targeted topics and skills and to ensure that all important subject matter components are covered in the process. In this context, expert input is essential for improving the quality of educational materials and curricula (Smith et al., 2015; Khan et al., 2020). Expert reviews are an effective way to ensure the content validity of curricula and tests. In Khan et al.'s study, expert agreement on curriculum standards is considered an important step in improving the quality of education (Khan et al., 2020). This process demonstrates the importance of expert opinion in determining the goals and content of education.

The analyses conducted to assess the reliability of the tests and lesson plans utilized various methods. In this context, methods like the test-retest method and equivalent forms reliability serve as important tools for determining the reliability of measurements. The test-retest method evaluates the consistency of results obtained by applying the same test at different times. This method ensures test consistency over time (Benton, 2013). On the other hand, equivalent forms reliability assesses the capability of different forms to measure the same construct and examines whether the tests yield similar results (Benton, 2013).

While developing and implementing educational tests, studies on their reliability provide important findings about their validity and reliability. For instance, the results of a knowledge test were found to have a comparable level of difficulty when compared to other science education tests (Yıldırım, 2024). In this study, the tests administered to the participating students throughout the action plan were identified and organized according to Ceren's level. As part of this study, the tests given to the participating student during and at the conclusion of the action plan were thoughtfully determined and structured based on Ceren's level. In this process, Ceren's current knowledge and skill levels, as well as her learning style and needs, were considered when selecting the tests. To support Ceren's learning journey and assess the effectiveness of the action plan, the tests were individualized and designed to align with her developmental goals. This statement highlighted that an assessment process suitable for Ceren's educational level was conducted and that the tests were meticulously selected to meet individual learning needs. Consequently, the details of the study became clearer.



Ethical permission for this study was obtained from Kahramanmaraş Sütçü İmam University Social and Human Sciences Ethics Committee with the number E-72321963-050.04-366081 and approval dated 21.11.2024.

### **Data Collection Process**

The process started with the necessary permissions and the first meeting with the family was made face to face on 04.11.2024, and the family was informed about the process. One week before the practice with the Ceren family started, an average of half an hour of face-to-face and phone calls were scheduled. The 5-week application process started on 11.11.2024, and after each application with the family, half-hour discussions about the development of Ceren continued. As part of the research, a 20-question preliminary test to determine the student's mathematics level was prepared by the researcher and administered to the student. Questions included in the preliminary test 2. Our classroom level coins are prepared to cover sub-learning space gains. After the application, it was found that the student answered a significant part of the class level questions incorrectly and completed the test with only four correct answers. However, Ceren could not explain the questions that she answered correctly. The student was found to be below grade level. The following results were obtained: The student cannot distinguish between "kuruş" and "lira", she has difficulties in distinguishing between the amount of money given and the needs she can satisfy, she cannot establish the relationship between pennies and lira, she has difficulties in comparing different amounts of money and she cannot solve problems involving money. In addition, it was observed that the student answered the questions related to paper money more easily in the activities created with Web2.0 tools. Based on the mathematics achievement test results, an action plan was created within the framework of the teaching program and class level. The research was conducted in a home environment. A suitable environment for home research was prepared. The research was carried out for 5 weeks.

## **FINDINGS**

In this section, the findings obtained are presented according to the order of implementation of the action plan in accordance with the purpose of the research.

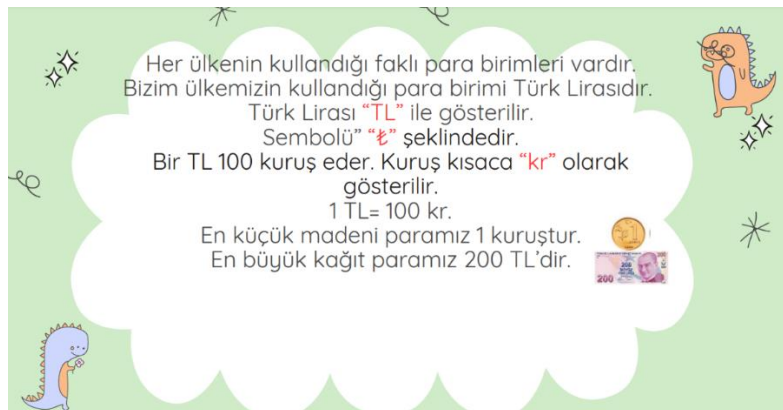
### **Findings on Terms and Concepts**

Week 1: In the first week of the research, the course began with an animation about our currency to capture attention. After viewing the animation, the students were asked about it. It was noted that the students correctly responded to the questions regarding the events depicted in the animation. However, they struggled to recall the amount of money mentioned and how those coins were calculated. The students were then asked about using our currency in daily life. The questions were as follows:

- Imagine you go shopping with your mother and ask her for toys. Can your mother pick up the toy in the store and just come out?
- Where do we use money in our daily lives?
- Can you give an example of the amount of money you know?
- What problems can we have if we cannot make money accounts?
- What would have happened without the concept of money?
- Have you ever saved money in a piggy bank? How did you calculate the total amount of money you saved?

