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The Effect of Edmark Reading Program Functional Words Series Presented with Tablet Computer in Acquiring Functional Reading Skills for Students with Intellectual Disabilities

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ABSTRACT

This study aims to examine the effect of the Edmark Reading Program Functional Words Series, which is presented with a tablet computer, on the acquisition of functional reading skills by three high school students with moderate intellectual disabilities. The design of the study is a multiple-probe model with an inter-subject probe phase, which is one of the single-subject research models. While the dependent variable is identified as functional reading skill, the independent variable of the present study is the Edmark Reading Program Functional Words Series offered via a tablet computer. The participants of the study are three male students with moderate intellectual disability. The starting level of the experimental process of the research, the implementation of the Edmark Reading Program Functional Words Series consisted of monitoring and generalization stages. The data obtained in the research were analyzed and interpreted graphically. As a result of the research, it was found that the Edmark Reading Program Functional Words Series, which was tested with a tablet computer, was effective in acquiring functional reading skills of students with moderate intellectual disability. In addition, the participants of the research were able to generalize the 10 target words that were taught in the real environment as well as in the teaching environment, and they were able to continue reading one and three weeks after the teaching. The interviews conducted to determine the social validity of the research revealed that parents, teachers and participant students expressed positive opinions about the program offered via tablet computer.

Zihinsel Yetersizliği Olan Öğrencilere İşlevsel Okuma Becerilerinin Kazandırılmasında Tablet Bilgisayar ile Sunulan Edmark Okuma Programı İşlevsel Kelimeler Serisinin Etkisi

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ÖZET

Bu araştırmada, lise kademesinde orta düzeyde zihinsel yetersizliği olan üç öğrenciye işlevsel okuma becerilerinin kazandırılmasında tablet bilgisayarla sunulan Edmark Okuma Programı İşlevsel Kelimeler Serisi'nin etkisinin incelenmesi amaçlanmıştır. Araştırmanın deseni tek denekli araştırma modellerinden, denekler arası yoklama evreli çoklu yoklama modelidir. Araştırmanın bağımlı değişkeni; işlevsel okuma becerisidir. Bağımsız değişkeni ise tablet bilgisayar aracılığı ile sunulan Edmark Okuma Programı İşlevsel Kelimeler Serisi'dir. Araştırmanın katılımcıları orta düzeyde zihinsel yetersizliği olan üç erkek öğrencidir. Araştırmanın deney süreci başlama düzeyi, Edmark Okuma Programı İşlevsel Kelimeler Serisi'nin uygulanması izleme ve genelleme aşamalarından oluşmuştur. Araştırmada elde edilen veriler grafiksel olarak analiz edilerek ve yorumlanmıştır. Araştırmanın sonucunda, tablet bilgisayarla sunulan Edmark Okuma Programı İşlevsel Kelimeler Serisi'nin orta düzeyde zihin yetersizliği olan öğrencinin İşlevsel okuma becerisini kazanmasında etkili olduğu bulunmuştur. Ayrıca araştırmanın katılımcıları öğretimi yapılan 10 hedef kelimeyi öğretim ortamı dışında, gerçek ortamında da genelleyebilmişler ve öğretimden bir ve üç hafta sonra da okumayı sürdürebilmişlerdir. Araştırmanın sosyal geçerliğini belirlemek amacıyla yapılan görüşmelerde ebeveynlerin ve öğretmenlerin ve katılımcı öğrencilerin tablet bilgisayar aracılığı ile sunulan programa yönelik olumlu görüş bildirdikleri bulunmuştur.

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INTRODUCTION

Since the learning characteristics and learning speeds of individuals affected by intellectual disability cause delays in the acquisition of reading and writing skills, the choice of literacy teaching method is extremely important (Özgüç et al., 2016). Classroom support with appropriate reading-writing strategies and materials have the potential to contribute to greatly contribute to the reading and writing of individuals affected by intellectual disability (Akçamete, 2003). This can be possible with a functional reading-writing method in which the individual characteristics of individuals affected by intellectual disability are prioritized, their learning style and speed are taken into account, the words they encounter frequently in their lives are selected, and the teaching is structured.

The learning characteristics and learning speeds of individuals affected by intellectual disability require alternative literacy instruction in cases where it is not possible to teach literacy with classical literacy instruction within the formal education age. The functional reading-writing process becomes a necessity for students for whom classical reading-writing teaching methods have been tried and failed. Functional reading refers to visual recognition in its shortest form. The reason why it is defined in this way is the teaching of visual recognition of the written symbols of the relevant words in order to enable individuals to use the skills that will ensure their independent living in social life (Browder & Lalli, 1991; Conners, 1992). In other words, functional reading is the minimum reading of visual stimuli of the skills necessary for an individual to live independently (Bender et al., 2008).

