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İlkokulda Matematik Öğrenme Güçlüğüne Web 2.0 Çözümleri: Eylem Araştırması

Web 2.0 Solutions to Math Learning Disabilities in Primary School: Action Research

Özet

Bu çalışmada, matematik güçlüğü çeken bir ilkokul ikinci sınıf öğrencisinin Web 2.0 araçları ile toplama ve çıkarma işlemi becerilerinin geliştirilmesi amaçlanmıştır. Nitel araştırma desenlerinden eylem araştırmasının kullanıldığı çalışma 2023-2024 güz yarıyılında gerçekleştirilmiştir. Öğrencinin matematik öğrenme güçlüğü, sınıfta yapılan kazanım testi, gözlemler ve görüşmeler ile belirlenmiştir. 12 saatlik çalışma programında Matematik dersi "Sayılar ve İşlem "alt öğrenme alanına yönelik Web 2.0 araçlarıyla 5 kazanım üzerinde çalışılmıştır. Kazanım ön değerlendirme çalışmasında yapabildiği işlem sayısı, son değerlendirme çalışmasında yapabildiği işlem sayısından azdır. Web 2.0 araçlarıyla yapılan etkinlikler sonucunda öğrencinin Matematik dersine karşı olumlu bir tutum geliştirmiş daha önce bağımsız yapamadığı toplama ve çıkarma işlemlerini istekle ve dikkatle yapmaya başlamıştır. Eylem planında hedeflenen sınıf düzeyinde işlem yapabilme hedefine ulaşılmıştır.

Anahtar Kelimeler: İlkokul öğrencileri, matematik öğrenme güçlüğü, Web 2.0 araçları.

Abstract

This study aimed to improve the addition and subtraction skills of a second-grade primary school student with mathematics difficulties with Web 2.0 tools. The study, in which action research, one of the qualitative research designs, was conducted in the autumn semester of 2023-2024. The student's mathematics learning disability was determined by the achievement test, observations and interviews conducted in the classroom. In the 12-hour study program, five objectives were studied with Web 2.0 tools for the sub-learning area of "Numbers and Operations" in the mathematics course. The number of operations performed in the pre-assessment study is less than in the post-assessment survey. As a result of the activities carried out with Web 2.0 tools, the student developed a positive attitude towards the mathematics course and started to do addition and subtraction operations willingly and carefully, which he could not do independently before. The goal of performing operations at the grade level targeted in the action plan was achieved.

Keywords: Primary school students, mathematics learning disabilities, Web 2.0 tools.

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Introduction

Mathematics is one of the most important core subjects in primary education. It facilitates students' academic performance in other subjects by encouraging abstract and logical thinking (Wang et al., 2016). Mathematics education aims to raise individuals who can solve the problems they face in real life, use mathematics effectively in their daily lives, and see mathematics as a subject they enjoy instead of seeing it as a fear factor (Doruk & Umay, 2011). However, it is possible to encounter some obstacles to achieve this goal. One of these obstacles is a math learning disability. Mathematics learning disability is the difficulty experienced by the individual in arithmetic operations and other mathematical subjects due to impaired number perception (Kaçar, 2018). Difficulties such as the student starting to count at a later age than their classmates, taking more time to learn how to write numbers and memorise them, counting on their fingers instead of using number facts mentally, having difficulty in using the number line that is not represented in their mind and that they cannot concretise, having difficulty in choosing the larger of two small amounts without counting, having difficulty in perceiving shapes and sizes, forgetting what they have learned the next day, etc. appear as mathematics learning disabilities (Math & Dyscalculia Services, 2024).

Although most students have difficulties with mathematics in the early years of school, they can find solutions in a short time, either individually or with help. Some students, on the other hand, not only need external support but also expect individual attention and different instruction. In this sense, experts and educators must solve students' math learning difficulties with various interventions. Early intervention for math learning disabilities, especially in primary school, helps to reduce the problems that may arise in later stages of education. The Sehiffman study reported in Fleishner (2004) found that early detection and identification of students with learning disabilities and the provision of effective treatment programs in the first grade resulted in an 84% improvement (84%) and a 46% improvement (46%) when identified in the third grade. Moreover, the improvement does not exceed (18%) if the identification occurs in the fifth grade. If the diagnosis, identification and treatment occurred in the sixth grade, the recovery percentage may be only (8%) (Abualrub, 2020; Fleishner, 2004). Most of the research investigating student attitudes focuses on secondary education, where students have the option to enter or exit mathematics to some extent. In the primary school context, students do not have the option to (physically) drop out of mathematics, but they may well (psychologically) drop out by distancing themselves emotionally and attitudinally (Larkin & Jorgensen, 2016). In this context, intervening and addressing students with math learning difficulties in primary school would be the right approach. In this study, an action plan focusing on Web 2.0 tools prepared by the researcher for the learning domain of numbers and operations will be implemented for a 2nd-grade student with mathematics learning difficulties.

