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## Improving School-Age Children's Knowledge on Coughing and Sneezing Ethics through Linear Multimedia



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### Abstract

School-age children's knowledge of cough and sneeze etiquette is mostly in the low category. Cough and sneeze etiquette looks very simple, but most children admitted that they do not know and understand how to apply proper cough and sneeze etiquette. One of the recommended ways to prevent the spread of infection is to cover the mouth and nose when coughing and sneezing or often referred to as cough and sneeze etiquette. This study aimed to determine the effect of linear multimedia on students' knowledge about cough and sneeze ethics at SDN IV Tapan Tulungagung Regency. The design of the study used Quasy Experiment (pseudo experiment). The sampling technique used non-probability sampling; purposive sampling technique. Comparison of knowledge values between the pre-test and post-test indicated that there was a significant difference between the level of knowledge before and after being given education on cough and sneeze ethics through linear multimedia. Through those results, it can be concluded that there is an effect of linear multimedia on students' knowledge and attitudes about cough and sneeze ethics at SDN IV Tapan Tulungagung Regency. Therefore, linear multimedia can be used as a suitable educational media for school-age children.

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## INTRODUCTION

ARI is an acute respiratory infection that can be easily spread through germs, air, and droplet contamination (Aprianti & Kailani, 2021). Droplets exhaled during various respiratory activities can carry infectious viruses that can then be inhaled after they evaporate, spread, float in the air, or lodge on the walls of a relatively confined environment (Jia et al., 2022). One of the recommended ways to prevent the spread of infection when coughing and sneezing is to cover the respiratory tract, namely the mouth and nose or often referred to as cough and sneeze ethics (Arif et al., 2020).

Cough and sneeze etiquette refers to the proper and correct way of coughing and sneezing, which involves covering the mouth and nose with a tissue or sleeve (Triutami. H, 2020). Cough and sneeze etiquette seems very simple, but in fact, there are only 18 (42.8%) elementary school students who can correctly complete questions regarding knowledge of cough and sneeze etiquette out of 42 students (Wardhany et al., 2022). Most of the children admitted that they did not know and understand how to implement proper cough and sneeze etiquette (Mei et al., 2021). The majority of school-age children's knowledge about cough and sneeze ethics is in the low category, namely 63% of students (Monika et al., 2022).

A large proportion of disease morbidity and mortality worldwide is caused by ARI. Lower respiratory tract infections account for 98% of the nearly four million annual ARI deaths. The risk occurs in groups that include young children, children, and also individuals living in countries with very low or moderate per capita income levels (WHO, 2007). One example of a developing country with a significant number of ARI cases is Indonesia. Indonesia consistently tops the list in terms of infant and under-five deaths due to ARI (Triutami. H, 2020). The prevalence of ARI in Indonesia in 2018 was 1,017,290 cases with the most cases in the 5-14 age group with 182,338 cases (Risksedas, 2018). In addition, pneumonia is also a cause of ARI in Indonesia (Abbas & Haryati, 2022). The pneumonia case finding coverage in Indonesia in the last three years, namely in 2018, the percentage reached 56.5%, then decreased to 52.9% in 2019, and finally reached 34.8% in 2020 (Ministry of Health, 2020), while in East Java, the pneumonia case finding coverage in the last two years, namely in 2019 was 51.1% and in 2020 was 44.3% (Kemenkes, 2019, 2020). The coverage of

pneumonia cases in the last two years in Tulungagung Regency was 46.72% in 2019 and 36.75% in 2020 (Dinkes Jatim, 2020, 2021).

The results of interviews with the homeroom teachers of fourth and fifth grade in SDN IV Tapan Tulungagung Regency obtained data that in 1 semester, there were 35 fourth grade students and 30 fifth grade students who were excused due to illness. Most of the illnesses experienced by students are symptoms of ARI, namely fever, cough, and runny nose. SDN IV Tapan has never received socialization about cough and sneeze etiquette from the puskesmas or the local health office. The results of the questionnaire distributed to 21 students of SDN IV Tapan with closed questions in multiple choice answers obtained data that there were 11 (52.4%) students who had a poor level of knowledge on the ethics of coughing and sneezing. Students of SDN IV Tapan who stated that they did not know about the ethics of coughing and sneezing by answering closed questions with the answer options already and not as many as 14 (66.7%) students. When coughing and sneezing, 9 (42.8%) students have the habit of putting their palms to their mouths. In addition, 9 (42.8%) students of SDN IV Tapan also disagreed that when coughing and sneezing, they should use a tissue and sleeve to cover their mouth and nose.

