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The Effect of E-Infographic Media on Vocational High School Students' Learning Outcomes in Hair Layering Technique Material

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Abstract

The advancement of information technology in the digital era opens opportunities for developing innovative learning media, including in vocational high schools (SMK). However, conventional methods such as lectures and limited media usage still dominate, resulting in low student participation and understanding. The hair layering technique material in the beauty program requires a visual approach. This study used a quantitative quasi-experimental method with a nonequivalent control group design to examine the effect of e-infographic media on the cognitive learning outcomes of 11th-grade students at SMK Negeri 6 Semarang. The analysis results showed no significant difference in the pretest (p=0.343), but a significant improvement in the posttest (p=0.011), proving that e-infographic media effectively enhances learning outcomes with engaging and easy-to-understand visualizations.

Keywords

e-infographic, learning outcomes, layering technique, learning media

Introduction

The advancement of information technology in the digital era has had a significant impact on the field of education, including the development and utilization of learning media. Learning media play an important role as tools that not only facilitate the delivery of material but also enhance students' understanding through more visual, interactive, and engaging approaches. In the learning process, media function not only as technical aids but also as external factors that influence students' learning achievement (Pratiwi & Meilani, 2018).

However, the reality in the field shows that conventional learning methods still dominate in many educational institutions, including Vocational High Schools (SMK). Teacher-centered approaches, in which teachers act as the main source of information while students tend to be passive, are still widely applied. The limited use of learning media—such as relying only on textbooks, whiteboards, and lectures—results in less varied learning activities. This condition leads to low student participation and weak understanding of learning material (Arrahim & Ratnasari, 2023).

This becomes a particular challenge in skill-based learning at vocational schools, such as in beauty programs. One of the topics that requires a strong visual approach and conceptual understanding is hair layering techniques. This material involves several important aspects, such as face shape, hair type, and appropriate cutting techniques. Due to its complex nature and the need for clear visualization, learning that relies solely on text or

verbal explanation often makes it difficult for students to fully understand and remember the concepts.

As a solution that is relevant to students' needs in the digital era, the use of e-infographic media becomes an innovative alternative. E-infographics are digital visual media that combine text, images, graphics, and other visual elements into informative and appealing displays. This media helps simplify complex information so that it is easier for students to understand. Previous studies have shown that infographic media can improve students' understanding in various subjects such as Science and Arts. However, most of these studies were conducted at the elementary and secondary school levels, and have not specifically examined the effectiveness of infographics in teaching hair-cutting theory in vocational schools.

In addition, there is still limited research that directly measures the influence of infographics on students' learning outcomes in hair layering materials—content that requires deep procedural and technical understanding. Meanwhile, students' ability to understand the sequence of work steps and haircutting principles greatly depends on systematic and visually supported material delivery. This indicates a gap in the study of effective learning media to support student understanding in vocational school environments, particularly in beauty programs.

Considering these conditions, this study was conducted to determine the effect of using e-infographic media on students' learning outcomes in hair layering technique material. The study is expected to contribute to the development of learning media relevant to the digital era and serve as a reference for teachers in

selecting learning strategies that match the characteristics of vocational students and the demands of 21st-century education.

Method

This study employed a quantitative method with a quasi-experimental approach using a nonequivalent control group design. The population of this research consisted of Grade XI students in the Beauty Program at SMK Negeri 6 Semarang. The sample was selected using purposive sampling by choosing two existing classes, namely Grade XI Beauty 1 as the experimental group, which received learning using e-infographic media, and Grade XI Beauty 2 as the control group, which received conventional learning. This study involved two variables: the independent variable, namely the use of e-infographic media, and the dependent variable, namely students' learning outcomes in the hair layering technique material. The data collection techniques used were: 1) Interviews, which were conducted to obtain information related to learning barriers and classroom learning conditions, including students' difficulties in understanding the material and the limited variation of learning media used. 2) Tests, consisting of pretests and posttests, which were used to measure students' initial abilities and their learning outcomes after receiving treatment. The instrument used was a multiple-choice test consisting of 25 questions administered during both the pretest and posttest. Data analysis was carried out through several stages, including validity testing, reliability testing, normality testing, homogeneity testing, and hypothesis testing.

Result and Discussion

A. Result

a. Validation of Learning Media and Materials

Table 1. Media and Content Expert Validation

Experts	1	2	3	Skor Total	Average	Presentace
Content expert	60	48	60	168	55,33	93,33%
Media expert	51	54	60	165	55	91,67%

Based on the results of the data analysis from the media expert validation, the total score obtained was 165, which, when referred to the media feasibility criteria table, indicates that the infographic learning media falls into the "highly feasible" category. Meanwhile, the validation results from the material expert showed a total score of 168, which also places the material within the infographic learning media in the "highly feasible" category based on the feasibility assessment table. Overall, the expert validators concluded that the media are highly suitable for use, although revisions are still recommended. The suggestions provided are related to the operational aspects of the e-infographic media, as there is potential for technical obstacles that may occasionally hinder students' access to the material.

b. Item Validity Test

Table 2. item validity test

Criteria	Items	Total
Valid	1, 2, 3, 4, 5, 6, 7, 9, 12,14, 15, 16, 17, 18, 19, 20, 22, 23, 25	24
Invalid	8, 10, 11, 13, 21, 24	6

Based on the validity calculation of the 30 test items administered, 24 items were categorized as valid and 6 items were categorized as invalid.

c. Reliability Test of Test Items

The instrument is considered consistent if r > 0.70. Based on the reliability test calculated using Cronbach's Alpha in Excel, the test instrument demonstrated a high level of reliability. The results showed a reliability value of 0.862, which falls into the high category. This indicates that the multiple-choice test items developed possess good internal consistency. Therefore, it can be concluded that the instrument is reliable and suitable for use.