The Role of Web 2.0 Tools in Mathematics Education

Web 2.0 tools represent an interactive and participatory online environment that emerged with the evolution of the Internet. They allow users to create, organise and share content while encouraging collaboration and communication. It provides students with interactive learning experiences through various tools such as social networking sites, blogs, wikis, and podcasts. While students develop their skills in creating and sharing content, teachers can use these tools to make learning processes more effective. Web 2.0 tools are considered technological innovations that support change in education and promote student-centred learning (Çelebi & Satırlı, 2021).

Web 2.0 tools play an essential role in education today. These tools can make mathematics concepts more attractive and accessible by providing students an interactive and participatory learning experience. They can help students develop their mathematical skills and provide a supportive environment for the learning process. For example, interactive math games can help students reinforce essential math skills in a fun way. These games, available through various online platforms, allow students to learn mathematical concepts through practice.

Furthermore, web-based learning management systems can provide students with customised learning content and allow teachers to monitor student progress (Yuen et al., 2011). By referring to the studies conducted by researchers, it is possible to understand in more detail the role of Web 2.0 tools in primary school mathematics education. They have shown that interactive mathematics applications increase students' mathematics achievement. Similarly, he found that web-based learning management systems effectively improve students' mathematics skills. These studies support that Web 2.0 tools are essential in elementary school mathematics education (Çelebi & Satırlı, 2021). In addition, data show that digital tools improve numerical performance and numerical understanding to a similar extent in elementary school children with mathematics learning difficulties and preschool children (Benavides-Varela et al., 2020; Korucu & Yücel, 2016).

This action research examines the role of Web 2.0 tools in elementary school mathematics education. Through a scientific approach, it is to identify the potential of these tools to increase student achievement and understand their impact on mathematics teaching. The research will have specific outcomes such as assessing student achievement, examining student engagement, supporting teacher training, and providing Curriculum development/improvement recommendations. In this way, our research will be an essential resource for evaluating the effectiveness of Web 2.0 tools in elementary mathematics education and determining their potential to increase student learning.

Method

The study is in action research design, one of the qualitative research designs. This action research, a scientific process in which interventions can change in line with the findings obtained, aims to develop, improve or resolve the existing situation due to its nature (Gürgür, 2017). This study preferred this model since it aimed to create, enhance and solve the student's mathematics learning.

Swann (2002) emphasises that action research is born from a problem. Action research is an applied research method and a systematic study involving planning, implementation, and observation. Therefore, this action research addressing specific learning disabilities was also systematically planned. This process aims to understand, evaluate, and improve educational practices (Köklü, 2001)

Participant

The participants of this study were determined by convenience sampling method. Convenience sampling is a method that quickly reaches the study group formed for the research (Patton, 2014). The convenience sampling method, which aims to save labour, money and time, involves selecting the most accessible and cost-effective sample of the study group required for the research (Gürbüz & Şahin, 2015).

- The following characteristics were taken into consideration when determining the participants:
- Being a second-grade primary school student,
- No mental, auditory or visual problems,
- Having an educational diagnosis of particular learning disability.

The counsellor was also interviewed during this process, and information about the participants was collected. To protect the confidentiality of the participant students, a code name (Zeynel) was used instead of their real names.

The participant is Zeynel, a 2nd-grade student studying in a public school with a medium socioeconomic level in Konya province. Zeynel is eight and the only child of a family whose parents are divorced. He lives with his mother, grandfather, aunts and grandmother. Zeynel completed 1st grade under a recently retired teacher and knows how to read and write. He has a large body compared to his peers. He does not have any intellectual, auditory or visual disabilities. He attends the second grade with his teacher, one of the researchers of this study.

