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The Effect of Digital Stories about Healthy Eating on Health Behaviors of Primary School Children

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Sebahat Türkyılmaz* **Seher Esen****

Menşure Alkış Küçükaydın***

Abstract

In this study, the effects of digital stories about healthy eating developed for primary school 2nd-grade students on health perception, nutritional behavior, nutritional self-efficacy, and nutrition attitude were investigated. The study, in which the quasi-experimental design with the pre-test and post-test control group was used, was carried out with 90 students studying at a public school in Istanbul. In the control group, the primary school life science textbook was used in accordance with the program. In the experimental group of the research, the teaching of healthy and balanced eating was carried out through digital storytelling for five weeks. Children's Dietary Self- Efficacy Scale, Health Perception Form, Food Behavior Scale, and Nutrition Attitude Scale were used in the study. The obtained data were subjected to parametric analysis. At the end of the study, it was observed that there was a positive change in the health perception, nutritional behavior, nutritional self-efficacy, and nutrition attitudes of the students in the experimental group. On the other hand, it was observed that the nutritional self-efficacy and nutritional behavior scores of the control group students increased in the post-tests. The results obtained showed that the digital storytelling approach was effective. Based on this, it is suggested to examine the effect of the relevant method on different variables.

Keywords: Digital storytelling, healthy eating, healthy behavior, primary school children

* *Corresponding Author:* PhD. Student, Necmettin Erbakan University, Institute of Education Sciences, Konya, Turkey. E-mail: turkyilmazsebahat@gmail.com, https://orcid.org/0000-0002-9784-4183

** Research Assist., Selçuk University, Faculty of Education, Konya Turkey. E-mail:seheresen42@gmail.com, https://orcid.org/0000-0002-3569-1185

*** Assoc. Prof. Dr., Necmettin Erbakan University Eregli Faculty of Education, Konya, Turkey. E-mail:mensurealkis@hotmail.com, https://orcid.org/ 0000-0003-4410-1279

Sağlıklı Beslenme Konusunda Hazırlanan Dijital Öykülerin İlkokul Çocuklarının Sağlık Davranışları Üzerindeki Etkisi

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Sebahat Türkyılmaz* **Seher Esen****

Menşure Alkış Küçükaydın***

Öz

Bu çalışmada, ilkokul 2.sınıf öğrencileri için geliştirilen sağlıklı beslenme konulu dijital öykülerin sağlık algısı, beslenme davranışı, beslenme öz-yeterliği ve beslenme tutumu üzerindeki etkileri araştırılmıştır. Ön test son test deney-kontrol gruplu yarı deneysel desenin kullanıldığı çalışma, İstanbul ilinde bir devlet okulunda öğrenim görmekte olan 90 öğrenci ile gerçekleştirilmiştir. Kontrol grubunda ilkokul hayat bilgisi ders kitabı programına uygun biçimde öğretim gerçekleştirilmiştir. Araştırmanın deney grubunda ise sağlıklı ve dengeli beslenme konusunun öğretimi beş hafta boyunca dijital öyküleme yoluyla yapılmıştır. Çalışmada Çocuk Beslenme Öz-Yeterlik Ölçeği, Sağlık Algısı Formu, Beslenme Davranış Ölçeği ile Beslenme Tutum Ölçeği kullanılmıştır. Elde edilen veriler parametrik analizlere tabii tutulmuştur. Çalışma sonunda deney grubunda yer alan öğrencilerin sağlık algısı, beslenme davranışı, beslenme öz-yeterliği ve beslenme tutumlarında olumlu yönde değişim olduğu görülmüştür. Bununla beraber kontrol grubu öğrencilerinde son testlerde beslenme öz-yeterliği ile beslenme davranışı puanlarının arttığı görülmüştür. Elde edilen sonuçlar dijital öyküleme yaklaşımının etkili olduğunu göstermiştir. Buna dayanarak ilgili yöntemin farklı değişkenler üzerindeki etkisinin incelenmesi önerilmiştir.

