Development of Tutorial Video Media for Learning to Operate 3D Design Software in the Visual Communication Design Expertise Program

Patan Pindoyono, Priyanto

Graduate School, Yogyakarta State University, Indonesia

DOI: https://dx.doi.org/10.47772/IJRISS.2025.908000147

Received: 25 July 2025; Accepted: 31 July 2025; Published: 01 September 2025

ABSTRACT

This study aims to: (1) develop a video tutorial for operating 3D design software, (2) assess its feasibility, and (3) evaluate its effectiveness in improving learning outcomes of grade XI Visual Communication Design (DKV) students at SMK Negeri 2 Malinau. Using the ADDIE development model, the research involved five stages: analysis, design, development, implementation, and evaluation. Product validation was conducted through alpha testing by material and media experts, and beta testing involving teachers and students in small and large groups. Data were collected through observation, interviews, questionnaires, and tests, and analyzed using t-tests. The developed video tutorial, packaged in .mp4 format, was rated very feasible by experts and users based on content, media, and user response. The effectiveness test showed a significant improvement in student learning outcomes ($p < 0.05$), with the experimental group achieving a higher average score (72.65) than the control group (57.18). These findings indicate that the tutorial video is an effective and practical learning medium for enhancing students' understanding in operating 3D design software in vocational education settings.

Keywords: 3D Design Software, Video Tutorial, Learning Media, Vocational Education, ADDIE Model

INTRODUCTION

Vocational education in Indonesia aims to prepare students for the workforce by equipping them with skills relevant to their chosen field. This is in accordance with Law Number 20 of 2003 on the National Education System, Article 18, which states that vocational education is secondary education designed to prepare learners for specific occupations (Undang-Undang Nomor 20 Tahun 2003). Consequently, the vocational school curriculum is structured to align with the demands of industry and equip students with the necessary competencies (Nurcahyono et al., 2020).

To achieve work-ready graduates, schools must design effective and efficient learning environments, supported by adequate facilities and the integration of technology (Rahmawati & Rodiyah, 2023). Teachers are expected to integrate technology, pedagogy, and content knowledge—known as Technological Pedagogical Content Knowledge (TPACK)—to enhance the quality of learning experiences (Nusa, 2021). One of the most effective technologies in vocational learning is educational video media. Prior studies have shown that videos help reduce cognitive load, improve conceptual understanding, and support independent learning (Xiao & Adnan, 2022; Abu Farha et al., 2020; C et al., 2024).

In the Visual Communication Design expertise concentration at SMK Negeri 2 Malinau, the subject of operating 3D design software demands hands-on practice and spatial understanding. However, preliminary observations revealed that instruction is still largely dependent on printed textbooks and modules. This often leads to difficulties among students in understanding 3D concepts and software operations, especially when presented only through text or static images. Interview results show that 43% of students have not met the

Minimum Competency Criteria, while questionnaire data from 27 students indicated that 56% struggled with 3D concepts and 67% had difficulty operating 3D design software such as Blender.

These challenges are exacerbated by the limited availability of digital learning resources that can support self-paced learning. Although video tutorials are widely available on platforms like YouTube, they are often unstructured and not aligned with the curriculum, which limits their effectiveness in a formal educational context.

Therefore, it is necessary to develop structured, curriculum-based video tutorial media that align with school learning objectives. This study seeks to develop a video tutorial as an alternative digital learning medium to assist students in independently understanding and practicing the steps of operating 3D design software in the Visual Communication Design program at SMK Negeri 2 Malinau.

METHOD

This study employs a research and development (R&D) approach using the ADDIE instructional design model, which includes five stages: Analyze, Design, Development, Implementation, and Evaluation (Dick & Carey, 1996). The purpose of this method is to develop a video tutorial product for teaching 3D software operation in the Visual Communication Design program and to assess its feasibility and effectiveness.

A. Development Procedure

The ADDIE model was applied as follows:

1. Analysis Stage: Conducted through interviews and observations at SMK Negeri 2 Malinau to identify the learning objectives, teaching materials, and students' learning characteristics. A needs analysis and curriculum review were also performed to ensure the video tutorial aligns with the current curriculum and learning outcomes.
2. Design Stage: Learning goals and content were formulated, focusing on the basics of 3D modeling. Video content was storyboarded and supported with clear narration scripts. Assessment instruments were also designed and reviewed by subject matter and media experts.
3. Development Stage: Instructional content was developed into screen-recorded video tutorials, covering topics such as interface navigation, basic tools, 3D modeling, texturing, and rendering using Blender. Feedback from content and media experts was incorporated into the product revision.
4. Implementation Stage: The video tutorial was tested in small and large group settings. The small group involved 5 students and 1 teacher; the large-scale trial included 64 students divided into an experimental group and a control group.
5. Evaluation Stage: Evaluation was conducted using expert validations and student responses through questionnaires. Additionally, pretest and posttest data were collected to evaluate the product's effectiveness.