The second-grade mathematics curriculum continues with numbers and operations, writing and reading two-digit numbers, decimal-unity studies, and addition and subtraction. As a result of the observations, lesson activities, and evaluation studies, Zeynel needed help with simple additions and gave incorrect answers. After counting with fingers and concrete clues, he could provide answers. In addition, during in-class activities, he completed the activities by looking left and right and writing the answers written by his friends. He approaches math questions with anxiety and insecurity. There is no attempt to participate and answer independently. The class teacher directed Student Zeynel to meet with the school guidance and psychological counsellors for her particular situation and academic success. As a result of the counsellor interview,

"Zeynel spoke eagerly about his family. He has a dream that his father and mother will reconcile again. I made the necessary conversations and instructions about this. I know the situation well because I talked to his mother beforehand. Zeynel speaks disorganised. He switches from one topic to another topic a lot. He needs to be more confident about his studies, especially math. I applied the D2 Attention Test (Brickenkamp & Zillmer, 1998) to our student for your concern about her very distracted attention. Although the test's lower limit is nine years old, I applied it with the opinion that the student could participate in the application considering her development and literacy level. When the results are analysed, it is seen that Zeynel.

He may have a learning disability.

Sustainable attention problem.

Psychomotor speed (perception speed) is weak.

He is the right student to participate in your study. I will provide the necessary guidance during the process and help him with his particular problems. I also believe that your research will be beneficial."

He expressed Zeynel's situation this way and gave important clues that he had learning difficulties.

Geary (2004) stated that although students' potentials measured by intelligence tests are average or above normal, their failure to show the expected success in standardised achievement tests and the continuation of this achievement difference in the following two years indicate that the student has mathematics difficulties. Accordingly, in the achievement test administered to the whole class, Zeynel remained below the class level. The researchers determined that Zeynel had math learning difficulties due to the test results, the guidance counsellor's opinion, and the observations and evaluation. Family interviews also supported this determination. His family stated that the student could not do homework independently or comprehend addition and subtraction operations. His mother specifically stated that he sometimes froze while doing math, waited as if he was thinking and could not do it without help, and requested individual attention.

Action Steps and Data Collection Process

An outcome test was applied during the action research process to determine what Zeynel needed. Zeynel submitted the answers to the achievement test after everyone else during recess. The achievement test revealed that he needed help with addition and subtraction by hand. As a result of this pre-assessment, which was applied to the whole class, Zeynel was below the class level. The researcher also interviewed Zeynel during the action plan. Zeynel, who had deficiencies in the learning domain of Numbers and Operations, showed joy when told he would work with him privately. For this purpose, I decided to keep a diary after the lessons.

For Zeynel, an action plan of 3 weeks and 12 hours was prepared for her missing learning outcomes (Table 1.). It was decided to use Web 2.0 tools to concretise abstract mathematics topics based on his mother's observation that Zeynel was too interested in his grandmother's phone and his attachment to games. After each lesson, observations were noted, and planning was made.

Table 1. Implemented action plan

Date What to do	Duration	Learning Area Outcomes	What to do
Week 1			
28.11.2023	40 min	It divides a multiplicity of objects, with several objects less than 100, into groups of tens and unities using a model and expresses them with numbers.	Number bars Real object count Number bead making The Game Smartboard and personal computer Reinforcement with Web 2 tool (Wordwall)
29.11.2023	40 min	Names of the digits of natural numbers less than 100 on the models indicate the place values of the digits in the digits.	
30.11.2023	40 min	Counts forward and backwards by twos, fives and tens within 100; by threes within 30; by fours within 40.	
01.12.2021	40 min	Counts forward and backwards by twos, fives and tens within 100; by threes within 30; by fours within 40.	
Week 2			
05.12.2023 06.12.2023	40 min +40 min	It makes additions with and without sums of up to 100 (including 100) natural numbers.	Collection with real objects Tens and ones with number sticks (hand) Addition with number stamps Reinforcement with Web 2 tool (Wordwall, Learning App) Lesson application on screen
07.12.2023 08.12.2023	40 min +40 min	It makes additions with and without sums of up to 100 (including 100) natural numbers.	
Week 3			
12.12.2023 13.12.2023	40 min +40 min	100'e kadar olan doğal sayılarla onluk bozmayı gerektiren ve gerektirmeyen çıkarma işlemini yapar.	Subtraction with real objects Decimal unity with number sticks (decimalization) Addition with number stamps Reinforcement with Web 2 tool (Wordwall, Learning App) Lesson application on the screen
14.12.2023 15.12.2023	40 min +40 min	Performs subtraction with natural numbers up to 100 with and without decimalization.	