Anahtar Sözcükler: Dijital öyküleme, ilkokul öğrencisi, sağlıklı beslenme, sağlık davranışı

* *Sorumlu Yazar:* Doktora Öğrencisi, Necmettin Erbakan Üniversitesi, Eğitim Bilimleri Enstitüsü, Konya, Türkiye. E-posta: turkyilmazsebahat@gmail.com, https://orcid.org/0000-0002-9784-4183

** Arş. Gör., Selçuk Üniversitesi, Eğitim Fakültesi, Konya, Türkiye. E-posta: seheresen42@gmail.com, https://orcid.org/0000-0002-3569-1185

*** Doç. Dr., Necmettin Erbakan Üniversitesi, Ereğli Eğitim Fakültesi, Konya, Türkiye. E-posta: mensurealkis@hotmail.com, https://orcid.org/ 0000-0003-4410-1279

Introduction

It is known that inadequate and irregular nutrition and a lack of hygiene cause diseases. Inadequate or excessive nutrition that does not comply with hygiene rules triggers infectious diseases (Vilar-Compte et al., 2021) and increases the likelihood of conditions such as cardiovascular diseases, obesity, and cancer (Gupta, Bray, Kumar, & Johnson, 2017; Lee et al., 2014; Tian & Tien, 2020). In addition, unhealthy eating can lead to dangerous weakness and psychological distress (Teo, Chin, Lim, Masrom, & Shariff, 2019). In order to avoid these problems, it is necessary to gain healthy eating habits at a young age, because these habits positively affect both the school success and nutrition perceptions of children (Meydanlıoğlu, 2016).

If children and parents are made aware of healthy living, a positive attitude about healthy eating can develop (Branen & Fletcher, 1999). Especially since the habits acquired during childhood are more likely to be permanent (Manios et al., 2004), these ages are important in terms of gaining healthy eating habits. In addition, healthy eating habits gained in childhood continue throughout life (Aslan et al., 2003; Chae & Chung, 2021; Manios et al., 2004). Branen and Fletcher (1999) examined the relationship between the eating habits of university students and their childhood eating habits and revealed that there is a connection between childhood and adult eating habits. Therefore, childhood is a very important period for developing positive health behaviors.

The relevant literature indicates that there is a need for policies and programs aimed at preventing diseases caused by unhealthy and irregular eating (Rosi et al., 2016; Van Cauwenberghe et al., 2010). Policies and practices needed for healthy living can be implemented through schools. In this context, school-based practices can offer opportunities for healthy eating education (Wechsler, Devereaux, Davis, & Collins, 2000). Education is defined as ensuring the desired behaviors in individuals. Educating children about the concepts related to nutrition and increasing the level of healthy nutrition is very important in the educational process (İnalcık & Angın, 2021). It is believed that learning the principles of healthy nutrition and adopting these principles as a lifestyle during primary school prevents many diseases, especially obesity (Salas, Forhan, Caulfield, Sharma, & Raine, 2017). Thus, including food and nutrition-related topics in the curriculum of the first years of school is an important step in terms of establishing the foundations of nutrition education and nutrition literacy at an early age. In addition, the curriculum in primary school touching on issues related to food and nutrition is an important indicator that nutrition education and nutritional literacy are acquired at an early age (Aktaş, 2021). According to studies conducted in different countries of the world, the common opinion of experts is that nutritional behaviors and dietary habits are acquired and shaped in childhood, and that this also affects an individual's later life (Zembat et al., 2015). In order for primary school children to have a healthy lifestyle, good eating, and good cognitive performance and lead a quality life, there is a need for programs that encourage healthy eating and an active life (Teo et al., 2019). Moreover, it has been observed that school-based education on healthy eating is effective in changing the behavior of school-age children (Van Cauwenberghe et al., 2010). This shows that the most important period in which eating habits and health behaviors are acquired is the school-age period (Akder, Meseri, & Çakıroğlu, 2018; Tural Büyük & Topçu, 2015). Acquiring correct behaviours in early childhood is important for the child to start a quality life and to prevent or minimize problems that may occur in the future (Elliott, 2006). Malnutrition or excessive eating cause obesity, vitamin deficiencies, tooth decay, constipation or diarrhea, diabetes, heart diseases and infectious diseases. These behaviours may also cause problems such as fatigue, restlessness, irritability, attention deficit and learning disabilities (Food and Agriculture Organization of the United Nations, 2005). Thus, it is important for children to develop healthy eating habits with the help of talented teachers (Kolbe, 1993).