One of the factors causing ARI cases is behavioral factors (Triutami. H, 2020). In theory, behavior is divided into 3 components, including: knowledge, attitudes, and actions (Jaji, 2020). Children are considered to contribute to the spread of the virus and cannot yet prevent it, so their age should receive a lot of attention (Monika et al., 2022). Therefore, school-age children need to be taught about cough and sneeze etiquette because this age group is the right target (Triutami. H, 2020). School-age children refer to children in the age range of 6 to 12 years (Dewi et al., 2020). At this age, children have mastered various vocabularies, children have also fluently used vocabulary related to the academic field, children understand instruction sentences, and children have also been able to understand a symbol in the form of metaphors, rhymes, poems, and so on (Dewi et al., 2020). School-age children have gone through a process of cognitive change, namely C1 to remember (retention), C2 to understand (comprehension), and C3 to apply (application) (Krawohl., 2010).

The use of media as a means to inspire school children to apply proper cough and sneeze ethics is

considered more practical (Triutami, H, 2020). This is because multimedia is a form of educational media that contributes to improving student understanding and learning outcomes (Panjaitan et al., 2020). Audiovisuals are more motivating to watch so that the theory in audiovisual-based shows can be more easily understood by elementary school students at the concrete operational stage (Jampel & Puspita, 2017). Children can learn more focused and directed when learning activities use audiovisual media. This is because audiovisual media can make it easier for students to understand complex ideas (Jampel & Puspita, 2017). Electronic media is superior as an educational media compared to print media (Wasludin, 2019). This is because students are more interested in watching and listening through electronic media compared to having to read for themselves through printed media (Wasludin, 2019).

Linear multimedia includes electronic media that has proven to be superior as an educational media. Electronic media can display moving images and are supported by sound so that it is more interesting. The information conveyed is more easily accepted and absorbed because students are more focused on paying attention to the material presented. Based on the background explanation, the researcher has a plan to conduct research on the effect of linear multimedia on students' knowledge about the ethics of coughing and sneezing at SDN IV Tapan

Tulungagung Regency which aims to determine the effect of linear multimedia on students' knowledge and attitudes about the ethics of coughing and sneezing at SDN IV Tapan Tulungagung Regency.

## METHODS

Research design is a systematic and objective process when collecting, processing, analyzing, and presenting data to test hypotheses or solve problems and establish general principles (Herdayati & Syahrial, 2019). This study adopted a quasi-experiment design. Quasi Experiment is a type of research that compares the results of a health program intervention with a comparable but not necessarily identical control group (Setiadi, 2013). This study was conducted on 2 groups, namely the treatment group that was given education about cough and sneeze ethics with linear multimedia and the control group in this study was a group that did not receive the same treatment or intervention (Setiadi, 2013). Students of SDN IV Tapan Tulungagung Regency who are in fourth and fifth grade are the population of this study. The total population amounted to 50 students divided into 4th grade as many as 23 students and 5th grade as many as 27 students. The sample used amounted to 30 students. The sampling technique used was nonprobability with purposive sampling.