The teaching of functional reading skills involves the acquisition of the skills necessary for the individual to review written and printed materials or the teaching of the vocabulary required for a particular activity (Browder & Snell, 2000; Özgüç et al., 2016). It is important that the words learned through the activities involving functional learning will facilitate the daily life of the individual. The words that the individual encounters in his/her daily life and those that he/she is likely to encounter in his/her future life gain importance in functional reading. Functional reading is taught in areas that require the ability to decide which movie to watch from the DVD movie list, to choose the TV channel or TV program they want, to find their own name from the list, to find the names of their family members from the list, to read the names of streets, to read the basic words used in business (Browder & Snell, 2000; Özgüç et al., 2016). In practice, very few individuals with moderate intellectual disabilities can be taught reading skills. These skills can range from reading warning signs such as "stop", "exit", "no entry", "danger of death", etc., which are necessary for the individual to function independently and to be protected from dangers, to comprehend simple reading materials. The measure of simplicity here is that the reading material is meaningful and familiar to the individual.

During functional reading instruction, the primary focus is to ensure that individuals can acquire the skills necessary in reading to sustain their daily lives (Er, 2020; Thomas, 1996). Two types of functional reading are mentioned in some studies. The first one is generalized functional reading and the other is restricted reading (Browder & Snell, 2000; Er, 2020). Generalized functional reading involves teaching the words needed by the individual to review written materials or during any activity. Restricted functional reading, on the other hand, involves teaching a limited group of words or keywords that the individual will use frequently in his/her life (Browder & Snell, 2000; Er, 2020; Başal & Batu, 2002). In restricted functional reading, it is important to prefer words that will help the individual to continue his/her daily life (Başal & Batu, 2002; Browder & Snell, 2000).

Demirok and Akçam (2019) stated that the use of intensive and systematic prompting with repeated trials is effective in teaching literacy in children with intellectual disabilities. In

functional reading instruction, structured programs are preferred because of their manageable implementation and their core system that leaves fewer decisions about the process to the teacher as well as having less margin for error (Bereiter, 1972; Bereiter & Engleman, 1966; Ellson et al., 1965; Er, 2020). There are systematically structured functional reading programs. One of the most important implementations of these programs is the Edmark Reading Program Functional Word Series Program (EFWS) The aim of the Edmark Reading Program is to increase individuals' recognition of frequently encountered words, vocabulary, comprehension and fluency levels. Moreover, there are many features that make EFWS advantageous. First of all, since the program is easy to implement, staged and sequential, a minimum level of training is sufficient for the instructor. Secondly, since the lessons of the program are pre-structured, the instructor does not need to make a lesson plan again. Therefore, the program allows the instructor to have more time to spend longer active teaching time with the individual and to spend the entire lesson doing active teaching instead of doing preliminary preparation. Finally, the Edmark Reading Program is designed to present new words in a mostly "error-free" way for individuals who have reading difficulties, who are challenged learners, and whose motivation declines rapidly. In the literature, there are studies testing the effectiveness of functional reading from the 1970s to the present day. Among the studies in the literature, there are studies evaluating whether the Edmark Reading Program is effective or not (Barrier, 1981; Browder & Xin, 1998; Brown, 1984; Henning & Pickett, 2000; Mayfield, 2000; Meeks et al., 2014; Sugasawara & Yamamoto, 2007; Swain, 2015). In Turkey, there are few studies on teaching functional reading to individuals with special educational needs (Çatak & Tekinarslan, 2008; Elçin, 2015; Er, 2020; Ohene-Djan & Sen, 2007; Özak, 2007; Subakan & Koç 2019).

As a result of scientific developments in the fields of special education and technology, new teaching methods and materials are introduced. These technological developments are also used in functional reading instruction. It is thought that teaching functional reading via computer will contribute to presenting concrete examples to individuals with intellectual disabilities, who are known to have attention, perception and memory deficits, and to make teaching more concrete with visual and auditory presentations. As in all levels of formal education, the vast majority of studies showing the effectiveness of the use of technology in the education of individuals with intellectual disabilities and in functional reading instruction have shown that technology-supported instruction is effective (Er, 2020).

In this study, it is aimed to test the effectiveness of EFWS using tablet computer technology in high school students with moderate and severe intellectual disabilities and to reveal what its possible effects are. Since the research on functional reading instruction is very limited in our country, this study will guide other future research on teaching functional reading skills in the implementation and research of technology-supported and systematic structured programs.

METHOD

This study aims to examine the effectiveness of EFWS in teaching functional literacy to individuals with intellectual disabilities by using the multiple probe model with inter-subject probe phase, one of the single-subject research models.

Research Model

In this study, the multiple probe model with an inter-subject probe phase, one of the single-subject research models, was used. This model aims to replicate the effect of the independent variable on the dependent variable in at least three participants and gives the opportunity to evaluate its permanence (Tekin İftar ve Kırcaali-İftar, 2012).

In research, models that aim to measure the effectiveness of an application or program

from different variables or conditions are referred to as "Multiple Baseline Models" (Tekin-İftar, 2018). This model can be applied in two different ways as probe phase and probe trial. In this study, which aims to determine the effectiveness of EFWS presented to three students with intellectual disabilities via a tablet computer, the multiple probe design with between-subjects probe phase, one of the single-subject research designs, was used. Multiple probe design with a between-subjects probe phase is a research model in which the effectiveness of an independent variable is examined on three different participants (Tekin-İftar, 2012). In this study, the dependent variable was determined as functional reading skills. The independent variable is the EFWS presented through a tablet computer.