The study was planned for the 2023-2024 academic year between November 28 and December 15. The action plan includes five objectives to teach addition and subtraction. For the formation of the concept of numbers, which forms the basis of addition and subtraction, one week was devoted to decimals and unity and the idea of digits. One week was planned as addition with and without hands, and the last week as subtraction and subtraction by decimalisation. The work with Zeynel was done in his classroom after school. The smart board in the classroom, the researcher's personal computer and cell phone, and the materials in the school were used as teaching aids. Zeynel's home is within walking distance of the school. During the action research, his teacher handed Zeynel over to his family. A warm, safe and flexible working environment was provided in this sense.

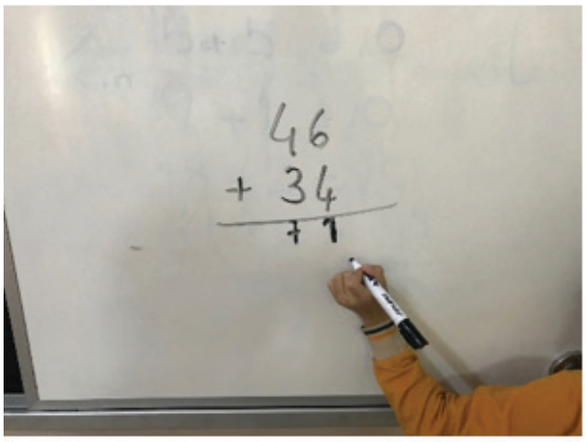
Web 2.0-based games and tools were utilised in the action research. The researcher's personal phone, computer and the smart board in the classroom were kept active. Since Zeynel's mother worked late hours, the Web 2.0 tools were also sent to his grandmother's phone so he could practice at home. In addition, he is left-handed and has difficulty in writing. Since he has difficulty writing, notebook studies were kept short, and the digital board and

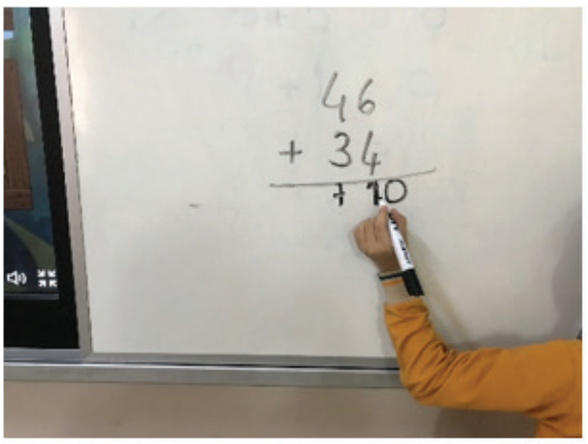
whiteboard were used more. Since it was observed that Zeynel needed concretisation in the studies, the processes were repeated with supported materials, and then the process was turned into a process. Repetitions and visuals were used effectively with Web 2.0 tools to reinforce the subject, get instant feedback, and keep the student's attention.

In the first week, the student was fined reading numbers, decimals and unity. Repetitions were made on the digit name and value to perform the operations correctly. These acquisitions were included in the plan for 2 lesson hours to strengthen the foundation. In addition, since addition and subtraction are rhythmic counting, 2, 3 and 4 rhythmic counts were included in the plan for 2 class hours. However, counting forward and backwards by 3 and 4 in rhythmic counting was difficult. Number sticks and abacuses we made together were used for concretisation. Since Web 2.0 tools provide feedback instantly, we worked with plenty of repetitions. Again, counting was encouraged as needed.

Week 2 started with addition without hands activities, with a significant number in my mind method. Since he was an active and energetic student, he continued to do the operations on the board instead of the notebook. In the next lesson with Zeynel, he was asked to do addition with hands on the board after repeating addition without hands (46+34). No intervention was made. He added and wrote the answer as 71. Then, she was told to add aloud. He said "6, 4 more 10" and wrote 1. What did you do with 0? When asked, he wrote 710 together. Then she was asked about the digits, and when she was reminded that we were writing a single digit for each digit, she repeated it out loud and remembered "6,4 more 10" and "0 of 10". Whether one is a dime or a unit was examined by returning to the number 10. She said that she would add it to tens with her guiding questions. Concrete and visual activities were done to make them realise the hand. Then, plenty of repetitions were made with the excitement of the competition in Web 2.0 tools and the motivation of digital awards.