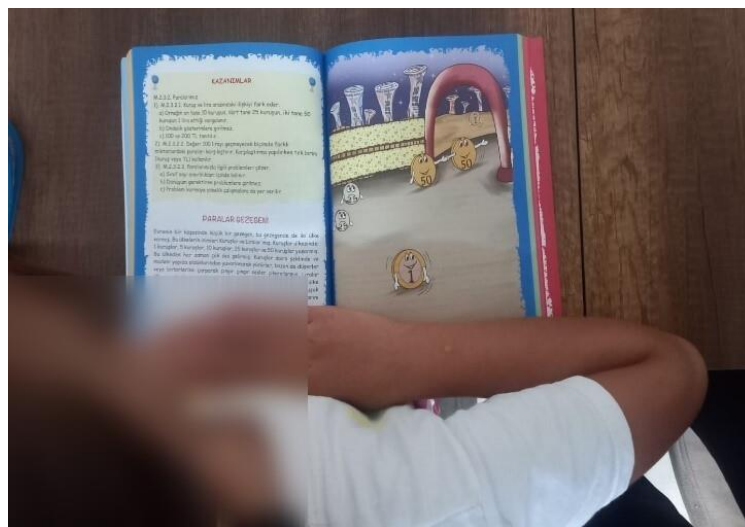
After the student was made aware of the importance of our currencies in our daily lives, expressions such as "TL", "₺", "kr" were taught using a presentation on the web2.0 tool Canva, and the currencies with the least and most monetary value were introduced (Figure 1). At this point, the student was able

to remember the expressions that were taught but had difficulty learning the least and most monetary amounts. The teaching process was rearranged and visual content was added to the presentation.



**Figure 1.** Presentation Made on Web2.0 Tool

Week 2: The second week started with a review of the topics learned in the previous week. It was observed that the student could outline the activities carried out in the previous course, but avoided saying the monetary statements that constitute the content of these activities. Then the student was told a story about our currency and the student's attention was drawn to the lesson (Figure 2). At the end of the story, the student was asked questions about the story. The student explained the events in the story superficially, stating that he had forgotten the numerical expressions. Throughout the story, the student was constantly distracted.



**Figure 2.** Reading the Story about Our Currency

The presentation created by the researcher using the Web 2.0 tool was displayed on the computer, and the instruction on kuruş and lira took place (Figure 3). The lesson was supplemented with tangible materials (coins and paper money). Following the instruction on money, to reinforce the information, the matching activity of the names of the currency and their visuals, designed by the researcher, was opened on the computer, and the student was instructed to complete this task (Figure 4). It was noted that the student faced significant challenges in matching the kuruş and required frequent repetition.





Figure 3. Presentation Prepared with Web2.0 Tool

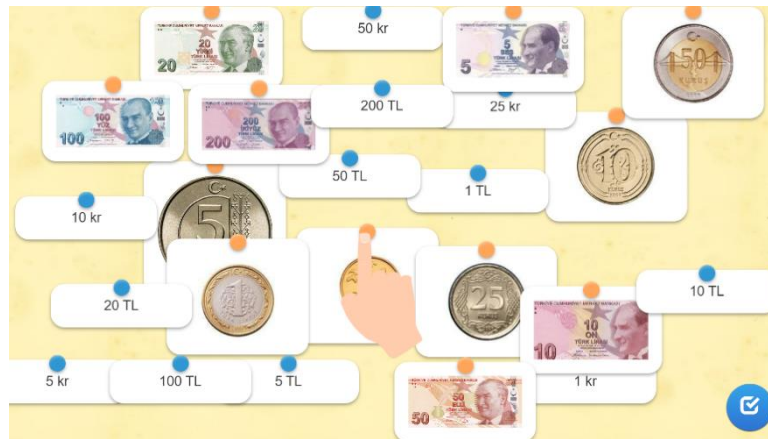


Figure 4. Matching Activity

After the pairing event, the lesson continued with the "Cube Game" (Figure 5). In this game, prepared by the researcher, the student throws the cube into the air. When the cube falls on the table, he identifies the amount of money indicated on the front surface from the various sets of money laid out and presents it to the teacher. The student expressed that he did not want to participate in this activity alone. He determined the amount of money on the front of the cube with the teacher's assistance. The "Cube Game," followed by the "Can we get it?" game, was then moved to the last classroom activity (Figure 6). In this game, the student is given different amounts of money. Objects are placed in front of the student, each labeled with specific prices. The student selects the objects he can purchase with the amount of

money he has been given. On-money calculations are used in this game. The aim is to connect the subject the student is learning to real-life situations. The student struggled with his on-money calculations when choosing the appropriate toy to buy with the amount of money provided in this lesson. Finally, the student received a working paper and concluded the course with a final summary (Figure 7).