## RESULTS

The distribution of general data from the characteristics of respondents is described in the following:

Table 1: General Data and Characteristics of Respondents of SDN IV Tapan Tulungagung April 01, 2023

Variable	Category	Treatment Group		Control Group	
		Frequency	Presentation	Frequency	Presentation
Gender	Boy	8	53,3	8	53,3
	Girl	7	46,7	7	46,7
	<b>Total</b>	<b>15</b>	<b>100,0</b>	<b>15</b>	<b>100,0</b>
Age	9 <sup>th</sup>	2	13,3	0	0
	10 <sup>th</sup>	6	40	6	40
	11 <sup>th</sup>	7	46,7	9	60
	<b>Total</b>	<b>15</b>	<b>100,0</b>	<b>15</b>	<b>100,0</b>
Grade	4 <sup>th</sup> Grade	7	46,7	7	46,7
	5 <sup>th</sup> Grade	8	53,3	8	53,3
	<b>Total</b>	<b>15</b>	<b>100,0</b>	<b>15</b>	<b>100,0</b>

Based on Table 1, the data shows that in the treatment group, most of the respondents were boys, totaling 8 people (53.3%). In terms of age, almost half of the respondents were 11 years old, totaling 7 people (46.7%). In terms of class, most of the respondents were from grade 5, totaling 8 students (53.3%).

In the control group, most of the respondents were also boys, totaling 8 students (53.3%). According to age, most respondents were 11 years old, totaling 9 people (60%). In terms of class, most respondents came from 5<sup>th</sup> grade, totaling 8 students (53.3%).

Table 2: Pre-Test and Post-Test Knowledge Score of Respondents of SDN IV Tapan Tulungagung Regency April 01, 2023

Variable	Pre-Test								Post-Test							
	Good		Enough		Less		Total		Good		Enough		Less		Total	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
<b>Control Group</b>	2	13,3	4	26,7	9	60,0	15	100,0	2	13,3	4	26,7	9	60,0	15	100,0
<b>Treatment Group</b>	2	13,3	4	26,7	9	60,0	15	100,0	15	100,0	0	0,0	0	0,0	15	100,0

Based on Table 2, information was obtained that in the control group, most respondents had a poor level of knowledge in the pre-test score, with a total of 9 students (60.0%). The same thing also happened in the treatment group, where most respondents had a poor level of knowledge at the pre-test value, totaling 9 students (60.0%). In the control group, most respondents still had a poor level of knowledge, with a total of 9 students (60.0%). In the treatment group, the acquisition of post-test knowledge scores, all respondents had a good level of knowledge, namely 15 students (100.0%).

Table 3: Results of Cross Tabulation and Wilcoxon Test of Students' Knowledge Level about Cough and Sneez Ethics in the Control Group

	Post-Test										Sig (2-tailed) Wilcoxon
		Less		Enough		Good		Total			
		f	%	f	%	f	%	f	%		
<b>Pre-Test</b>	<b>Less</b>	9	60,0	0	0,0	0	0,0	9	60,0	1,000	
	<b>Enough</b>	0	0,0	4	26,7	0	0,0	4	26,7		
	<b>Good</b>	0	0,0	0	0,0	2	13,3	2	13,3		
	<b>Total</b>	9	60,0	4	26,7	2	13,3	15	100,0		

Based on table 3, the results of the cross tabulation show that the number of respondents who have a poor level of knowledge at pre-test and post-test remains the same, namely 9 students (60.0%). In both groups, after being analyzed using the Wilcoxon test, the sig result (2-tailed) = 1.000 means that there is no difference in the pre-test and post-test knowledge values of the respondents.

Table 4: Results of Cross Tabulation and Wilcoxon Test of Students' Knowledge Level about Cough and Sneez Ethics in the Treatment Group

	Post-Test										Sig (2-tailed) Wilcoxon
		Less		Enough		Good		Total			
		f	%	f	%	f	%	f	%		
<b>Pre-Test</b>	<b>Less</b>	0	0,0	0	0,0	9	60,0	9	60,0	0,001	
	<b>Enough</b>	0	0,0	0	0,0	4	26,7	4	26,7		
	<b>Good</b>	0	0,0	0	0,0	2	13,3	2	13,3		
	<b>Total</b>	0	0,0	0	0,0	15	100,0	15	100,0		

Based on table 4, the results of the cross tabulation show that in the treatment group who had a poor level of knowledge increased to good as many as 9 students (60.0%). In both groups, after analyzing the Wilcoxon test, the sig result (2-tailed) = 0.001 means that there is a difference in the acquisition of pre-test and post-test knowledge scores of respondents after being given linear multimedia.