Sample/Study Group/Participants

The participants of this study were three students with intellectual disabilities who continued their education at a special education application school, Level III (High School) within the MoNE in Konya in the 2020-2021 academic year. A number of criteria were determined for the selection of students with intellectual disabilities participating in the study. These included (a) the participants have an officially certified report from the relevant specialty of a full-scope medical faculty hospital or city hospital with a diagnosis of moderate or severe intellectual disability; (b) the three participants who have been taught reading for the first time but have not yet learned to read are between the ages of 14 and 27, which is the age limit for enrollment in Level III of the participating student's educational practice schools; (c) no study on functional literacy instruction had been conducted with any of the participants prior to the study; (d) they had the skill of naming the pictures presented through the tablet computer; (e) they had the skill of showing the functional words spoken through the tablet computer by touching them; (f) they had the skill of fulfilling the commands given by the practitioner, (g) the attention span of the participants for the visual and auditory stimuli given was at least 5 min (h) obtaining the written permission of their parents and teachers for the participants to be included in the study; (i) finally, in the preferences of the participant students; teacher and parent interviews, determining whether the participant students met the criteria, and filling out and signing the forms for the necessary permissions were carried out.

Table 1. *Demographic Characteristics of Participants*

Participants	Gender	Age	Grade	Education Environment	Diagnosis	Intelligence Division
Student 1	M	21	11.Grade	Ind. Ed. Class.	Moderate Int. Dis.	55
Student 2	M	19	10.Grade	Ind. Ed. Class.	Moderate Int. Dis.	50
Student 3	M	17	10.Grade	Ind. Ed. Class.	Moderate Int. Dis.	55

The first participant has been attending the 11th grade at the special education practice school where he is currently enrolled for four years. Student 1 has the ability to communicate by forming two- and three-word sentences. He can communicate with his peers and family members in his immediate environment. He can initiate communication by asking questions and can respond to simple questions asked to him, yet has limitations in the pronunciation of some words, which creates difficulties in comprehension of his speech. He can match the interactive visuals shown on the tablet computer, say their names, and show the desired one among the visuals presented on the tablet computer. The average duration of listening to a video story is 11 minutes. He has the skills to recognize and use writing utensils, hence possessing the ability to go over the written forms of sounds with dots with a pen. Unsuccessful literacy attempts were made with this participant in

previous years with different teachers using traditional methods. The participant cannot distinguish any other sound except the sound "e". No functional reading work has been done with the participant before.

The second participant has been enrolled for two years in the 10th grade at the special education practice school where he is currently enrolled. Student 2 has self-care skills, large muscle-small motor skills and communication skills. He can independently perform daily living skills such as kitchen skills, clothing care, house cleaning and organization. He can independently perform basic math and social life skills, can follow the instructions given to him and he can follow an activity carefully for at least 15 minutes. Additionally, he speaks less than average and he has a calm structure. He responds to questions in a low voice and later than the other subjects. In previous years, phonics-based literacy teaching was attempted but the attempts were unsuccessful. He does not have reading and writing skills and no functional reading study was conducted with the participant before the research.

The third participant has been studying in the 10th grade at the special education practice school where he is currently enrolled for the last two years. Student 3 can independently perform self-care, communication and large muscle-small motor skills. He has basic math skills. He is able to fulfill two- and three-step instructions given to him and fulfill social life skills. He has fine and gross motor skills, he h as receptive language skills, uses some sounds incompletely and incorrectly while fulfilling expressive language skills. He haas limited fluency in speech and limited understanding due to pronunciation and he haslimitations in initiating a conversation and asking questions. He does not have reading and writing skills.

Data Collection Instruments and Procedures

Three different data collection instruments were created for the study. These are 1) Criterion Dependent Measurement Instrument, 2) Social Validity Forms, and 3) Reliability Forms. In this part of the study, information about the data collection instruments, the contents of these instruments and how they were used in the implementation process of the study are described.

The criterion-dependent measurement instruments in the study were created to reveal the students' performances in the baseline, probe, monitoring and generalization sessions for 10 target words on the tablet computer. A sample criterion-dependent measurement instrument is given in Appendix 6 in the APPENDICES section.

In order to obtain baseline and probe data for the 10 target words on the tablet computer presented to the students, the sub-stages of the word reading stage of the application were transformed into notifications. Proper criteria were determined for all the statements and questions were created for the students' performance in meeting the criteria for the statements. Students' pre-implementation data were collected with this criterion-dependent measurement instrument.

Used in the Implementation Phase

In this study, as mentioned before, EFWS consists of the stages of reading the target word presented via tablet computer, matching the word with the image, matching the image with the word, and reading the target words from the given sentence and text. All these stages are in a sequence from simple to complex according to the order of occurrence. Therefore, criterion-dependent measurement instruments with sub-stages were prepared for each stage in line with the words taught. In the study, three different measurement instruments were developed to determine student performances in the baseline assessment, instructional sessions and generalization sessions in the real environment. Appropriate criteria were determined for all statements, and questions were created for students' performance in meeting the criteria for the specified statements. These instruments help the practitioner

and the students to decide whether to continue to the next stage while also assisting the practitioner in determining whether to move on to the next stage or to a new target word with the participants who meet the criterion. Sample measurement instruments can be found in Appendix 7 in the APPENDICES section.