B. Participants

The study was conducted at SMK Negeri 2 Malinau with 64 grade XI students from the Visual Communication Design department. Students were assigned to experimental and control groups to assess learning outcomes with and without the use of video tutorials.

C. Data Collection Instruments

Data were collected through:

1. Observations and interviews with teachers and students.
2. Questionnaires for needs analysis, expert validation (media and content), and user responses.
3. Tests (pretest and posttest) to measure students' understanding before and after using the video tutorial.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue VIII August 2025

D. Data Analysis Techniques

1. Qualitative data from interviews and observations were analyzed using descriptive analysis and thematic categorization.
2. Quantitative data from questionnaires and test scores were analyzed using descriptive statistics (mean scores with Likert scales) to assess feasibility and effectiveness.
3. A paired sample t-test was used to determine the effectiveness of the video tutorial, preceded by normality and homogeneity tests using SPSS v26.

The significance level was set at 0.05. The effectiveness was determined by comparing the mean scores of the experimental group and control group. A significance value (Sig.) < 0.05 indicated that the developed tutorial video had a statistically significant effect on learning outcomes.

RESULTS AND DISCUSSION

In this study, an experiment was conducted involving two classes: a control class and a treatment class. The control class did not receive any special treatment, while the treatment class was given a different approach in accordance with the research objectives. The differences between the two classes were observed in specific aspects.

The data obtained were analyzed using appropriate statistical methods, namely the t-test, to determine whether there were significant differences between the two groups. The t-test is a statistical method used to compare the means of two data groups and to assess whether the observed differences are statistically significant or merely due to chance. Prior to the t-test, the data underwent quality checks, including normality and homogeneity tests.

Normality Test

The normality test is used to determine whether the research data follow a normal distribution. Data are considered normally distributed if the significance value is greater than 0.05 (p > 5%). If the significance value is less than 0.05 (p < 5%), the data are considered not normally distributed. In this study, the normality test was calculated using the Lilliefors method, an adaptation of the Kolmogorov-Smirnov and Shapiro-Wilk tests, with the help of SPSS version 26 for Windows. The results of the normality test are as follows:

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Eks Kon	Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar	Eksperimen	,151	32	,061	,960	32	,269
	Kontrol	,153	32	,056	,937	32	,060

a. Lilliefors Significance Correction

Figure 1 Results of the Normality Test of the Research Data

In the Kolmogorov-Smirnov test, the experimental group obtained a significance (Sig.) value of 0.061 for students' learning outcomes, while the control group obtained a significance value of 0.056. Furthermore, in the Shapiro-Wilk test, the experimental group had a significance value of 0.269, and the control group had a significance value of 0.060. These results indicate that both groups have significance values greater than 0.05. Therefore, it can be concluded that the learning outcome data from both groups are normally distributed.

Homogeneity Test

The homogeneity test aims to determine whether the samples drawn from the population have equal variances and do not show significant differences from each other (i.e., they are homogeneous) between the experimental

and control groups in the study. The formula used in this test is Levene's test for equality of variances, applied to the students' learning outcome data from both the experimental and control classes, using SPSS version 26 for Windows. In the homogeneity test, if the significance value is greater than 0.050, the data are considered homogeneous. The results of the homogeneity test are as follows:

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar	Based on Mean	1,637	1	62	,205
	Based on Median	1,142	1	62	,289
	Based on Median and with adjusted df	1,142	1	56,369	,290
	Based on trimmed mean	1,603	1	62	,210

Figure 2 Results of the Normality Test of the Research Data

Based on the table, the significance (Sig.) value based on the mean is 0.205. Since the significance value of 0.205 is greater than 0.05, it can be concluded that the variance in students' learning outcomes between the experimental and control classes is homogeneous or equal.

Hypothesis Testing

The purpose of hypothesis testing is to determine the level of significance of the effect of using video tutorial-based instructional media in teaching 3D design software on the learning comprehension of Grade XI Visual Communication Design (DKV) students at SMK Negeri 2 Malinau. The data analysis technique used for this hypothesis testing is the independent sample t-test. This technique is employed to test the hypothesis that there is a significant difference in students' understanding of the learning material between the group taught using video tutorials and the group taught using conventional methods.