Table 6: Mann Withney Test Results of Students' Knowledge Level on Coughing and Sneezing Ethics

Variabel 1	Variabel 2	Sig (2-tailed) Mann Withney
Post-Test Control Group	Post-Test Treatment Group	0,000

Based on the results from Table 6, the Mann-Whitney test analysis showed that there was a significant difference in the post-test knowledge level scores between the control and treatment groups, with a significance value (2-tailed) of 0.000. This finding indicates that there is a significant difference between the two groups.

## DISCUSSION

Based on Table 2, it can be concluded that most respondents in the control group and treatment group had a poor level of knowledge, each as many as 9 students (60.0%). However, after the post-test, there were differences in the level of knowledge. In the control group, most respondents still had a poor level of knowledge, namely 9 people (60.0%). Whereas in the treatment group all respondents had a good level of knowledge, namely 15 students (100%).

In the pre-test and post-test control group after being analyzed using the Wilcoxon test, the sig (2-tailed) = 1.000 results were obtained, which means that there was no difference in the pre-test and post-test knowledge values of the respondents. In the treatment group after analyzing the Wilcoxon test, the sig result (2-tailed) = 0.001 means that there is a difference in the acquisition of pre-test and post-test knowledge values of respondents after being given cough and sneeze ethics education through linear multimedia. To determine the effect, the post-test of the control group and the treatment group conducted the Mann Withney test. Based on this test, a significance value (2-tailed) of 0.000 was obtained. This finding indicates that there is a significant difference between the two groups. ARI is an upper respiratory tract infection that can be easily spread through germ, air, and droplet contamination (Aprianti & Kailani, 2021). One of the recommended ways to prevent the spread of infection is to cover the mouth and nose when coughing and sneezing or often referred to as cough and sneeze ethics (Arif et al., 2020). Ethics when coughing and sneezing is a good and correct way of coughing and sneezing which includes covering the mouth and nose with a tissue or sleeve of clothing (Triutami. H, 2020). The main purpose of complying with proper cough and sneeze etiquette is to prevent widespread transmission of disease through droplets and to provide a sense of comfort for the surrounding environment (Triyana et al., 2022). Therefore, cough and sneeze etiquette need to be taught early to children because this age group is the right target (Triutami. H, 2020).

Knowledge is the result of curiosity that encourages the use of the senses, especially the use of eyes and ears in recognizing and identifying an object (Purnamasari & Raharyani, 2020). The process of changing cognition through several stages, namely C1 refers to the ability to remember (remembering),

C2 refers to the ability to understand (understanding), C3 refers to the ability to apply (applying), C4 refers to the ability to analyze (analyzing), C5 refers to the ability to evaluate (evaluating), and C6 refers to the ability to create (creating) (Ruwaida, 2019). Increasing children's knowledge through several stages, including children being able to remember the information conveyed which is characterized by being able to define the information obtained (know), children being able to explain the information that has been obtained (comprehevision), children being able to apply the principles of the information obtained (application), children being able to describe an object obtained from the information conveyed (analysis), children being able to connect different components into a new whole (synthesis), and children being able to assess an object obtained from the information conveyed (evaluation) (Puastiningsih, 2017). Factors that impact knowledge involve education, sources of information, social and cultural aspects, economic conditions, environment, experience, and age (Silviana, 2014). Children aged 11-12 years are able to answer more questions correctly regarding indicators of definition, impact, types, and benefits compared to 10-year-olds because the level of maturity and thinking ability of a person increases with age (Fitriani & Andriyani, 2015).

Cough and sneeze ethics education through electronic media, namely videos, has been proven to increase the level of knowledge about cough and sneeze ethics as in Triutami's research. H, 2020, on a study entitled "The Effect of Cough and Sneezing Ethics Video Media on Increasing Knowledge in State Elementary School Children 11 Bengkulu", it was found that the results of univariate analysis showed that the average level of knowledge of respondents before intervention was 6.0833 and the average level of knowledge after intervention was 7.5000, with a significance value of  $\rho$ -value = 0.000. Based on this study, it can be concluded that there is a significant effect of cough and sneeze ethics video media on increasing knowledge in school children.