Criterion Dependent Measurement Instruments Used in the Final Instructional Generalization Phase (Real Environment)

The study was designed to reveal the participants' performances towards the target words after the presentation of the target words to the participants with the tablet computer to determine the level of performance of the participants in reading the target words after 1 and 3 weeks and the level of their reading performance in real environments such as products, menus including the target words. In order to measure the participants' performances in real environments, they were evaluated on whether they could read the words functionally in different writing styles and font sizes on four different products, menus, and signboards in real environments, considering the environments they frequently use in daily life. Students are expected to read the word functionally on at least three different products in the real environment. Students' performance data for the target words were recorded. A sample measurement instrument is given in Appendix 8 in the APPENDICES section.

Analysis

In this part of the study, the data recorded in the Social Validity Forms, Implementation Reliability Forms, and Inter-observer Reliability Forms were interpreted and calculated after the EFWS implementation with tablet computers in teaching functional reading skills to students with intellectual disabilities.

Analysis of the Implementation

In order to measure the students' functional reading performances for the target words and to determine their progress in the implementation, measurement procedures were carried out by the researcher at the baseline level, during the implementation process, in the end-of-instruction mass probe sessions, generalization in the real environment, and 1- and 3-week follow-up sessions, and the data were recorded on the recording forms. The data obtained in this study were shown and interpreted graphically. In the graph, the horizontal line indicates the number of weeks and sessions, while the vertical line shows the target 10 words taught. The findings of the study were designed according to the multiple probe model with a between-subjects procedure and the graph was created and interpreted according to this design. In the graph, the effect of the independent variable on the dependent variable was analyzed. In this context, the study examined the effect of teaching sessions using EFWS delivered via tablet computer on students' acquisition of functional reading skills.

Social Validity Data Analysis

Semi-structured interviews were conducted face-to-face by filling out the Teacher and Family Social Validity Forms prepared by the researcher using open-ended questions. After obtaining the necessary permissions, a voice recorder was used to record the responses to the questions asked to teachers, parents and participants. These recordings were then tabulated and interpreted by the researcher using descriptive analysis method.

Implementation Fidelity -Data Calculation

Implementation fidelity is a reliability study carried out by monitoring and evaluating the implementer by a different observer in order to determine to what extent the implementer acts in accordance with the evaluation and implementation plan prepared (Er, 2020; Tekin İftar & Kırcaali İftar, 2012). Video recordings were taken continuously during the implementation process. The

implementation videos were watched by an expert teacher who completed his/her postgraduate education in the Department of Special Education, and implementation fidelity forms were filled out. The average of the baseline assessment sessions was calculated as 100%. The average implementation fidelity of the instructional sessions was calculated as 99.64% (maximum 99.72% and minimum 99.57%). The average of the first follow-up sessions was 99.87% and the average of the second follow-up sessions was 99.93%. The implementation fidelity of the generalization sessions was calculated as 100%.

Table 2. *Implementation Fidelity Data*

STUDENTS						GENERALIZATION	TOTAL
Student 1	100	99,72	100	99,87	100	100	99,93
Student 2	100	99,65	100	99,76	100	100	99,90
Student 3	100	99,57	100	100	99,80	100	99,92
Total	100	99,64	100	99,87	99,93	100	99,90

Inter-observer Reliability Data Calculation

Inter-observer reliabilities of the baseline, end of instruction, probe and follow-up sessions were calculated. Two different observers monitored 30% of the videos from all phases, recorded the data and made their calculations. One of the observers was an expert who was an observer in the previous phase, and the other was a teacher who graduated from the field of special education and was working at the school while pursuing her master's degree in the field of special education. A 40-minute briefing meeting was held with the second observer in order to overcome the differences in observation experience and knowledge about the process between the two observers. Then, the two observers recorded the data of 30% of the application videos separately through unbiased assignment, and the inter-observer reliability data were calculated by comparing the reliability forms of the application.

