



Research Article

The Correlation between Knowledge Level and Cariogenic Animated Video Playback in 10 to 12-year-old Children

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Received date: March 7th, 2022; revised date: April 5th, 2022; accepted: May 24th, 2022

DOI: 10.18196/di.v10i1.14189

Abstract

Recently, technology has developed massively. The utilization of technology has benefited all aspects of human life. One field has benefitted from technology as a tool for innovation in education. Health education, including dental and oral health, makes the use of audio-visual media as an impact of technology development for teaching tools. The teaching tool is used for children of the school-age (10-12 years old) by utilizing videos that describe cariogenic food. It is conducted since children are likely to consume food causing dental caries. This study aims to identify animated video effects on knowledge enhancement about cariogenic food in children of 10-12 years old. This study is quasi-experimental with a pre-test and post-test design. The study sample included 32 students of 10-12 years old. The students filled out the pre-test sheet, watched animated videos, and completed an online post-test sheet. Data analysis was carried out using the statistical test of the Wilcoxon signed-rank test. The mean pre-test score was 79.17, while the post-test was 82.03. The difference between pre and post-test was 2.86. A normality test of data distribution was conducted using the Shapiro Wilk test and showed that the data distribution was not normal. Wilcoxon test results showed a significance value of 0.274 ($p > 0.05$). As a result, an animated video showed no significant increase in knowledge level about cariogenic food in children of 10-12 years old.

Keywords: animated video; cariogenic food; children; knowledge

INTRODUCTION

Knowledge results from 'knowing' after a person has sensed a certain object. It is influenced by many aspects, for example, formal education.¹ The development of educational technology is closely related to technological developments in general. Educators were the only sources to access education before the existence of teaching tools. However, as time went on, tools to help to learn activities began to be used. Visual teaching tools were equipped with audio in the 20th century, called audiovisual media.² Educational technology developments in general and health education, including dental and oral

health, experienced significant changes. Technology is moving fast, leading to many new learning media innovations, including the shift from whiteboards to virtual simulations. Audiovisual media are used for better clarity and illustration.³

The study conducted by WHO stated that the primary uncontagious health problem that commonly occurs is dental caries.⁴ Caries is a progressive demineralization of dental hard tissues.⁵ Cariogenic foods are included in one of the main factors of caries, along with microorganisms, host, and time.

Elementary school children are an age group that needs special attention from

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parents and society. At that age, the children will experience a period of growth. School-age children's growth and cognitive development depend on the quality and quantity of nutrition. The choice of food to be consumed manifests behavior.⁶ Children's food consumption behavior is very dependent on the environment, including the school environment. It shows that peers and the availability of snacks strongly influence the choice of snacks consumed by the children. End-of-school age children also realize that healthy and nutritious food is good for their health. However, they hardly understand further processes in the body. They are likely to eat modern food as it is considered more delicious.⁶

School-age children like sweet foods, such as chocolate, candy, biscuits, bread, and pastries. The foods have a sticky texture, easy to stick to the surface of teeth, and are tucked between the teeth. For example, they are included in the type of cariogenic foods available in the market. The foods are one of the children's favorites; thus, it needs careful attention to the influence of cariogenic substrate carbohydrates on the incidence of dental caries.⁷ Based on the description, this study aims to identify the influence of animated videos about cariogenic food on knowledge enhancement in children of 10-12 years old.

MATERIALS AND METHODS

This study is quasi-experimental with one group pre-test and post-test design, aiming to identify the cause and effect by involving one subject group. The study was conducted by giving a pre-test to a subject group related to cariogenic food knowledge. After that, the subject group was given the health learning material related to cariogenic food using animated videos. The video was made with animated cartoon stories.



Figure 1. Video animation

Furthermore, the subject group was given a post-test. The pretest and post-test consisted of twelve questions that had been tested for validity and reliability. The problem consisted of three large parts: sweet foods, fibrous foods, and foods containing calcium and phosphate. The creation of an animated video was adapted to the material in the problem. The sample population in this study included 47 students aged 10-12 years old enrolled in Tegalrejo Muhammadiyah Elementary School. The minimum sample was counted using the slovin formula, and 32 samples were obtained.