Figure 5. Cube Game



Figure 6. "Can We Get It?" Game



6- Aşağıdaki 5 soruyu yukarıdaki görsellerden yararlanarak "daha azdır", "daha çoktur" ifadelerinden birini kullanarak doldurunuz.

Masa örtüsünün fiyatı boya setinin fiyatından .....

Boyama kitabının fiyatı çantanın fiyatından .....

Boya setinin fiyatı çantanın fiyatından .....

Boyama kitabının fiyatı boya setinin fiyatından .....

Masa örtüsünün fiyatı çantanın fiyatından .....

7- Aşağıda kumbaradaki biriken paraları inceleyiniz. İçinde en az para tutarı olan kumbarayı daire içine alınız.



Figure 7. Worksheet

### Findings on Money Recognition Skills

Week 3: Three students were asked to outline the information and activities learned the previous week. Necessary clues were provided for points the student could not remember. The student elaborated on his game in more detail. Following a previous week's recap, the lesson shifted focus to a song about our coins. After bringing attention to the lesson, the researcher's presentation was opened on the computer (Figure 8). The relationships between the presentation and the concrete materials and money were taught. Frequent repetitions occurred during the lesson. However, despite the repetitions, it was observed that the students struggled to understand the relationship between pennies and lira. To enhance the retention of information, the subject matter was supported with an activity prepared using a Web 2.0 tool (Figure 9). The student provided more accurate answers regarding the relationship between the coins during the event, yet still had difficulty establishing their connections. In response to the students' struggles, a concrete lesson was delivered using real coins to facilitate a better understanding of the relationships among the coins.

<b>Bilgi Notu: 1 TL 100 kuruşa eşittir.</b> <b>Bilgi Notu: 10, 25 veya 50 kuruşları uygun biçimde bir araya getirerek değeri 1 TL'ye eşit olan para grupları oluşturabiliriz.</b>		
		<b>100 kr</b>
		<b>100 kr</b>
		<b>100 kr</b>