Table 3. *Inter-observer Reliability Data*

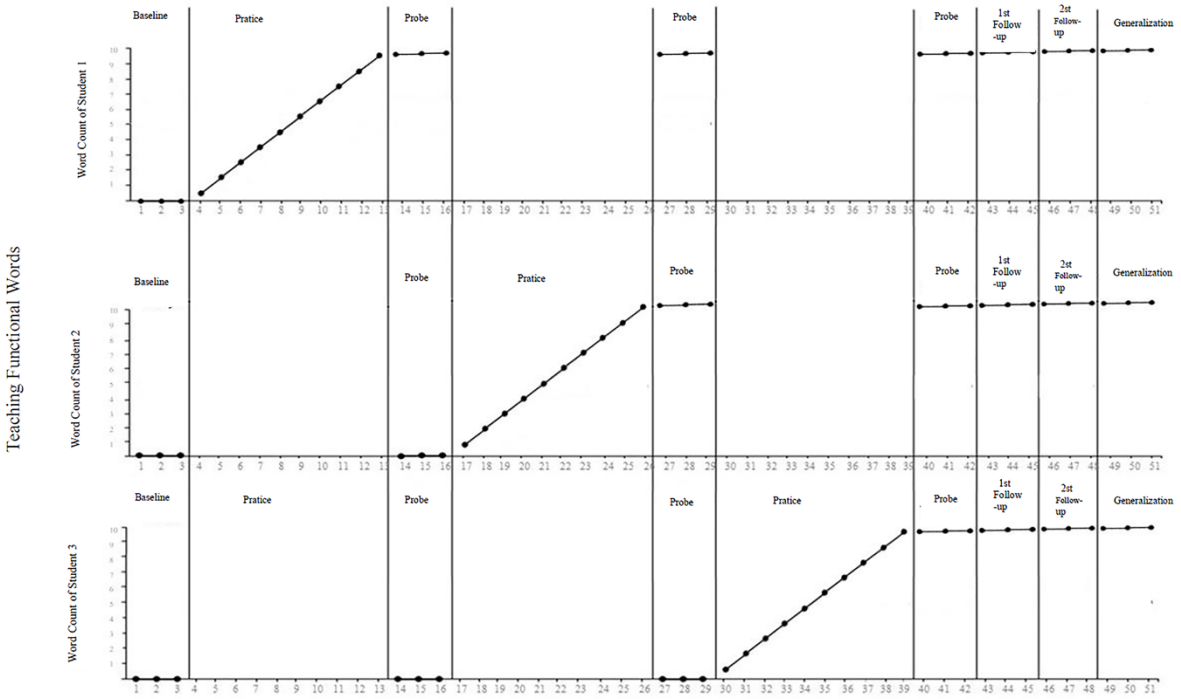
PARTICIPANTS	OBSERVER RELIABILITY IN EVALUATION SESSIONS
First Participant	99,4%
Second Participant	100%
Third Participant	100%
Total	99,85%

Ethics

This research was ethically approved by Necmettin Erbakan University Social and Human Sciences Scientific Research Ethics Committee with the decision numbered 2021/242 on 16.04.2021.

RESULTS

In this study, the effectiveness of EFWS presented with a tablet computer in teaching functional reading skills to three high school students with intellectual disabilities was tested using the multiple probe design of the multiple probe model, one of the single-subject research methods, with an inter-subject probe phase. In this part of the study, the results obtained during the implementation are presented. The results are listed according to the research objectives.



Graph 1. *Functional Reading Levels of Three Participant Students for Baseline, Practice, Probe, Follow-up and Generalization Sessions*

End-of-Instruction Findings

The findings regarding the effect of EFWS presented with a tablet computer on the acquisition and maintenance of functional reading skills of all students participating in the study are presented in Graph 1. The functional words determined in accordance with the needs and preferences of the three students participating in the study were "Water, Milk, Tea, Egg, Soup, Meatball, Cake, Soap, Toilet, Market". The end-of-instruction findings of the first, second and third students in the study are given below, respectively.

The number of functional words to which Student 1 responded correctly in the probe, practice and monitoring phases regarding his functional reading skills is shown in Graph 1. As can be seen in the graph in the figure, in the baseline phase, Student 1Student 1's functional reading skill was at the level of 0%. After obtaining stable data, the implementation phase was started. In Student 1Student 1's practice phase, there was a 100% change in the correct response percentages for 10 functional target words. In Student 1Student 1's practice phase, there were the words "Water, Milk, Tea, Egg, Soup, Meatball, Cake, Soap, Toilet, Market".

Student 1 was able to read independently at the end of all teaching sessions of EFWS provided with a tablet computer. Student 1 was able to read the 10 functional words that he could not read at the baseline level in the mass probe sessions. The correct response percentage of the Student 1 for reading the 10 target words was 100% and the implementation phase was completed. After the end of the instruction of the functional words in the EFWS, the student performed at the 100% level in the follow-up sessions organized 1 and 3 weeks later. In the generalization sessions, the student also performed at 100% level in the assessments of functional words in the real environment.

The number of correct responses of the student in the baseline assessment, probe, practice, monitoring and generalization phases for the functional reading skills of Student 2 is shown in Graph. 1. As seen in Graph 1, in the baseline phase, the number of correct responses of Student 2 in functional

reading skills was 0. After obtaining stable data, the implementation phase was started. The number of correct responses of Student 2 for 10 functional words in the practice phase varied between 0 and 10. Student 2 was able to read the 10 functional words that he could not read at the baseline level in the probe sessions. Student 2's number of correct responses was found to be 10, and the implementation phase was terminated at the performance level. After Student 2 teaching of the functional words in the EFWS ended, he performed at 100% level in the follow-up sessions held after the first and third weeks. In the evaluations of the functional words in the real environment in the generalization sessions, Student 2 responded correctly to all 10 words and performed at 100% level.

The number of correct responses of Student 3 in the baseline assessment, probe, practice, monitoring and generalization phases for functional reading skills are shown in Graph 1. As shown in Graph 1, in the baseline phase, Student 2's number of correct responses in functional reading skills was 0. After obtaining stable data, the implementation phase was started. In the practice phase of Student 3, the number of correct responses for 10 functional words was between 0 and 10. In the implementation phase of Student 3, the instructional sessions organized for the 10 functional words started in the 30th session and ended in the 42nd session. Student 3 responded correctly for all 10 functional words. Student 3 met the criterion for reading the identified functional words, the intervention sessions ended and the third probe sessions were conducted. In the last probe sessions, the same interactive web page presented with the tablet computer used to obtain baseline data was used. Student 3 was able to do the EFWS presented with the tablet computer independently at the end of all instructional sessions. Student 3 was able to read 10 functional words that he could not read at the baseline level in the mass probe sessions. Student 3 correct response number was found to be 10, and the implementation phase was terminated at the performance level. Student 3 performed at the 100% level in the follow-up sessions held 1 and 3 weeks after the end of the teaching of the functional words in the EFWS. In the evaluations of the functional words in the real environment in the generalization sessions, Student 3 responded correctly to all 10 words and performed at the 100% level.