Photograph 1. Process repetitions in the action process





In the third week, subtraction by counting backwards was complex. He needed reminding. She was timid about subtraction operations where the number difference was slight (9-7=?). It was ensured that he gained the courage to do the operation by repeating it aloud and a lot. Gradual progression and concrete-abstract combination in Web 2.0 tools strengthened the study. It helped me to work longer.

Photograph 2. The use of Web 2.0 tools in the action process

The action plan implementation process was completed on time and without any problems. Some lessons continued for more than 40 minutes due to the excitement and motivation provided by Web 2.0 tools. The student was also eager to work with Web 2.0 tools at home.

The student was asked to write a few questions in his math diary for the first week and answer them when he went home. However, Zeynel did not write anything in his diary. For the second week, his teacher said, "I want you to write what you feel inside". However, he did not write anything again. For the last week, the teacher asked Zeynel to write her feelings in 1-2 sentences in the evening. Zeynel wrote 1-2 sentences about his feelings and thoughts.

After each lesson, the researcher kept reports noting her observations. While taking the student home, she had three 10-15 minute interviews with the grandmother. On the mother's days off, she had two 40-minute interviews before and after the study. She had 30-minute interviews with the school counsellor before and after the study. The researcher's interviews with the mother were conducted after the mother's interviews with the school counsellor. When the action plan was completed, Zeynel's achievement test for the pre-assessment was repeated as the post-assessment. The student completed and submitted the final assessment within 20 minutes.

Data Collection Tool

An acquisition test measuring addition and subtraction knowledge was used to select the student. There are 20 operations in the test, including five addition operations without hands, five addition operations with hands, five subtraction operations, and five subtraction operations by breaking a dime. Her observations were utilised since the researcher was also the student's teacher. The student's attitudes were observed in other lessons, especially mathematics lessons. Interviews were conducted with the students during the pre-assessment process and throughout the study. Semi-structured questions were asked in the interviews. The student's diary was utilised. He was asked to answer most of the questions verbally. Audio recordings were taken during this process. There was constant communication with the family. Daily feedback was received from the grandmother while taking the student home. The counsellor's thoughts and observations were consulted.

Data Analysis

Action research directs future research based on the practices of individuals (Patton, 2014). In this context, the data obtained in the study should be accurate and reliable. In addition, the simultaneous collection and analysis of data in action research provides a systematic and analytical approach (Gürgür, 2017). In this study, data collection

and analysis were conducted together. The records taken during the implementation were evaluated after each lesson, and necessary notes were taken. Test results were checked. Observations were transcribed. The activities and records were reviewed again by the researchers.

In addition, Şencan (2005) states that validity in action research requires the research to reflect reality. The research should have a purpose and be applicable. This study collected data before, during and after the implementation. To see the effectiveness of the action plan presented to the student, notes were kept for the activities of all lesson plans throughout the research to follow the student's development level. The researcher consulted the opinions of the Special Education field expert while determining the outcomes. While creating the lesson plans for the selected outcomes, an expert in the field of Curriculum was consulted. The experiences of a classroom teacher working in the Ministry of National Education were consulted, and lesson plans were created for the participants. As can be understood from the data collection tools (semi-structured observation form, diary, achievement test), data diversity was used to ensure data validity. Yıldırım and Şimşek (2013) state that collecting data on the same phenomenon in different ways is data diversity, and this contributes to validity.

Findings

This section presents achievement test findings, classroom teacher observation and interview findings.

Findings Related to the Attainment Test

At the end of the study, the achievement assessment scale given to the student for pre-assessment was applied as a post-assessment. When the results of the pre-assessment are examined, it is seen that the student made five correct and 0 incorrect in addition without elements, 0 correct and five incorrect in addition with elements, four correct and one incorrect in subtraction, 0 correct and four incorrect in subtraction with decimalisation and one blank. In the final assessment, it is seen that he made three correct two errors in addition without elements, three correct two errors in addition with elements, five correct 0 errors in subtraction, and four correct errors in subtraction by decimalisation.

When the operation results are analysed, it is seen that the student made two mistakes in the post-assessment. In contrast, he did not make any mistakes without his hands in the pre-assessment, and he made three mistakes with his hands in the post-assessment, while he could not make any mistakes in the pre-test. Subtraction operations were more successful with one error in the post-assessment than the pre-assessment results. Considering the total number of questions, the action study was helpful since the number of correct answers in the post-assessment was higher. It increased the student's ability to do total subtraction.