The school-age period covers ages between 6-12, and this period constitutes the foundation for the acquisition of healthy nutrition and lifestyle habits for children and it is the period when healthy eating awareness is established (Ministry of Health, 2016). During this period, children acquire most of the behaviors that they will maintain throughout their lives. Children's energy and nutrient requirements must be met in an adequate and balanced manner in order to achieve healthy development. Therefore, schools have an important function in raising awareness of a healthy life and preventing diseases caused by unhealthy eating (Story, 1999). It is possible to use products of children's literature and the use of these products supported with technology to help children gain the right eating habits. Children's

literature is a genre of literature that considers children's mental, emotional, social and linguistic development by aligning itself with individuals in the period of primary school, and helps children recognize themselves, guides them in achieving the right behaviour and contributes to development of a sense of aesthetics (Tüfekçi Can 2012). Therefore, this genre has a significant impact on the social development of children, and thus on social progress. Especially feelings, thoughts and actions of protagonists, and solutions that these protagonists reach in fairy tales, short stories and novels are important role models for children (Sever, 2008). Schools can benefit from technology while fulfilling these functions. It is seen that the use of digital stories as an effective educational tool in this context has become widespread recently.

Digital storytelling is seen as a powerful tool for teachers and students (Robin, 2006; Smeda, Dakich & Sharda, 2010). According to Robin (2008), using digital storytelling in the field of education enables collaborative learning by enabling both teachers and students to obtain information and use their problem-solving skills effectively. Digital stories are a student-centered method that enriches the learning environment by combining elements such as text, images, videos, and music (Chung, 2006) in the computer environment (McLellan, 2007) in order to increase 21st-century skills, visual skills, collaboration skills, and technology use. Digital storytelling tools can be used at many levels from primary education to higher education (Dakich, 2008; Smeda et al., 2010). Unlike traditional storytelling, digital storytelling studies turn learners from passive listeners into active participants (Dörner, Grimm & Abawi, 2002). When teaching processes are planned systematically, digital storytelling is a versatile teaching tool that empowers teachers, motivates students to participate in the lesson (Yang & Wu, 2012), attracts students' attention, and creates a creative learning environment (Sadik, 2008). According to Miller (2009), digital storytelling increases students' motivation by allowing them to personalize their learning experiences. Smeda et al. (2010) attribute the increased motivation to the fact that students see the information they learn through digital storytelling as useful and that they can use this information in other subjects. It has been reported that students' interest, focus, and motivation increase in lessons in which digital stories are used (Robin, 2006; 2008). In addition, it has been determined that digital stories increase cooperation between students, facilitate the understanding of difficult-to-learn subjects (Van Gils, 2005), and enable easier integration of learned information into different fields (Sadik, 2008). Digital stories are a valuable tool enabling students to actively participate in the learning process, improves their decision-making skills by increasing their life experiences, and enables them to learn cooperatively by enabling group work (Behmer, Schmidt & Schmidt, 2006). The use of these tools increases in direct proportion to the active participation of students' research and editing skills in the digital storytelling process (Paull, 2002; Salpeter, 2005), because students who actively participate in the digital storytelling process can organize their ideas in order, gain the ability to ask effective questions, express their thoughts comfortably, verbally express without difficulty, and as a result develop communication skills (Robin, 2006).