The findings regarding the first aim of the study, which is the effect of EFWS provided with a tablet computer on students' acquisition and maintenance of functional reading skills, are presented in Graph 1. As seen in Graph 1, the participant students did not have functional reading skills in any word at the baseline level. In the process of applying EFWS to the students, there was a 100% increase between the baseline and functional reading levels. Student 1, Student 2 and Student 3 were able to read the words "Water, Milk, Tea, Egg, Soup, Meatball, Cake, Soap, Toilet, Market" in the implementation sessions. Graph data were in the direction of the vertical slope, and at the end of the instruction, students were able to read all the words in the probe sessions. In the third probe, follow-up and generalization sessions taken after the intervention, there was no change compared to the probe sessions taken at the end of the instruction, and the functional reading levels of the students remained the same. When the follow-up data collected one and three weeks after the end of the intervention were analyzed, there was no change in the first and second follow-up sessions compared to the end-of-instruction probe sessions, and the functional reading levels of the students remained the same. The results of the follow-up evaluation show that all students maintained their end-of-instruction performances one and three weeks later. In the generalization session for all students, there was no change compared to the probe sessions and the functional reading levels of the students remained the same. The probe data of the generalization session showed that the participants were able to generalize their end-of-instruction performances to the real environment (market, café) as well as their performances in the follow-up sessions conducted one and three weeks later.

As a result, Student 1, Student 2, and Student 3 were able to read all of the words "Water, Milk, Tea, Egg, Soup, Meatball, Cake, Soap, Toilet, Market" with the EFWS presented with the tablet

computer. The rate of change in the functional reading levels of three students in the end-of-instruction probe data compared to the baseline data was 100%. These results show that the EFWS presented via tablet computer is effective in teaching and generalizing functional reading skills to individuals with moderate intellectual disability and maintaining them for one and three weeks after the end of the intervention.

Social Validity Findings

In this section, the effectiveness of EFWS in teaching functional reading skills to students with intellectual disabilities through tablet computers was analyzed by collecting and calculating data with Parent, Teacher, and Participant Social Validity Forms. For this reason, teacher and parent social validity forms and participant social validity forms, which were created by the researcher to obtain the opinions of students, parents and teachers after the implementation, were used. The social validity forms in the study were prepared as open-ended questions and applied in the form of semi-structured interviews. Parents and teachers expressed positive opinions on all of the questions posed to the three participants regarding the social validity of functional reading instruction. The parents of the participants stated that their children started to go to school more willingly and developed positive attitudes towards school and functional reading. They also stated that their children were able to read the 10 target words they acquired during the implementation.

The majority of the parents stated that the 10 target words taught supported their children's independent lives, were a start for them to stand on their own feet in daily life, and helped them love school and reading. Teachers and parents expressed that there was no negative or disliked aspect of the implementation process of the research. Again, parents and teachers expressed that the implementation process was carried out in a healthy way despite the restrictions due to the COVID-19 pandemic while also highlighting that their children/students learned quickly and developed positive attitudes towards reading and school. They thought that it would be extremely beneficial to extend this practice to other individuals with moderate intellectual disabilities. In summary, the social validity findings show that EFWS is an effective method for teaching functional reading to students with intellectual disabilities with tablet computers in terms of social validity when the opinions of parents and teachers are considered.

In the interviews with the participants, it is evident that they responded positively to all the questions asked. They indicated their happiness and satisfaction with participating in this study. They expressed that they would like to learn new words other than the ten words they learned and that they would like to continue this study with their other teachers. Participants also indicated that they were able to read some of the functional words they learned when they saw them outside of school or at home. They also expressed that the functional words they learned to read through the tablet computer were useful for them. The participants further expressed they did not have any difficulties during the study.

DISCUSSION AND CONCLUSION

In this study, the effectiveness of EFWS delivered via tablet computer in teaching functional reading skills to three participants with moderate intellectual disability at high school level was investigated. The findings of this study proved that EFWS delivered via tablet computer is effective in teaching functional reading skills to the participants. After the implementation of the EFWS delivered via Tablet Computer, the participants maintained their performance for the 10 target words in generalization sessions and follow-up sessions in the first and third weeks. According to the social validity findings, which is another aim and result of the study, parents, teachers, and participants expressed positive opinions about the implementation of EFWS delivered via tablet computer. In this context, it is concluded that EFWS offered via tablet computers has social validity. The positive opinions

about the implementation of EFWS presented through tablet computers showed that functional reading instruction can be provided to a wider audience in the ongoing process.