Table 2. Findings related to the achievement test

	Preliminary Evaluation			Final Evaluation		
	Number of Correct - Incorrect Blanks			Number of Correct - Incorrect Blanks		
Addition without hands	5	0	0	3	2	0
Addition with elimination	0	5	0	3	2	0
Subtraction	4	1	0	5	0	0
Subtraction by breaking a dime	0	4	1	4	1	0
Total	9	10	1	15	5	0

Findings Related to Observation and Interview

The researcher interviewed Zeynel after the preliminary evaluation. Examples of direct answers received from the participant from the questions asked are as follows;

En çok hangi dersi seviyorsun?

Which subject do you dislike the most?

Do you like math class?

In his answers to the questions;

I liked it, but I could not decide on the course because I could not do it.

It was observed that he gave an abstaining answer. However, as can be understood from the audio recordings, at the end of the research, she made more hopeful rather than pessimistic sentences for mathematics.

The researcher's teacher reported the 3-week process at the end of the lesson. In these reports, she observed that the student tended to forget the information she had learned. In addition, she observed that he could do the correct work correctly and then do it incorrectly because he had focusing problems. She confirmed in her interviews with the family that she had made some progress in eliminating this deficiency with plenty of repetition. Grandmother

My teacher never did homework alone before. We used to help him with the work. Last night, he went to the room. He did it correctly without help and brought it back.

In the form of "I am not a member of the society".

In addition, since the researcher had the chance to observe the student in mathematics lessons, he found that the student willingly raised his finger in the mathematics lesson after the individual work. It was observed that his self-confidence in the lesson increased. He expressed this self-confidence in 1-2 sentences in his diary written in the last week.

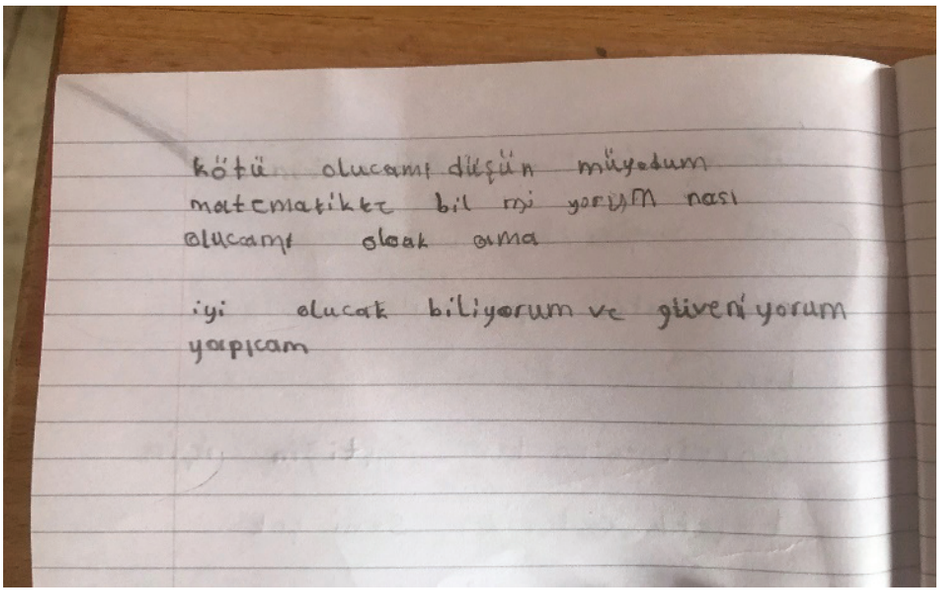


Photo 3. From the participant's diary

"I do not know how to do it, but I can. I can succeed when I work."

Again, when I asked what he liked the most in our study, he showed the computer by referring to Web 2.0 tools. In the studies with Web 2.0 tools, getting the digital rewards (applause, stars, trophies ...) was recorded as the most enjoyable point.

In the preliminary interview with the guidance counsellor at the beginning of the research, according to the D2 attention test applied to the student, signs that the student may have sustainable distraction problems and learning difficulties were detected. In this context, it was understood that the disorganisation in the student's speech and the act of speaking irrelevantly from subject to subject decreased due to the last interview with the counsellor. He stated that the student liked these lessons very much and that he could add and subtract better. He said that he was optimistic about himself and his academic success.