RESULT

Table 1. Frequency Distribution of Research Data before and after Watching Animated Videos about Cariogenic Food

	Pre-test	Post-test
Mean	79.17	82.03
Median	83.33	83.33
Mode	83.33	100.00
Standard Deviation	11.40	13.90
Highest score	100.00	100.00
Lowest score	50.00	58.33
Total	2533.34	2625.01

Table 1 shows that the mean value before and after watching animated videos is different. The result of mean value of the pre-test was 79.17, while the result of the mean value of the post-test was 82.03. It indicated that the mean value from pre-test to post-test increased. The highest score on the pre-test was 100.00, and the lowest score was 50.00. Meanwhile, the highest post-test score was 100.00, and the lowest was 58.33.

The normality test was conducted using Shapiro-Wilk as the total number of subjects was less than 50. It was conducted to identify whether the data followed a normal distribution. Below is the result of the normality test.

Table 2. Normality Test Data using Shapiro-Wilk

Variable	Sig	Note
Pre-test	0.045	Not normal
Post-test	0.005	Not normal

The normality test in table 2 shows that pre-test and post-test scores were not normal as the *sig* value was less than 0.05. Furthermore, a statistical analysis test was conducted using Wilcoxon Signed Rank Test to identify a significant difference in the knowledge level before (pre-test) and after (post-test) watching animated videos about cariogenic food.

Table 3. The test analysis of the Wilcoxon Signed Rank Test

	Mean	Mean Difference	Asymp. sig (2-tailed)
Pre-test	79.17		
Post-test	82.03	2.86	0.274

Based on table 3, the knowledge enhancement about cariogenic food before and after watching animated videos was 2.86. Wilcoxon test results obtained sig. Value of 0.274 ($p > 0.05$), indicating no significant difference between the pre-test and post-test scores after watching animated videos about cariogenic food. Next, the frequency of gender and age of the research subject can be seen in table 4.

Table 4. Frequency of gender

Gender	Frequency	Percentage
Male	13	40.6%
Female	19	59.4%
Total	32	100%

Table 5. Frequency of age

Age	Frequency	Percentage
10 years old	17	53.1%
11 years old	13	40.6%
12 years old	2	6.3%
Total	32	100%

Based on tables 4 and 5, the research subject was dominated by females, with 19 female children (59.4%) and 13 male children (40.6%). The age ranges from 10, 11, and 12 years old. There were 17 ten-year-old children (53.1%), 13 eleven-year-old children (40.9%), and 2 twelve-year-old children (6.3%). The data from the questionnaire before and after the provision of material about cariogenic food with animated video can be distributed based on the category of knowledge level. The category ranges from "high" (the correct answer between 76%-100%), "moderate" (the correct answers between 56%-75%), and low (the correct answers < 56%). The description can be seen in the table below:

Table 6. Distribution of knowledge level before and after the provision of the material

Category	Pre-test (n)	Post-test (n)
High	56.25% (18)	56.25% (18)
Moderate	40.625% (13)	43.75% (14)
Low	3.125% (1)	0% (0)

Based on table 6, the knowledge level on the pre-test is 56.25% for the high category, 40.625% for the moderate category, and 3.125% for the low category. Meanwhile, regarding the post-test scores, 56.25% is for the high category, 43.75% is for the moderate category, and 0% is for the low category.

Table 7. Change in knowledge level

Change in knowledge level	Percentage (n)
Increase	46.875% (15)
Stagnant	21.875% (7)
Decrease	31.25% (10)

Table 7 shows that the highest level of change occurs in the "increase category," with a total of 46.875%. The stagnant category shows 21.875%, and the decrease category shows 31.25%.

DISCUSSION

The school-age children period is when children start to live up in family groups and interact with their peers.