In this study, the effect of EFWS delivered via a tablet computer on teaching functional reading skills to three students with moderate intellectual disability was tested. When the post-instruction findings of the participants of the study were analyzed, it was found that they gained functional reading skills for all 10 target words. Therefore, EFWS delivered via tablet computer to all three participants was found to be effective. There is no study on EFWS provided to children with moderate intellectual disability via tablet computer. On the other hand, Er (2020) conducted a study investigating the effectiveness of EFWS with cards. Another local study is the study conducted by Eliçin (2015) testing the effectiveness of the program presented through a tablet computer in teaching functional reading skills to children with ASD. In the international literature, there are studies investigating whether the Edmark Reading Program is effective (Barrier 1981; Brown, 1984). In recent studies, there are studies comparing the Edmark Reading Program with other literacy methods (e.g., Bruni & Hixon, 2017). The results of these studies suggest that the Edmark Reading Program is effective for individuals with intellectual disabilities. Considering the findings of this study, it supports other research findings presented in prior studies.

In this study, as of 2018, functional reading contents according to the Edmark Reading Program, which is included in the Turkish, Reading and Writing course curricula and textbooks in the second and third level schools of the Ministry of National Education Special Education Implementation School, were designed as interactive web pages presented with tablet computers and used as assistive technology. In this respect, the study is considered to be important in terms of being one of the few studies conducted in Turkey. It was stated that it would be beneficial to work with error-free teaching methods in the implementation of EFWS to individuals with special education needs (Edmark, 2013). As can be seen in the literature review, there are studies examining the effect of Instructional Management with Simultaneous Prompting in the implementation of functional reading skills (Er, 2020; Schuster et al., 1992; Waugh et al., 2011). Although most of these studies were not conducted for the Edmark Reading Program, they can be examined in terms of the techniques used in vocabulary instruction sessions. In this study, it was observed that the simultaneous prompting method used in the implementation phase was effective and in this respect, it coincided with the results of other studies (Mechling & Gast, 2003). When the literature is analyzed, the results of many studies demonstrate that participants with moderate to severe intellectual disability acquire functional word reading skills (Eliçin, 2015; Er, 2020; Fiscus et al., 2002). Three participants of this study had moderate intellectual disability and could read 10 target words functionally. This study is in parallel with the results of other studies analyzed in the literature.

When the first question of the study is analyzed, the effectiveness EFWS presented with a tablet computer on the reading of target words by the participant individuals was investigated. In the research, it have to be clear that EFWS presented with a tablet computer is effective. The graph analysis shows that all three participant students learned to read ten target words. When the research findings are evaluated in terms of effectiveness, it is observed that the EFWS teaching study supports the findings of other studies conducted with children with intellectual disabilities in national and international literature.

In the second question of the study, the effect of tablet computer instruction on the reading of target words by the participants was analyzed. It is seen that teaching with a tablet computer has an effect on the reading of target words by the participant individuals. In the second question, teaching with tablet computers was effective in EFWS, in which individuals with moderate intellectual disability participated. However, there are differences between the participant individuals in terms of the duration

of instruction with the tablet computer. It is considered that the differences in the total session duration between the participant individuals stem from their previous experience of using tablet computers or portable devices. There was a significant difference between the first participant, the second participant and the third participant. This is believed to be due to the fact that the first participant has more experience in the use of tablet computers than the other participant individuals.

Thirdly, an answer was sought to the the third research question whether the participants maintained their performances. When the results of the research are examined, it can be shown that the participant can continue to read all ten target words functionally after one and three weeks. Due tothe COVID-19 restrictions and the health problems of the participants, the follow-up session to be held five weeks later could not be conducted. This shows that the participant individuals maintained their performance after one and three weeks. It is thought that the participants maintained their performances in 1 and 3 weeks due to the fact that EFWS has a systematic structure, teaching with simultaneous prompting, which is one of the errorless teaching methods, the content is more remarkable because it is interactive and presented with a tablet computer, this time is used more for teaching and repetitions since it does not require preliminary preparation for the materials, and generalization is carried out in real environments.

In the fourth question of the study, following the teaching of EFWS provided to the participant individuals with a tablet computer, the participants' families were asked about their views on functional reading performances. The opinions of the families and teachers of the participant students revealed that the 10 words taught contributed to their children's independence. The parents of Student 2 stated that their child could easily buy the product he wanted in the market by reading the functional words he learned. The parent of the third participant said that he could now find his place by reading the toilet sign outside the home and at school. Hhe stated that he could read the ten target words taught on labels, food and beverage menus, on products, and on signs in school or community areas. This is likely to be due to the number of repetitions of the target words presented with the tablet computer in the instructional sessions, the number of repetitions in the monitoring sessions, and the fact that the generalization sessions were conducted in the real environment.

In the fifth question of the research, the participants were asked about the opinions of their teachers regarding the functional reading performances of the participants after the teaching of EFWS presented with a tablet computer. In line with the findings of the research, classroom teachers reported that EFWS presented with a tablet computer was effective for the participant students. They concluded that the teaching of target words was faster and more permanent than other traditional methods. Teachers also concluded that the teaching of EFWS presented with a tablet computer was beneficial for the development of independent living skills of the participant students. This is considered to be due to the fact that the selection of target words by the researcher was made by taking into account the needs of the participant students in line with the opinions of parents and teachers.