Conclusion, Discussion and Suggestions

As a result of this action research, a second-grade student with mathematics learning difficulties achieved success due to the activities carried out with Web 2.0 tools in the sub-learning area of "Numbers and Operations" in the mathematics course. The activities carried out with Web 2.0 tools positively affected the success and attitude of the second-grade students in the mathematics course. Morrison (2016) states that the second-grade level is primarily one where particular learning difficulties are recognised. He also states that it is easier for classroom teachers to identify the learning difficulties of primary school students in reading, writing or mathematics. In this study, a 12-hour action plan was prepared for a 2nd-grade student with math learning difficulties. Web 2.0 tools were used extensively in the study. It was aimed at benefiting from the fact that Web 2.0 tools appeal to multiple senses, motivation-enhancing features, and instant feedback features. The study observed that Web 2.0 tools increased the processing speed of students with learning difficulties in primary school mathematics and contributed to faster and more confident answers.

According to the achievement test for applied acquisition, the student can add and subtract much better than before in a short time despite the unsuccessful result, the sustainable attention deficit and learning difficulties detected in the student. This proves that Web 2.0 tools applied in the research can help solve learning disability problems in the long term. In the study conducted by Koç (2018), it was observed that students with mathematics learning difficulties could learn subjects more efficiently and show sufficient success thanks to the scenarios, activities, and computer-aided games used. In another study, it was found that mathematics lessons using Web 2.0 tools had a positive effect on fifth-grade students' achievement and attitudes towards mathematics (Özpınar, 2023). Students with learning difficulties may develop negative attitudes towards the course. Web 2.0 interactive tools can be seen as a support for the student in this sense. In this context, the research results are expected to support each other.

In another action research similar to the results of this study, the effect of technology on mathematics teaching was examined. It was stated that technology plays a vital role in learning mathematics subjects, and it was emphasised that the subject of fractions is incredibly complex and abstract. For this reason, digital stories (Web 2.0 tool) were used to identify and eliminate students' errors in fractions. The research was conducted on fourth-grade students. As a result of the application, it was found that digital stories were effective in eliminating students' errors and misconceptions about fractions. The opinions of the students and the teacher about digital stories were positive. However, the teacher believed digital stories could not be instructive if perceived only as a game (Karaoğlan et al., 2017).

The fact that the action plans applied in the research were designed according to the student and based on Web 2.0 activity reveals that the success in the learning process increased. Kıraç (2009) showed that organising instruction for mathematics lessons by considering the achievements of students with low academic achievement levels is more effective in achieving the objectives. In this context, it is essential to design the action plan together with Zeynel. Thus, the chance of reaching the goals of the action research increased. In another study, Koç (2018) prepared a programme by determining the acquisitions for addition and subtraction operations for students who continue to the 3rd grade of primary school and have mathematics learning difficulties. A success rate of over 90% was achieved in individual success.

This study aimed to improve the situation of a student with learning difficulties related to mathematics achievement and perception with Web 2.0 tools, which are teaching materials. However, according to Olkun (2014), low achievement in mathematics can be caused by environmental and individual factors. Environmental factors such as school, family, environment, class, programme and method affect the child externally. Particular problems such as Zeynel's mother working in shifts, the student spending more time with the grandmother, the family being a large family (grandfather, aunts, grandmother), and the student being separated from his father may have affected the student's achievement and attitude in mathematics. In this context, action research should be conducted.

Limitations

- This study was conducted with only one student, so its generalizability is limited. Studies with a larger sample group could provide more generalizable results.
- The study was limited to the "Numbers and Operations" sub-learning area. Similar studies can be conducted in other mathematics sub-learning areas.
- The study used only Web 2.0 tools. The effects of different technological tools can be investigated in the future.
- The study duration was limited to 12 hours. The effects of longer-term applications can be observed.

Suggestions for Future Studies

- Similar studies can be repeated with a larger sample group.
- The effect of Web 2.0 tools can be investigated in different mathematics sub-learning areas.
- The effects of technological tools other than Web 2.0 tools can also be researched.
- The study duration can be increased to observe long-term effects.
- The impact of environmental factors such as the student's family and environment on mathematics achievement can also be investigated.

Contribution Rate of Authors

In the implementation phase 1. Author. Author 2 contributed to the translation into academic article format, proofreading, development and translation.

Conflict of Interest

There is no conflict of interest in the study.

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