The healthy future of societies depends on the healthy development of these societies (Merdol, 2008). A balanced and nutritious diet is one of the main requirements for an individual to have a quality and healthy life (Hasbay, 2004). The primary school age is a period when certain behaviors are acquired and education about healthy nutrition is especially important for children in this period (Çetiner, 2013). According to Sabbağ and Sürücüoğlu (2011), it is beneficial to start nutrition education in the primary school period. Dietary habits acquired during childhood affect both this period of an individual's life and the future of their life (Merdol, 2008). Dietary habits acquired during childhood also have an important role in eating disorders that may arise later in an individual's life (Kaya, 1999). Therefore, the topic of healthy nutrition taught at school has an important role in helping children gain information, behaviors and habits about what can be done to prevent diseases by teaching them desired behaviors related to balanced and adequate nutrition (Sabbağ, 2009). Balanced and adequate nutrition is required to support children's cognitive and behavioral skills and increase their learning capacity (Ruel & Alderman, 2013). In studies conducted on healthy nutrition in schools, it is reported that through teaching the subject in schools, children's academic development, their active participation in education and their quality of life have increased (Yabancı, 2011). This fact shows the importance of implementing healthy nutrition education programs in all schools.

Purpose of the Study

Considering the importance of the childhood period, it is seen that the health education to be given in schools during these periods needs to be presented in relation to both the age and cognitive level of the child and the curriculum gains. In this context, the relevant acquisitions are clearly included in the Life Studies Curriculum of the Ministry of National Education (Ministry of National Education [MoNE], 2018). Relevant achievements can be supported by digital stories and presented to students and awareness can be raised in children about healthy eating. Therefore, the aim of the present study was to examine the effect of digital stories on the healthy eating behaviors of primary school students. In the present study, the effectiveness of digital stories presented to primary school children on the subject of healthy nutrition was investigated. In this context, the following research questions were formulated:

1) Is there a significant difference students' pretest scores obtained from the health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

2) Is there a significant difference students' posttest scores obtained from the health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

3) Is there a significant difference scores obtained from the experimental and control group students' health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

4) Is there a significant difference between the final test scores of the experimental and control groups when the pre-test scores are examined?

Method

Research Design

A quasi-experimental design was used. In quasi-experimental research, assignments to groups are performed purposefully, not impartially as in experimental research (Büyüköztürk, Çokluk, & Köklü, 2020). In the pretest–posttest design with an unpaired control group, in which the research was conducted and which is frequently used in quasi-experimental studies, the experimental group and the control group are selected without random assignment, and the experimental process is applied only to the experimental group, while pretest–posttests are applied to the two groups (Sönmez & Alacapınar, 2019). Similarly, the aim of this study was to show the effect of digital stories about healthy nutrition. Experimental and control groups were created to show the effectiveness of the stories that were written. Through these groups, it will be possible to show whether the possible difference of results gained from the experimental group is caused by digital stories or not. For this reason, it was decided to use a quasi-experimental method in the present study.

Research Sample

The study included 2nd-grade students studying in a public school in Turkey in the 2020-2021 academic year. A convenience sampling technique was used. In this technique, it is essential to collect data from a sample group that the researcher can easily reach (Büyüköztürk, Kılıç, Akgün, Karadeniz, & Demirel, 2018). In the present study, the researchers used this technique, which allows for the collection of data in terms of time and space. The demographic information of participants was presented in Table 1. As can be seen in Table 1, a total of 90 students participated in the study and the experimental and control groups consisted of an equal number (n=45) of students. Equality was observed in the gender distribution of experimental and control groups. Accordingly, the number of female students is 25, and the number of male students is 20 in both groups. In this context, a total of 50 female and 40 male students participated in the study.

Table 1
Demographic Characteristics of the Participants

		Gender		
		Female	Male	Total
Groups	Experimental	25	20	45
	Control	25	20	45
Total		50	40	90

Research Instruments

Children's Dietary Self-Efficacy Scale (CDSS)

The CDSS was used to determine children's food preferences. The scale is one of the Child and Adolescent Trial for Cardiovascular Health Behavior Questionnaire scales that developed for the American population (Edmundson et al., 1996). The questions in the scale were used to determine the children's preferences for low-fat and low-salt food. The scale, which consists of 15 items, has a 3-point Likert type, single-factor structure. Scale items are scored in the range of -1 to +1 (-1: not sure, 0: somewhat sure, +1: very sure). The score obtained from the scale varies between -15 and +15, and as the total score increases, the level of self-efficacy also increases. The adaptation of the scale to Turkish language and culture was performed by Öztürk (2010). Accordingly, the content validity index of the scale was .90 and the Cronbach alpha value was .70. In our study, the internal consistency coefficient was .74.