In the sixth question of the study, the question “What are the opinions of the participant individuals about their own performance levels in exhibiting functional reading skills after the implementation of EFWS presented with a tablet computer?” was sought to be answered. The participant students were pleased to participate in the study andthey wanted to continue this study with other teachers by learning new words. Three participant students also stated that the functional vocabulary reading study was useful for them. This is considered to be due to the fact that the study was presented on a tablet computer, there was visual and auditory support in the program, and the generalization sessions were conducted in real environments. The social validity findings collected and analyzed in this study show that in addition to the objectives of the study, they also overlap with the main objectives of other studies on teaching functional reading skills in the literature.

Moreover, when studies similar to this study are examined in the literature, one can conclude that there are studies that reveal the comparative effectiveness of different teaching methods in literacy teaching and the effectiveness of computer-based instruction in literacy teaching. The research findings of Akçin's (2013) study showed that and in that particular study, prompt fading instruction were equally effective in helping participants learn to read visual words. When the results of the study are considered, it is estimulated that the fixed waiting time instruction method, which is one of the errorless instruction methods, is effective in functional word reading. In this sense, the results revealed thatEFWS using the simultaneous prompting instruction method, which is one of the errorless instruction methods used in this study, was effective. Akçin's (2013) study and this study are in parallel in terms of the effectiveness of the results by using errorless teaching methods in terms of literacy learning. Özak (2008) investigated the effectiveness of simultaneous prompting presented via computer in teaching reading skills to students with intellectual disabilities. , This study demonstrated that simultaneous prompting instruction via computer was effective in teaching reading skills to students with intellectual disabilities. According to the findings of the study, it has been observed that the subjects achieved high levels of retention and generalization (Özak, 2008). It is also observed that the results of this study are similar to the results of Özak's (2008) study in terms of the effectiveness of the simultaneous prompting instruction method presented via computer in functional literacy instruction. Therefore, it can be concluded that both studies have effective results in terms of both the use of computer and the use of simultaneous prompting method in literacy instruction.

There are a number of limitations in this study. One of these limitations is that 1 and 3 weeks follow-up data were collected. The fifth week follow-up data collection was not possible due to COVID-19 pandemic restrictions and health problems of the participant students. The second limitation is that 10 target words that are assumed to be functional were determined by asking the participant students, their families, teachers, and finally themselves, hence being taught. Moreover, in the study, whether the participant students were able to read the taught words functionally was tested in a small number and limited amount of real environments, and it would be more useful to test the functional reading of the target 10 words more comprehensively and by directly observing the participants in real-life environments. Another limitation is the need for an internet connection since EFWS, which is presented with a tablet computer, works through a website. The words in the tablet program need to be changed; for example, when one set is finished, the words of the other set should be activated. The need for an internet connection for EFWS is among the limitations of this study. In order to improve or repeat this study in future research, web design of the content to be used in functional reading instruction or tablet computer applications will be necessary. In this case, a budget should be allocated for the designs to be done. However, considering the possibility of repeating the study in future research, the website was designed as an open address. For future research, the researcher and the content used in the study can be reached at www.islevselokuma.com.tr.

The present study demonstrated that EFWS presented with a tablet computer was effective for teaching functional reading skills to individuals with moderate intellectual disabilities. The results of this research can be listed as follows; (a) EFWS presented with tablet computer was effective in teaching target words for functional reading to students with intellectual disabilities, (b) the use of tablet computer was effective in the implementation of EFWS for students with intellectual disabilities, (c) simultaneous prompting method was effective in teaching target words to students with intellectual disabilities with EFWS presented with tablet computer, (d) after teaching with EFWS presented with tablet computer, students with intellectual disabilities can generalize the target words to the real environment (market, café), (e) after teaching with EFWS presented with tablet

computer, the reading levels of students with intellectual disabilities continue after 1 and 3 weeks, (f) the opinions of families, teachers and students regarding the social validity of the research in the implementation of EFWS presented with tablet computer to students with intellectual disabilities are affirmative. The effectiveness of EFWS presented with a tablet computer was tested on individuals with moderate and severe intellectual disabilities in a special education application school in Konya province. Functional reading instruction was provided with EFWS for ten target words.

Future studies can be carried out in different settings (children's homes), with different people (parents, teachers), with different groups with different developmental disabilities (ASD, Multiple Disabilities). In this study, in the effectiveness of EFWS presented with a tablet computer, individuals with moderate and severe intellectual disabilities were practiced reading the word, matching the word with the image, reading the word in sentence and text for ten target words. Research can be conducted in which writing stages are included along with functional reading.

Ethical Statement

This study is based on the master's thesis titled "The Effect of Edmark Reading Program Functional Words Series Presented with Tablet Computer in Acquiring Functional Reading Skills for Students with Intellectual Disabilities" submitted on 16.04.2024 under the supervision of Associate Professor Zehra ATBAŞI.

Ethics Committee Approval

16/04/2021 dated and 2021/242 numbered ethics committee approval was given by Necmettin Erbakan University, social and human sciences ethics committee.

Author Contributions

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Data Collection (CRediT 2) Author 1 (%55) – Author 2 (%45)

Research - Data analysis - Validation (CRediT 3-4-6-11) Author 1 (%60) – Author 2 (%40)

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No financial support was received during the research process. There is no conflict of interest in this study.

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