Multimedia is defined as a combination of graphic design, text, images, audio, animation, and other video components presented digitally (Oka, 2022). Multimedia has the potential to facilitate a deliberate, directed, and controlled learning process by stimulating learners' thoughts, emotions, attention, and motivation (Hatibie, 2019). Multimedia is

grouped into 3 types, one of which is linear multimedia. Linear multimedia is multimedia that runs sequentially, has no controller, and cannot be operated by its users (Hatibie, 2019). This multimedia is that users only watch and enjoy the product (Ilmiani et al., 2020). The use of media to inspire school children to implement good cough and sneeze etiquette is considered more practical (Triutami, H, 2020). This is because multimedia is a form of educational media that contributes to improving student understanding and learning outcomes (Panjaitan et al., 2020). Multimedia has several advantages including helping and facilitating the learning process independently so that it can overcome the weaknesses of classical learning, making it easier for students to understand the material presented because there are examples and illustrations, accommodating visual and auditory learning styles, can overcome student learning problems related to integrated learning (Wati, 2010). The choice of multimedia as a medium for delivering health education is because multimedia is a combination of text, images, graphic arts, audio, animation, and video components that are presented digitally (Oka, 2022). This causes not only the sense of vision (visual) to work but also the sense of hearing (auditory) to work. The involvement of many senses in learning media will make information easier to enter and store in the head (Hatipoglu et al., 2018).

In the researcher's opinion, linear multimedia can support changes in students' cognition to the C2 stage, namely understanding. After being given the linear multimedia intervention, students were able to formulate and communicate the ethics of coughing and sneezing in writing, namely answering the post-test questionnaire. Respondents' characteristics such as age are thought to be one of the factors that influence students' knowledge. This factor affects the maturity of students' thinking, causing the process of understanding the information received to vary. The acquisition value of the knowledge questionnaire which has the lowest number is a question about the steps of good and correct cough and sneeze ethics, this is in line with the research of Mei et al. (2021), in which most students admitted that they did not know and understand how to apply the correct cough and sneeze ethics. After being given a cough and sneeze ethics education intervention through linear multimedia, students were able to answer knowledge questionnaire questions about the steps of cough and sneeze ethics correctly.

Education through linear multimedia is very suitable to be applied to school-age children. Linear multimedia that contains elements of animation makes children more interested, in line with research by Wasludin (2019) that children are more interested in watching and listening than reading alone. In addition, the direct explanation video from the educator helps explain the message of cough and sneeze ethics that is being delivered. Educational linear multimedia on cough and sneeze ethics makes students more focused in paying attention to the material described, in line with the research of Panjaitan et al. (2020) that multimedia contributes to improving student understanding and learning outcomes.

## CONCLUSION

Linear multimedia is multimedia that runs sequentially, has no controller, and cannot be operated by its users. Education through linear multimedia is very suitable for school-age children. Linear multimedia that contains elements of animation makes children more interested. Based on the results of research that has been conducted on the effect of linear multimedia on students' knowledge and attitudes about cough and sneeze ethics at SDN IV Tapan Tulungagung Regency, the conclusion that can be drawn is that there is an effect of linear multimedia on students' knowledge about cough and sneeze ethics at SDN IV Tapan Tulungagung Regency. Linear multimedia is able to support changes in children's cognition to the C2 stage, namely understanding.

## SUGGESTION

Students are expected to be able to watch cough and sneeze ethics education through linear multimedia at any time so that the information can be absorbed optimally. Watching cough and sneeze ethics education through linear multimedia can be repeated as needed.

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**CONFLICTS OF INTEREST**

The authors declare no conflict of interest. Other funders than the authors had no role in the data collection, data analysis, and also in the writing of the manuscript.

**AUTHOR CONTRIBUTIONS**

FDA, research concept, research data tabulation, writing a draft manuscript and analysis; TA, wrote and revised the manuscript with support from the other author, team coordination. NH, performed the statistical analysis and interpreted the data; TN, verified the method and design of this study. All the authors agreed to the arrangement of authors in this study. We have read and approved the final version of the manuscript. we agreed to be accountable for all aspects of the work.

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