Health Perception Form (HPF)

The HPF, developed by Öztürk (2010), was also used. They were asked to answer "yes" or "no" to statements such as "I believe that I am healthy". According to this, they were asked to choose the appropriate answer from the "bad, moderate, good, excellent" answers that took a value in the range of 1-4 points.

Food Behavior Scale (FBS)

The FBS was developed by the CATCH HBQ program (Edmundson et al., 1996). The scale consists of items in which children are presented with food options such as low salt/salty and high fat/low fat through visuals. They are asked which of the two foods shown in these items they would prefer. Scale items are scored as -1 for unhealthy food and +1 for healthy food, and the total score varies between -14 and +14. A high total score from the scale indicates healthy eating habits. The validity and reliability study of the Turkish version of the FBS was carried out by Öztürk (2010). As a result of the pre-application of the scale, the KR20 coefficient was .68 and the test–retest reliability was .74. The reliability coefficient calculated for the present study was .63.

Nutrition Attitude Scale (NAS)

The scale, which was developed by Arvidson (1990) to reveal children's attitudes towards improving heart health and adapted into Turkish by Öztürk (2002), consists of four subtests: "*exercise, nutrition, smoking, stress control*". In the present study, the nutrition subscale was used. The nutrition subscale reveals children's attitudes towards healthy food consumption. The items in the scale are scored with 1-4 points. High scores obtained from the scale indicate that the attitude towards healthy nutrition consumption is positive. The internal consistency reliability coefficient of the nutrition subscale is .67. It was .84 in the present study.

Procedure

An examination of the relevant literature reveals different opinions about the stages of creating digital stories. Barrett (2009) divides the digital storytelling process into five stages: story writing, sound recording, editing, collecting images, and creating and publishing stories. The digital storytelling process consists of writing a story, creating scenes according to the story, determining the appropriate multimedia elements, and publishing the story in a video format (Jakes & Brennan, 2005).

The present study was based on Barrett's (2009) model. Firstly, the text of the story was written, the visuals were prepared, and the sound recordings were arranged for the created digital stories. In the last stage, the digital stories created were published and shared with the students. In the present study, in which the effect of digital stories on health behaviors was investigated, the primary school program was applied in the control group, while digital stories were presented in addition to the program in the experimental group. Five different topics that will affect the health behaviors of the students were chosen and a digital story was created for each week. Expert opinions were obtained during the creation and implementation of the digital stories. After obtaining expert opinions, implementation was initialized. Before implementation, CDSS, HPF, FBS and NAS scales were applied to both experimental

and control groups as a preliminary test. Then the five-week implementation process began. In this process, the students in the control group continued their education as before and used their regular textbooks. The students in the experimental group were taught through digital stories that were reviewed by expert opinion for five weeks. In this process, students were shown the stories. Then discussions were started in the classroom and students were encouraged to think about healthy nutrition. At the end of the five-week process, the aforementioned scales were applied to the students in both the experimental and control groups as the final test. In this context, digital stories were presented to the students week by week, taking into account primary school gains.

Week 1: The subject of obesity was discussed. First, a scenario about obesity was created. Then the scenario was presented to the expert and any necessary changes were made. In the digital storytelling stage, scenario scenes were created and voiceovers were recorded and presented to the expert again. After any necessary adjustments, the subject of obesity was presented to the experimental group students. In the scenario, what obesity means, its causes and effects, and what should be done to not be obese are emphasized.

Week 2: The issue of nutritional deficiency was discussed. For this, the meaning of nutritional deficiency, its effects on the human body, the consequences of nutritional deficiency, and the issues to be considered are emphasized.

Week 3: What food safety means, what needs to be done at home to ensure food safety, the importance of washing food correctly, and why hygiene should be taken into account when purchasing food were highlighted.

Week 4: An interactive scenario was presented about the importance of balanced and regular eating, the benefits of fruits and vegetables, the importance of milk and dairy products in human life, and the contents of all these nutrients.