Table 3. Normality pre test and post test

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Hasil_Pretest	Kelas kontrol	.172	27	.040	.950	27	.212
	Kelas eksperimen	.126	31	.200*	.967	31	.435

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Hasil_Posttest	Kelas Kontrol	.134	27	.200*	.950	27	.219
	Kelas Eksperimen	.170	31	.023	.956	31	.224

The results of the normality test for the pretest and posttest in both the control and experimental classes show that the significance (Sig.) value for the pretest was 0.212 and for the posttest was 0.219. Since the significance values for each group were greater than 0.05, it can be concluded that the data in both classes were normally distributed and met the requirements for further analysis using parametric statistical tests.

d. Homogenity test

Table 4. Test of homogeneity of variance

		Levene Statistic	df1	df2	Sig.
Hasil_Prosttest	Based on Mean	.331	1	56	.568
	Based on Median	.289	1	56	.593
	Based on Median and with adjusted df	.289	1	54.866	.593
	Based on trimmed mean	.296	1	56	.589

Based on the tests conducted, the results showed significance (p-value) of 0.687 > 0.05 for the pretest and 0.568 > 0.05 for the posttest. Therefore, it can be concluded that the variance of students' test results in the control and experimental classes was homogeneous or not significantly different. This means that the assumption of homogeneity of variance was fulfilled, so the subsequent statistical analysis to compare the mean learning outcomes between the two classes could be carried out using the t-test.

e. Hypothesis testing (Independent Sample t test)

Table 5. Independent Sample T Test (Pretest)

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Hasil_Pretest	Equal variances assumed	.164	.687	.957	56	.343
	Equal variances not assumed			.958	55.096	.342

This test was conducted using SPSS for Windows Version 10, and the results showed a significance value of 0.343 (> 0.05).

Therefore, it can be concluded that there was no significant difference between the pretest results of the control and experimental classes. This indicates that both groups had an equivalent level of initial understanding before the treatment was given.

Table 6. Independent Sample T Test (Posttest)

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Hasil	Equal variances assumed	.331	.568	-2.617	56	.011
	Equal variances not assumed			-2.615	54.702	.012

This test was conducted using SPSS for Windows Version 10 and resulted in a significance value of 0.011 (< 0.05), indicating a significant difference between the posttest results of the control and experimental classes. This finding shows that the treatment given to the experimental class had an effect on students' learning outcomes. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. This proves that there is a significant difference between the posttest results of the experimental and control groups, meaning that the use of e-infographic media has a significant influence on students' learning outcomes.

B. Discussion

This study aims to examine the effect of using infographic media on the understanding of Grade XI students regarding hair layering techniques. Using a quantitative approach with a quasi-experimental method, this research applied a nonequivalent control group design. Measurements were conducted through pretests and posttests to determine changes in students' cognitive learning outcomes after the implementation of the media.

Before being used in the experimental class, the infographic media were validated by four lecturers and one teacher as media and material experts. The validation results showed average scores of 55 and 55.33, with feasibility percentages of 91.67% and 93.33%, indicating that the media were categorized as highly feasible, although minor revisions were still needed based on the validators' suggestions.

Furthermore, a test instrument consisting of 30 multiple-choice questions was developed and tried out on 15 students at an equivalent school. The test results showed that 24 questions were valid and reliable. However, the researcher decided to use 25 questions after revising one less valid item. In addition, a lesson plan was also prepared as a guide during the learning process.

During implementation, the experimental class used infographic media, while the control class used only books, modules, and a whiteboard. The learning session lasted 120 minutes, beginning with the presentation of learning objectives, followed by material exploration with or without infographics, and ending with a discussion connecting the material to real-life contexts so that students could analyze, determine, and evaluate the information obtained.

After the pretest and posttest were administered, data analysis began with a normality test using Shapiro–Wilk. The significance values of 0.212 for the pretest and 0.219 for the posttest, both above 0.05, indicated that the data were normally distributed. This was followed by a homogeneity test using Levene's Test, which produced significance values of 0.687 for the pretest and 0.568 for the posttest, meaning that the variances of both groups were homogeneous and met the requirements for conducting a t-test.

Hypothesis testing was carried out using an independent t-test in SPSS Version 10. The pretest results showed a significance value of 0.343 (> 0.05), indicating no initial difference between the two classes. Conversely, the posttest results showed a significance value of 0.011 (<0.05), indicating a significant difference resulting from the use of infographic media. Therefore, the alternative hypothesis (H_1) was accepted, proving that infographic media had a positive effect on students' cognitive learning outcomes.

The strength of infographic media lies in its ability to present information visually in an attractive and easy-to-understand manner. Elements such as color, layout, icons, and images support student engagement in understanding the material. Thus, infographics serve as an effective learning medium in improving understanding while motivating students, thereby contributing to the success of the learning process (Hikmah & Hayudinna, 2022; Mansur & Rafiudin, 2020; Nurhayati et al., 2023).

I. Conclution

Based on the results of this study, it was found that the use of e-infographic media has a positive and significant effect on students' cognitive learning outcomes. The strength of infographics in presenting learning material visually, attractively, and in an easily understandable manner makes it an effective learning medium to enhance students' understanding as well as motivation, and it contributes to improving the quality of learning in vocational high schools (SMK).

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