

# The Effect of Education Through Powtoon-Based Learning Media on Balanced Nutrition Knowledge in Adolescents

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## ABSTRACT

Several studies in Indonesia have utilized learning media to educate students. Nevertheless, no research looks at the effect of education through learning media on high school students about balanced nutrition using Powtoon, which is website-based. The research design used was a quasi-experimental one-group pretest-posttest design. The research was conducted at SMA Negeri 3 West Aceh Regency. Seventy-three respondents who met the inclusion criteria were selected. The results obtained a p-value of 0.000 ( $p < 0.05$ ). Respondent's knowledge of balanced nutrition before being given education through Powtoon website-based learning media has a median value of 9 (5-12), and after the intervention, the median value rises to 13 (8 - 15). There is a significant difference in knowledge of balanced nutrition before and after the intervention. Therefore, learning with engaging media provides new experiences for students to understand the material presented. Powtoon learning media can be developed or compared with other learning media to find out which one is superior so that it can be widely used.

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## Introduction

Adolescence is a transition period characterized by profound cognitive and behavioral changes (Das et al., 2017). Sixteen percent of adolescents globally and 25% of the population of Indonesia consists of adolescents (Guthold, Regina, et al., 2020). 15% of Aceh Province's population comprises adolescents (Muhibbuthabry, Muhibbuthabry, et al., 2023). During adolescence, individuals become more receptive to adopting various lifestyle behaviors (Nushrat et al., 2017).

As a result of globalization, there are lifestyle changes, including the consumption of high-calorie foods and lack of activity (Colozza & Avendano, 2019). According to the 2018 Riskesdas data of the Ministry of Health, adolescents consumed 50.4% sweet foods, 61.86% sweet drinks, 31.4% salty foods, 44.2% oily foods, 78.5% flavorings, 96.4% fewer fruits and vegetables, and 64.5% less physical activity. (Hermina, Hermina, et al. 2016) Unhealthy behaviors can increase the likelihood of malnutrition (Colozza & Avendano, 2019).

According to the 2018 Riskesdas, 1.9% of adolescents were underweight, 6.8% were underweight, 11.2% were overweight, and 4.8% were obese. Inadequate nutrition knowledge is one of the indirect causes of malnutrition. Up to forty percent of Indonesian adolescents do not have adequate nutrition knowledge (Fatikhani et al. 2019). Low-income adolescents have limited nutrition knowledge (Sharma et al., 2019). Equipping adolescents with nutrition knowledge is essential to achieve optimal nutritional status (Winpenny et al., 2017).

The nutritional status of adolescents has significant implications for their current and future health (Corkins et al., 2016). The Indonesian government has developed the Balanced Nutrition Guidelines to promote healthy living. There is a need for education as many adolescents are not aware of the balanced nutrition guidelines. The involvement of lecturers in providing knowledge to students about balanced nutrition in adolescents is one approach in nutrition education and is one of the

service components of the Tridarma of higher education. Providing more interesting learning media and effective media delivery can increase student interest in understanding the material provided. (Agustina, Rina et al, 2019)

Students should be actively involved in learning to discover their potential and acquire new skills. Therefore, creativity is needed to arouse students' curiosity and encourage them to remember the subject. Evidence of creativity can be found in the production of new instructional resources. Videos and animated PowerPoint slides are two examples of effective learning media that can be used to impart knowledge to students. (Mulyasa et al., 2020)

Video-based learning has many advantages, including effectively enhancing presentations or explanations. (Munir et al., 2019). Applications like PowToon, Videoscribe, and Animaker are available for making videos. In this study, researchers used PowToon, a web-based tool that lets users make animated videos by manipulating objects, importing photographs, supplying music, and adding sound (Arwanda et al., 2020).

Learning videos created with PowToon are practical and can increase students' understanding of concepts, and have various functions that support the display of the provided material, such as longer video duration, various animations used to illustrate knowledge about balanced nutrition, and the use of sound recordings to clarify the material. (Asyifa et al., 2019)

Many studies in Indonesia have used learning media to educate their students better. Although Powtoon is a popular website for delivering educational content, no studies have examined the impact of such content on high school students' knowledge or ability to maintain a balanced nutrition in adolescence. Therefore, researchers are interested in researching the effect of education through Powtoon-based learning media on balanced nutrition knowledge in adolescents.

## Method

A quasi-experimental one-group pre-and post-test design was chosen for this research. The research was conducted at SMA Negeri 3 West Aceh Regency. The population in the study were 10th and 11th-grade students totaling 164 students. The sampling technique was stratified random sampling sample calculation using the two mean difference test formula.

Based on the calculation results, 73 respondents who met the inclusion criteria were selected: 10th and 11th-grade students, willing to attend counseling on balanced nutrition knowledge, can

read and write, fill out the distributed questionnaires, and become respondents. The materials used were a laptop, InFocus, projector screen, and speakers. The instruments used were questionnaires and nutrition education media.