Week 5: The subject of dental health and care was discussed; the importance of tooth brushing, toothbrush cleaning, and what the expiration date of toothpaste means were discussed with digital stories.

Each story lasted an average of 6-8 minutes. During each story, attention was paid to interaction, and students' opinions were sought by interrupting the stories.

Data Analysis

Before the analysis of the data obtained in the present study, it was determined whether the data showed a normal distribution or not. Due to the appropriate sample size (N=90), Kolmogorov–Smirnov test results were first examined (Büyüköztürk, 2011) and it was found that the value achieved was not significant (p>.05). In addition, skewness and kurtosis values for each scale were examined (Table 2) and it was seen that they met the normality assumptions for parametric data analysis (Hair, Black, Babin, Anderson, & Tatham, 2013). Thereupon, it was decided to use descriptive analyses and an independent sample t-test, paired sample t-test, and ANCOVA in the study.

Table 2

Skewness and Kurtosis Coefficients of Data

	S	Skewness	Kurtosis
CDSS-Pretest	.406	-.730	.244
CDSS-Posttest	.512	-.522	-.209
FBS-Pretest	4.160	.296	-.428
FBS-Posttest	3.604	-.818	-.354
HPF-Pretest	.824	-.378	-1.086
HPF-Posttest	.694	-.640	-.720
NAS-Pretest	.813	-.770	.001
NAS-Posttest	.520	-.927	.172

Results

The findings obtained within the scope of the study were presented according to the sub problems of the research, respectively.

Is there a significant difference students' pretest scores obtained from the health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

In the present study, the effects of digital stories prepared on healthy eating self-efficacy and food behaviors of primary school students were investigated. In the study, which was carried out using a quasi-experimental application, it was first investigated whether the pretest scores of the experimental and control groups were similar (Table 3).

Table 3

Equivalence Comparison of the Scores from the Scales before the Application

Scale	Groups	N	Mean	S	*SD*	*t*	*p*
CDSS	Experimental	45	-.136	.379	88	.137	.89
	Control	45	-.148	.439			
CDSS	Experimental	45	-3.244	2.772	88	.101	.92
	Control	45	-3.333	5.204			

The pre application equivalence status of the experimental and control groups is summarized in Table 3. Accordingly, there is no significant difference between the pretest scores of the students in the experimental and control groups (p <.05). Since it was seen that the relevant assumption was met for the quasi-experimental study, the posttest data obtained from the scales were examined.

Is there a significant difference students' posttest scores obtained from the health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

Table 4 presents the findings regarding the effect of the experimental application on the eating self-efficacy of primary school students.

Table 4

Food Self-Efficacy Posttest Scores

Scale	Groups	N	Mean	S	*SD*	*t*	*p*
CDSS	Experimental	45	.792	.383	88	6.195	.00
	Control	45	.226	.477			

Table 4 shows the averages of the experimental and control groups after the application. Accordingly, the mean score of the experimental group (M = .792) was higher than that of the control group (M = .226) and the difference was statistically significant ($t_{(88)} = 6.195$; p >.05).

Is there a significant difference scores obtained from the experimental and control group students' health perception, nutrition behavior, child nutrition self-efficacy, and nutrition attitude scales?

The pretest and posttest results of the experimental and control groups of the relevant application were examined separately (Table 5).

Table 5

Food Self-Efficacy Pretest and Posttest Results of the Experimental and Control Groups

Groups		Mean	N	S	*SD*	*t*	*p*	*d*
Experimental	Pretest	-.136	45	.379	44	-13.858	.00	.93
	Posttest	.656	45	.256				
Control	Pretest	-.148	45	.439	44	-2.435	.01	.36
	Posttest	-.117	45	.548				

The paired samples t-test was used to determine the pretest–posttest values of the experimental and control groups (Table 5). Accordingly, there was a significant difference between pre application scores (M = -.136) and post application scores (M = .656) in the experimental group ($t_{(44)}$ = 13.858; p>.05). The effect size calculated as a result of the test (d = .93) shows that this difference is large (Cohen, 1992). There was also a significant difference between the pre application scores (M= -.148) and the post application scores (M = .117) in the control group ($t_{(44)}$ = -2.435; p>.05). The effect size calculated as a result of the test (d =.36) shows that this difference is small (Cohen, 1992). This showed that the posttest scores increased in the control group in which the application was not used, but the posttest scores obtained from the experimental group were higher both at the average level and at the effect level.