Children's eating habits at school become an essential aspect that needs careful notice as it is not formally taught and goes naturally in their lives. Besides, school-age children also start having a food preference in their daily life.⁸

This study's measurement of knowledge level showed no significant increase in the mean value of pre-test to post-test. Intellectual ability highly determines success in the learning result. It tends to fluctuate; some increased, some were stagnant, and others decreased.⁹

The statistical Wilcoxon signed-rank test showed the difference between pre-test and post-test scores. It showed no significant difference in the mean value of pre-test and post-test. It also indicated that the result was contradictory with the initial hypothesis stating a significant influence of the learning media of animated video on knowledge enhancement in cariogenic food in children of 10-12 years old.

Furthermore, it is in line with research conducted by Tandilangi et al. (2016), revealing that success in education could be influenced by the methods and the learning tools utilized in the learning process.¹⁰ An educational method such as using animated videos is considered an easy and interesting method to be understood by students. However, Arsyad (2017), in his book entitled *Learning Media*, stated that images in animated videos would always move when the video was played.¹¹ Thus, not all students could follow the information to be delivered. It becomes one of the factors that cause animated videos to be insignificant in increasing the post-test score.

Furthermore, in terms of age, it is one of the factors to be considered in this study. According to Piaget's theory, a person's cognitive development can occur in 4 stages, namely sensorimotor (0-2 years), pre-operational (2-7 years), concrete operational (7-11 years), and formal operational (11-15 years) stage. Every stage has different quality progress. Therefore, although children accept the same

information, the result can differ. It can also influence the mean value of the research subject. Besides, although gender is not the primary aspect, it was also identified in this study. In the theory of Krutetskii, males are more advanced in the aspect of logical reasoning than their female counterparts. Meanwhile, females are more advanced in accuracy, precision, and thorough thinking. Furthermore, males also have the ability on mechanics.¹²

In this study, the children's knowledge levels showed varying results; high, moderate, and low. Different intellectual or cognitive abilities can influence this aspect. Saputra et al. (2017) mentioned that genetic factor that plays a role in intellectual development would have insignificant changes if the social environment factor did not support it.¹³ Environmental factors can enhance a person's thinking ability leading to intellectual development. Thus, this factor is essential for the young generation to encourage problem-solving, creativity, and conceptual ability.

The difference in the pre-test to post-test mean value can also be caused by the different learning times. The learning activity using animated videos in this study was conducted at noon, where, according to Lestari (2015), the children's concentration level on noonday tends to decrease.¹⁴ Furthermore, children will likely feel exhausted and sleepy at noon due to their busy morning activities. Therefore, they are unlikely to focus on exercise and absorbing the learning materials. In addition, it is one of the factors that children experience a decrease in their score as their interest in studying also decreases at noon compared to the morning studying. The morning atmosphere still feels fresh, and children have not yet carried out many activities in the morning, so they tend to focus more on the learning activity.

In the case of this study, the change from pre-test to post-test score could occur due to the provision of the learning materials using audiovisual media about

cariogenic food that could influence the children's knowledge level. Bujuri (2018) revealed that children's cognitive development has different levels, starting at 7 to 12 years old and above.¹⁵ Their cognitive development always fluctuates. Some can change massively, while others change slowly. The difference can occur due to a number of factors, including nutrition, genetics, education, and environment. Another aspect that needs consideration is the role of parents in monitoring children when they are provided with the learning material about cariogenic food. In this case, this research was conducted online due to the COVID-19 pandemic. Parent involvement in assisting the children in their daily life is essential. Parents must also create a conducive environment that can encourage children's potential, self-confidence, and intelligence.¹⁶

Moreover, in terms of further research, animated videos can be shared and aired together to the research subjects so that the research results can be maximized. The video can be played during the time when the children's learning concentration is high. Besides, the animated videos can be replayed so that children can more easily remember.

CONCLUSION

Based on the result of this study, it can be concluded that learning material using an animated video of cariogenic food in children aged 10-12 years at Muhammadiyah Tegalrejo elementary school did not increase their knowledge significantly.

ACKNOWLEDGMENT

The researchers would like to thank the principal, students, and guardians of the students of elementary school Muhammadiyah Tegalrejo.

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