The questionnaire is an adaptation of the regulation titled "Balanced Nutrition Recommendations," issued by the Minister of Health of the Republic of Indonesia under Regulation Number 41 of 2014. The questionnaire given to respondents consisted of fifteen questions about balanced nutrition knowledge. Respondents were ensured to answer all questions without skipping any questions. Each correct answer will be given a score of 1, and the wrong one will be given a score of 0.

The data collection procedure begins with selecting samples that meet the criteria. Next, respondents were given the first questionnaire (pre-test). After that, counseling on balanced nutrition was given to adolescents using Powtoon learning media. It aimed to provide experience to students on more attractive and audio-visual material so that it is hoped that the material conveyed can be optimal. After the intervention, respondents were given a second questionnaire (post-test).

## Results

### Sample Characteristics

Table 1. Frequency distribution of respondent

<b>Respondent Characteristics</b>	<b>n</b>	<b>%</b>
<b>Gender</b>		
Male	28	38.4
Female	45	61.6
<b>Age</b>		
Under 15 years old	26	35.6
15 to 16 years old	32	43.8
Over 16 years old	15	20.5
<b>Respondent class</b>		
10 <sup>th</sup> grade	33	45.2
11 <sup>th</sup> grade	40	54.8
<b>Parental education</b>		
Elementary school	5	6.8
Junior high school	11	15.1
Senior high school	23	31.5
College	34	46.6
<b>Father's occupation</b>		
Civil servants/Army/Police	11	15.1
Entrepreneur/trader	26	35.6
Farmers	7	9.6
Driver	6	8.2
Others	23	31.5
<b>Father's income</b>		
Below the RMW*	9	12.3
Above the RMW	64	87.7

\* Regional Minimum Income (RMW)

Based on Table 1, it is known that the frequency distribution of variable characteristics of gender in the female category is 45 people (61.6%), age 15 to 16 years is 32 people (43.8%), respondent class in grade 11 is 40 people (4.8%), parental education in the college category is 34 people (46.6%), other category father's work is 23 people (31.5%), and father's income is above the regional minimum income (RMW) category as many as 64 people (87.7%).

### Respondent's Balanced Nutrition Knowledge

Table 2. Descriptive Distribution of Respondents' Balanced Nutrition Knowledge

Variable	Median	Minimum	Maximum
Pre-test	9	5	12
Post-test	13	8	15

Respondents' balanced nutrition knowledge was carried out by filling out a questionnaire. The questionnaire was given twice to respondents. First, before being given intervention in the form of balanced nutrition education through website-based Powtoon learning media. Second, after the intervention with respondents. Referring to Table 2, the lowest score on the pre-test was 5, and the highest was 12. There was an increase in the post-test results, which had the lowest score of 8 and the highest score of 15. This is directly proportional to the increase in the median value. The median pre-test score was 9, and the increase in the median post-test score was 13.

### Distribution of answers to the variable knowledge of balanced nutrition of adolescents to respondents

Table 3. Distribution of answers to knowledge variables.

Variable	Correct answer (%)	
	Pre-test	Post-test
Diet is the most important behavior that can affect the state of nutrition.	78,7	98,9
Infants, children, and people of all ages need optimal nutrition to flourish physically and mentally.	60,5	88,7
Sub-optimal nutrition is associated with poor health and increases the risk of infectious diseases and non-communicable diseases	70,2	91,1
Appropriate and community-based communication, information, and education are	66,8	89,3

Variable	Correct answer (%)	
	Pre-test	Post-test
needed to optimize the delivery of Balanced Nutrition messages to the community.		
The nutrients consumed daily need to be of the kind and in an amount (portion) tailored to the requirements of each individual or age group.	75,2	95,9
Food consumption must consider the four pillars principle: food diversity, clean living behavior, physical activity, and monitoring weight regularly to maintain an average weight. Weight regularly to maintain normal body weight.	80,3	95,8
The definition of balanced nutrition is the composition of daily food that contains nutrients in types and amounts that follow the body's needs	78,5	96,9
Food ingredients must be considered because they are a source of energy, regulating substances, and building substances.	88,7	93,1
Recommended consumption of carbohydrate sources (rice) in a day of at least 100 grams	76,1	87,9
Recommendations for consuming animal-derived side dishes such as meat, fish, and eggs can be consumed a maximum of 160 grams daily.	55,1	75,9
The recommendation to consume vegetables for a healthy life is 250 grams a day	48,0	77,1
Recommended consumption of fruits for healthy living 150 grams a day	60,5	74,9
The Principle of Balanced Nutrition is a series of efforts to balance the outgoing and incoming nutrients by regularly monitoring body weight.	76,0	88,1
The Four Pillars of Balanced Nutrition Principles are eating various foods, Practicing clean living behavior, Doing physical activity, and Monitoring weight regularly to maintain an average weight.	63,9	81,5
Body mass index can be monitored through kartu	79,5	85,7

Variable	Correct answer (%)	
	Pre-test	Post-test
menuju Sehat Indonesia (KMS) starting at 18.		

In general, all questions asked in the questionnaire increased the correct answer when the test was carried out after counseling balanced nutrition in adolescents using the Powtoon web-based learning media approach. This is possible because students are interested in listening to exciting counseling material with good animation visuals and audio so that the material is conveyed well.