The effect of the digital stories prepared on food behaviors of primary school students was also investigated. The posttest data obtained from the scale are presented in Table 6.

Table 6

FBS Posttest Scores

Scale	Groups	N	Mean	S	*SD*	*t*	*p*
FBS	Experimental	45	8.400	2.750	88	8.523	.00
	Control	45	-1.200	7.037			

In Table 6, the averages of the experimental and control groups after the application are presented. Accordingly, it is seen that the mean score of the experimental group (M = 8.400) is higher than that of the control group (M = -1.200) and the difference is significant ($t_{(88)}$ = 8.523; p> .05). Then the pretest and posttest results of the experimental and control groups of the relevant application were examined separately (Table 7).

Table 7

Pretest and Posttest Results of the FBS in the Experimental and Control Groups

Groups		Mean	N	S	*SD*	*t*	*p*	*d*
Experimental	Pretest	-3.244	45	2.772	44	-18.967	.00	.95
	Posttest	8.400	45	2.750				
Control	Pretest	-3.333	45	5.204	44	-2.728	.01	.40
	Posttest	-1.200	45	7.037				

Table 7 shows the pretest and posttest scores of the experimental and control groups from the FBS. Accordingly, there was a significant difference between the pre application scores (M = -3.244) and the post application scores (M = 8400) in the experimental group ($t_{(44)}$= -18.967; p>.05). The effect size (d= .95) calculated as a result of the test shows that this difference is large (Cohen, 1992). There was also a significant difference between the pre application scores (M = -3.333) and the post application scores (M = -1.200) in the control group ($t_{(44)}$ = -2.728; p>.05). The effect size (d=.40) calculated as a result of the test shows that this difference is small (Cohen, 1992). This showed that the posttest scores increased in the control group in which the application was not used, but the posttest scores obtained from the experimental group were higher both at the average level and at the effect level.

The health perceptions of the students before and after the application were also measured with the HPF. Accordingly, the measurement results of the experimental and control groups are shown in Figure 1.

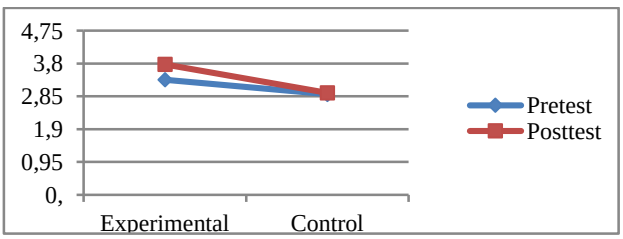

Figure 1. *HPF Experimental and Control Group Pretest–Posttest Values*

According to Figure 1, the scores obtained from the HPF increased in the posttest for the experimental and control groups. However, the score (M = 3.77) obtained by the experimental group in the posttest was higher than that (M = 2.95) of the control group.

Is there a significant difference between the final test scores of the experimental and control groups when the pre-test scores are examined?

It was observed that the pretest scores of the experimental and control group students were not equal, and the experimental group students got higher scores in the pretest. For this reason, in the study, NAS pretest scores were determined as a covariable and covariance analysis was performed. The analyses conducted are summarized in Tables 8 and 9.

Table 8

Descriptive Analysis Results of NAS Posttest Scores

Source	Groups	N	Mean	Corrected Mean	S
NAS-Posttest	Experimental	45	3.51	4.001	.058
	Control	45	3.39	3.231	.059

Table 9

ANCOVA Test Results

Source	Type III Sum of Squares	d*f*	Mean Square	*F*	*p*
NAS Pretest	12.000	1	12.000	88.430	.00
Group	3.693	1	3.693	27.215	.00
Error	11.806	87	.136		
Total	1097.063	90			
Corrected	24.112	89			

According to the findings in Tables 8 and 9, after the experimental applications, the NAS posttest mean scores of the experimental group students (M = 4.001) were significantly higher ($F_{(1, 87)} = 27.215$, $p<.05$) than those of the control group students (M = 3.231).