Figure 8. Presentation Made on Web2.0 Tool

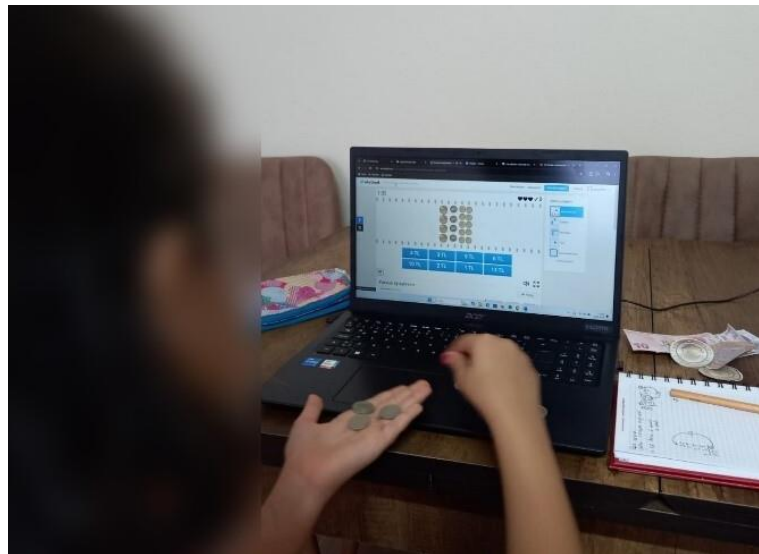


Figure 9. Activity of the Reinforcement

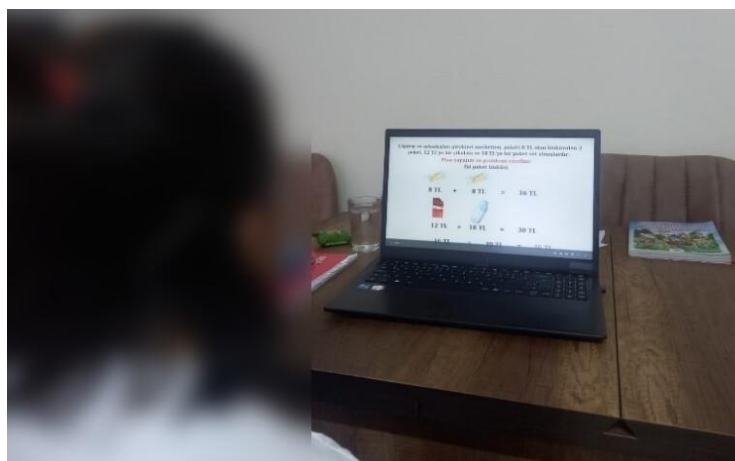
After the activity is completed, the phase of solving questions that require the student to establish relationships and conduct transactions with the coins concludes. During this phase, the student answered the questions with the teacher's assistance. It was noted that the number of incorrect answers provided by the student was greater than the number of correct answers. Consequently, the instances where the student answered incorrectly were recorded, and these topics were revisited in the next lesson.

Week 4: The fourth week began with reviewing the previous lesson. The relationship between pennies and lira was discussed, along with the combination of pennies and the resulting monetary amounts. An animation about Our Currency was then utilized to engage the students in the lesson (Figure 10). After viewing the animation, questions were posed to the students regarding its content.



**Figure 10.** Animation about Our Currencies

Then, a presentation was opened to explain how to solve the problems related to our currency, and the topic was narrated to the student (Figure 11). The problem related to the presentation was solved together with the student using problem-solving steps.



**Figure 11.** Problem Solving Subject Lecture Presentation

Then, the activity page containing simple problems prepared by the researcher through the Web2.0 tool was opened from the computer and the student was asked to solve the problems supported by the visuals (Figure 12). It was seen that the student could not solve the problems alone. In the questions, it was seen that the student had difficulty reading and understanding the problem, tried to collect all the numbers he read in the problem, did not use the problem solving steps, and ignored whether the amount given was a penny or a lira. The student answered all the questions that the teacher did not

support. Problem solving with given verbal clues and rotations is completed. A short summary was given at the end of the lesson.



**Figure 12.** Simple Problems Prepared with Web2.0 Tool

Week 5: The teacher reviewed the information learned in the previous weeks and provided a general summary. The students were then given an activity using the Web 2.0 tool prepared by the researcher (Figure 13).



**Figure 13.** Activity Created with Web2.0 Tool

After completing this activity, the mathematics achievement test that the student took before the study was applied for evaluation. Following the test administration, necessary checks were conducted, and it was observed that the student achieved the desired gains within the framework of the action plan. Most of the student's mistakes on the mathematics test were in the problem-solving questions. After completing this activity, the mathematics achievement test administered to the student at the beginning of the study was retaken for evaluation purposes. Once the test was given, necessary checks were made, revealing that the pupil made the desired progress within the action plan. Upon reviewing the test results, it was determined that the student generally understood mathematical concepts and developed basic skills but struggled more with problem-solving questions. These observations suggest that further efforts should be made to enhance the student's problem-solving skills, and the action plan can be adjusted accordingly. The student needs to practice more and focus on problem-solving strategies to improve his/her success. Doing so could enhance the student's overall mathematics performance and increase the action plan's effectiveness.

## DISCUSSION AND CONCLUSION

This study aims to investigate how to teach money and monetary calculations to a 2nd grade student at risk for dyscalculia using a level-appropriate action plan. In this context, the results of the action plan applied to the participating student and the results of other studies in the literature were discussed together. Finally, suggestions were made.

When the relevant field is examined, our currency has been found in limited action research for the sublearning area. Other types of research have found that the number of studies is small. The study's results by Kang and Chang (2019) suggest that the one more pound strategy effectively improves the money management skills of students with developmental disabilities. According to the study, implementing this strategy allowed students to become more independent in purchasing goods and use their money-using skills more effectively. In addition, teachers' positive views of the strategy support its applicability in educational practice. Dyscalculia is a learning disability in which individuals have difficulty understanding and applying mathematical concepts. This can affect their ability to identify and use money. Teaching money recognition and use skills to students at risk of dyscalculia is an important research topic in special education. In this context, studies of teaching methods and strategies play a critical role in meeting the needs of these students.