### Analysis of the effect of education through Powtoon web-based learning media on adolescents' balanced nutrition knowledge

Table 4. Bivariate analysis of paired test

Wilcoxon test result*	Median (Min-Max)	P value
Pre-counseling knowledge (pre-test) (n = 73)	9 (5 - 12)	0,000
Post-counseling knowledge (post-test) (n = 73)	13 (8 - 15)	

Wilcoxon test, 73 subject knowledge scores strengthened

\*Wilcoxon test (Numerical comparative hypothesis test, two paired groups and non-normal data distribution-Non parametric)

Table 4 shows the results obtained p-value 0.000 ( $p < 0.05$ ) after being analyzed. The results in the pre-test and post-test respondents experienced significant changes. The difference in respondents' nutritional knowledge occurs because adolescents have a great interest in matters related to nutrition, such as eating behavior and body shape. This interest is supported by good learning facilities and media so that respondents quickly understand new information and increase their nutritional knowledge (Stang & Stotmeister, 2017).

### Discussion

The findings of this study are consistent with those of earlier research. The research used Powtoon to educate student-athletes in the United States about nutrition. As a result, nutritional knowledge changed both before and after the education delivery through counseling. (Coccia et al, 2018). Another study addressing Indonesian adolescent girls with SEZ in rural and urban settings yielded comparable effects. Nutrition education using WhatsApp and Instagram increased the nutritional

knowledge of teenage girls in rural regions by 85.7% and in urban areas by 74.1%. (Sari, Hesti Permata et al, 2019).

Knowledge about anemia among adolescent girls can increase by 19.04% when delivered via an online media platform. (Khotimah et al., 2019). Nutrition education via Instagram and Facebook reveals changes in teenagers' nutritional understanding before and after the intervention. (Masitah et al., 2018). Research on nutrition teaching through Android applications and websites has demonstrated an 11.8% improvement in schoolchildren's nutritional understanding. (Perdana et al., 2017).

Given the prevalence of smartphone use, the results of this study are consistent with the notion that the use of technology-based platforms as a medium for nutrition education can successfully provide information to adolescents from low socioeconomic classes. (Oddo et al., 2018). The results of this study differ from recent research (Heikkila et al., 2019), which concluded that education using smartphone applications does not affect nutritional knowledge. This difference may be related to the respondents' inability to understand the smartphone application used in the study. Respondents felt unfamiliar with how to use the application, so they experienced problems in its operation.

A study including nutrition education delivered via online messaging also revealed distinct outcomes. In the evaluation conducted in the middle of the study period, nutritional knowledge increased. However, the final review revealed a decline in nutritional understanding. (Rohlman et al., 2018). The drop may be attributable to the increasing difficulty of information providing. Respondents did not comprehend the newly acquired information but were compelled to share it with their peers, spreading false information. The respondents' difficulties impeded their schooling, resulting in a decline in nutritional understanding.

This difficulty diminished respondents' interest in the subsequent nutrition material supplied, resulting in no difference in nutrition knowledge before and after the intervention. Interest motivates a person to bridge the gap between what they know and does not know, resulting in acquiring new information. (Lamnina et al, 2019). Providing nutrition instruction to adolescents through their interests, such as social media, is possible. (Pemmaraju et al., 2016). Adolescents will be receptive to new information and increase their nutritional knowledge when engaging in activities pique their interest.

There are several advantages to making Powtoon audio-visual media, including Its use is practical, easily accessible with the website [www.powtoon.com](http://www.powtoon.com) without having to download the application; There are many choices of background templates so that in the worksheet, you only need to insert images, text, audio and video that you want to use as teaching material; Available animation content, fonts, and transition effects; Attractive, dynamic and interactive appearance; Can be saved in MPEG format, MP4, AVI, or directly shared on YouTube; In the form of a learning video that can combine video and audio images. (Fitriyani, Nina., 2019)

Powtoon also has disadvantages, including It is online software that requires internet to open; Limited duration; To save requires internet with a stable speed because the result is in the form of a video that has a large memory capacity; For unpaid powtoon users can only export files and cannot be downloaded; To save requires internet with a stable speed because the result is in the form of a video that has a large memory capacity; if you want to save it, you can only download files via YouTube. (Fitriyani, Nina., 2019)

### Conclusion

Respondent's knowledge of balanced nutrition before being given education through Powtoon website-based learning media has a median value of 9 (5-12), and after the intervention, the median value rises to 13 (8 - 15). There is a significant difference in knowledge of balanced nutrition before and after the intervention ( $p = 0.000$ ). Therefore, learning with engaging media provides new experiences for students to understand the material presented.

### Acknowledgment

Other researchers who want to continue this study should include attitudes and actions toward a balanced diet as additional knowledge variables. The research period should be extended so that changes in adolescents' attitudes and behaviors about a balanced diet can be observed. A comparison group in the form of a control group can make the research results more persuasive compared to other groups. Powtoon learning media can be developed or compared with other learning media to find out which one is superior so that it can be widely used.

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