Discussion, Conclusion and Recommendations

In the present study, in which the effects of digital storytelling on the healthy eating behaviors of primary school students were investigated, a 5-week application was carried out. At the end of the application, a significant increase was observed in the nutritional self-efficacy, healthy eating behaviors, health perceptions, and nutrition attitudes of the experimental group students. When these levels were compared between the experimental group students and the control group students, they were found to be significantly higher in the former. This shows that the intervention applied to primary school students is positive. In the relevant literature, it has been concluded that digital stories have a positive effect on students and contribute to their learning (Yang & Wu, 2012; Robin, 2008; Wu & Yang, 2008; Hung, Hwang & Huang 2012). Burmark (2004) also revealed in his study that digital stories play an important role in students' acquiring new information. Therefore, it is seen that this application, which is carried out with digital storytelling, attracts the attention of the students and is effective in achieving healthy eating behaviors. This effect can also be associated with the fact that the students are at a young age. It is possible to conclude that this education, which is gained at a young age, can also be effective in later periods. It is accepted in the literature that the habits acquired in childhood continue throughout life (Branen & Fletcher, 1999; Manios et al., 2004). Likewise, healthy eating habits gained in childhood

become permanent and continue into adulthood. Therefore, the training given in these periods is very important (Chae & Chung, 2021). The education given in schools plays a major role in the child's life in order to develop a healthy life awareness and maintain these habits throughout life (Story, 1999; Van Cauwenberghe et al., 2010).

Digital stories, which are a technological application, have become a popular method in the digitalizing world as they enable students to actively participate in the process in education. Today, as a requirement of the digital age, web 2.0 tools have been developed and integrated into the educational environment. It has been determined that with the transfer of digital tools to the educational environment, students' active participation in the process has increased and their interest has increased (Behmer et al., 2006; Robin, 2006; 2008). In the present study, it is apparent that the attention of children was drawn during the digital storytelling process, because, with the applications, positive developments were seen in the health behaviors of the students. Digital stories are acknowledged as an effective tool for healthy nutrition (Gubrium, 2009). Brace, Finkelstein, & Sealy (2016) have reported in their studies that digital stories created mindfulness and increased awareness of healthy nutrition in individuals experiencing food insecurity. In addition, studies that examine the importance of brain development (Cueva et al., 2013), increasing awareness of cancer (Cueva, Kuhnley, Revels, Schoenberg, & Dignan, 2015) and prevention of heart attack (Anghel, Gorghiu, Buruleanu, & Gorghiu, 2017) through digital stories have shown the importance of storytelling in the field of medicine. This indicates that digital stories have an impact on the audience.

However, although no intervention was performed, there was an increase in the posttest scores obtained for nutrition self-efficacy and health perceptions in the control group students. This may have been associated with the practices used by the teacher in the classroom. MoNE (2018) mentioned active learning practices in programs and pointed out that teaching should be carried out in this way. Therefore, these results obtained from the control group may indicate that the teacher exhibits an active approach in the classroom. The high impact rate obtained from the experimental group is a reflection of the use of digital stories.

If the present study is repeated with students studying in different conditions in terms of socioeconomic level, similar results may not be obtained. This is seen as a limitation of the present study, because the findings to be obtained from a study with children who frequently use digital storytelling in the classroom environment or who are studying in private education institutions may differ. Based on this, it is recommended that the study be conducted with students in different age groups and of different socioeconomic levels. In addition, the results obtained in the present study can only be evaluated in terms of psychological variables such as behavior, self-efficacy, and attitude. However, the students' understanding and permanence of the gains that will be achieved with digital storytelling and that deal with healthy nutrition issues have not been discussed. From this point of view, the effect of teaching health issues with digital storytelling on academic achievement and permanence can be examined. In conclusion, due to their nature, digital stories involve short-term interactions (Kajder, Bull, & Albaugh, 2005). In line with this, students were presented with 6-8-minute stories. This situation should be considered as a limitation caused by the nature of digital stories.

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