First, increasing awareness of dyscalculia is essential for teachers to work effectively with students with such challenges. Baldemir and others (2022), who examined the opinions of pre-service elementary mathematics teachers about dyscalculia, emphasize the importance of teachers' knowledge. Teachers' ability to understand the characteristics of students with dyscalculia helps them to develop appropriate teaching strategies. In this context, it is concluded that specific content on dyscalculia should be included in teacher training programs. Money recognition and use skills are important skills that individuals face in their daily lives. Yılmaz (2021) points out the importance of increasing individuals' knowledge and skills in personal financial management. In order to improve the money management skills of students at risk of dyscalculia, educational programs need to be designed to target these skills. This type of education can help students improve their independent living skills by increasing their financial literacy. In addition, the teaching methods used to educate students at risk for dyscalculia are of great importance. Tufan et al. (2020) show that the direct teaching model is effective for students with mild mental retardation. This model helps students acquire specific skills while allowing for the structuring of the instructional process. Thus, similar structured approaches can be used to teach money recognition and use skills.

Family and teacher cooperation in special education should not be overlooked. Aydın and İftar (2020) emphasize the need for joint efforts of families and teachers in teaching mathematical skills to individuals with autism spectrum disorder. In developing the money recognition and use skills of students at risk for dyscalculia, involving families can enrich the students' learning experiences. In the study conducted by Yenioglu and others (2022), research on the ability of students with learning disabilities to solve shopping problems and the generalization of this skill to everyday life shows the effectiveness of the direct teaching method. The research results show that the participants gained the ability to solve the mathematical problems used in shopping and maintained this ability after practice. In addition, it was found that the participants could generalize the acquired skill to their daily lives and had positive views about the research.

Erbaş (2008), on the other hand, emphasizes the importance of functional academic skills in his work on teaching money management to students with special needs. The research suggests that teachers must develop individualized instructional plans and systematically implement these plans to teach money management to students with special needs. In this context, it is understood that the direct teaching method plays an important role in students' learning of functional skills such as money. Also, a study by Landerl and others (2009) shows that supporting individuals with learning difficulties, such as dyscalculia,

through early identification and individualized training programs can lead to more effective outcomes in the educational process. This highlights the importance of direct teaching methods as well as individualized approaches.

After completing the applications, it was observed that the student had made significant progress. According to the answers in the last test the student took, their success increased by about 20%. Based on the research observations, the participating student could not distinguish between pennies and lira before the application. She found it challenging to identify the amount of money given and what it could cover, struggled to establish a relationship between pennies and lira, had difficulties comparing different amounts of money, and could not solve money-related problems. After the application, she can now distinguish between pennies and lira, identify the amount of money given and its needs, and more easily establish the relationship between them. Furthermore, it was concluded that she faces no difficulties when comparing different amounts of money. However, it was found that the participant still struggles with solving money-related problems after the application. It is assumed that the errors made by the participant in the mathematical success test are due to processing errors, difficulty understanding the questions, and a lack of attention.

The data analysis concluded that the one-on-one teaching process and the practices implemented through an individualized action plan for second-year students with learning difficulties in the mathematics course have positively fostered the acquisition of essential skills. After the intervention, Ceren was found to have mastered most of the 2nd grade content (approximately 60%) in finance within our mathematics curriculum. Although this level may seem low, it is good for students like Ceren who face learning challenges.

Given the development demonstrated by the participating student, it is advisable to broaden the action plans through a more extensive process, increase the course hours during the application phase, and incorporate additional problem-solving exercises related to our currency. Additionally, using tangible materials like real money in the action activities, grocery shopping, etc., one could recommend creating drama activities tied to daily life scenarios such as bill payments and ensuring that students engage in the course interactively through games designed with web 2.0 tools. Moreover, it would be beneficial to compare the effectiveness of various methods for students at risk of dyscalculia by utilizing tangible objects, digital tools, and visually supported materials. Besides the action research model employed, evaluating which approach is more effective by teaching money directly with the direct teaching model or the structured teaching model is also feasible. Analyzing the impact of different methods on students at risk for dyscalculia can assist teachers and educators in selecting the most suitable instructional strategy.

This research was conducted in the Iskenderun district of Hatay province. The same study can be applied to various socio-economic structures in other districts or provinces, or to students or groups of students from different cultural backgrounds, allowing for a comparison of regional and cultural differences. This approach helps ensure the generalizability of the study's results. The influence of regional differences on students' learning processes can be highlighted by evaluating the effectiveness of educational strategies in diverse contexts. Additionally, such comparisons offer valuable insights into how educational strategies for dyscalculia can be tailored to different environments, thus contributing to a broader field and application perspective.

#### **Statement of Researchers**

**Researcher's contribution rate statement:** Two researchers contributed jointly to the study, and the authors' contribution rate is 50%.

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**Informed Consent:** "All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study."

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