As stated in Chapter II of the study, the research hypotheses are as follows:

- **H_0**: There is no significant difference between learning using video tutorials and without video tutorials in improving students' learning outcomes in operating 3D design software.
- **H_1**: There is a significant difference between learning using video tutorials and without video tutorials in improving students' learning outcomes in operating 3D design software.

The independent sample t-test analysis was performed using SPSS version 26 for Windows. The criteria for determining the presence of a significant effect are based on the comparison between the calculated significance value and the 5% significance threshold. If the calculated significance value is less than 0.05 (sig. < 0.05), it is concluded that there is a significant effect. Conversely, if the significance value is greater than 0.05 (sig. > 0.05), it is concluded that there is no significant effect. The results of the independent sample t-test are presented in the following table:

Group Statistics

	Eks Kon	N	Mean	Std. Deviation	Std. Error Mean
Hasli Belajar	Eksperimen	32	72,6563	10,07907	1,78175
	Kontrol	32	57,1875	8,22442	1,45389

Figure 3 t-Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasli Belajar	Equal variances assumed	1,637	,205	6,727	62	,000	15,469	2,2997	10,8718	20,06569
	Equal variances not assumed			6,727	59,602	,000	15,469	2,2997	10,8681	20,06937

Figure 4 Independent Samples t-Test

Based on the SPSS version 26 output table, the experimental class achieved an average score of 72.65, while the control class achieved an average score of 57.18. This difference in mean scores demonstrates a significant difference between the class taught using video tutorial-based learning media for operating 3D design software and the class taught using conventional methods. The t-test table showed a t-value of 6.727, degrees of freedom (df) of 62, a mean difference of 15.469, and a significance value (2-tailed) of 0.000. Since the significance value (0.000) is less than 0.05, it can be concluded that there is a significant effect of using video tutorial-based instructional media on students' understanding of the material, as reflected in the learning outcomes of Grade XI DKV students at SMK Negeri 2 Malinau. Therefore, the null hypothesis (H_0), which states "there is no significant difference between treatment using video tutorials and without video tutorials in improving students' learning outcomes in operating 3D design software," is rejected, and the alternative hypothesis (H_1) is accepted.

According to the SPSS analysis output, the average learning outcome of students in the experimental class using video tutorials for learning 3D design software was 72.65, while the control class, which used conventional learning methods, only scored an average of 57.18. The 15.47-point difference clearly indicates a significant improvement after applying video tutorial media in the learning process.

This difference is further supported by the results of the independent t-test, which yielded a t-value of 6.727 with 62 degrees of freedom and a significance value (2-tailed) of 0.000. Since the significance value is less than 0.05, it confirms that the null hypothesis is rejected, and the alternative hypothesis is accepted. Thus, the use of video tutorial media is proven to be effective in improving students' learning outcomes in operating 3D design software.

The improvement in learning outcomes is not only reflected in the average score difference but also in the suitability and effectiveness of the media used. The fact that the experimental class achieved an average score above the Minimum Mastery Criteria (KKM) indicates that the development of the video tutorial media successfully addressed the issue of students' low comprehension when learning solely through textbooks.

This finding aligns with Richard E. Mayer's Multimedia Learning Theory, which emphasizes that learning is more effective when students receive information through both verbal (text/narration) and visual (images/animation) channels simultaneously. As an interactive instructional medium, the video tutorial combines audio explanations (verbal) with visual demonstrations of 3D software operations. This principle supports cognitive load reduction, as the structured and multimodal presentation of information makes it easier for students to process, retain, and understand the material.

Furthermore, this finding supports Mayer's (2021) Cognitive Theory of Multimedia Learning (CTML), which states that people learn better from words and pictures than from words alone. In the context of this study, the use of video tutorials enabled students to repeatedly follow the steps, observe processes dynamically, and

practice more confidently compared to simply reading modules or listening to lectures. Therefore, the results also reinforce the role of video tutorials in overcoming the limitations of conventional learning media.

Overall, these findings indicate that video tutorial media is a feasible and effective tool for improving students' knowledge and skills in practical subjects, particularly in the Visual Communication Design program at SMK Negeri 2 Malinau. The achievement of a score increase from 57.18 to 72.65 reflects the success of this video tutorial development as an innovative learning approach that meets the demands of vocational education in producing skilled and job-ready graduates.

CONCLUSIONS

The results of the research and development of video tutorials aimed at improving Grade XI DKV students' knowledge in operating 3D design software can be summarized as follows:

1. The video tutorial was developed using the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The resulting product was implemented with Grade XI DKV students at SMK Negeri 2 Malinau to enhance their knowledge of operating 3D design software. The video tutorials are delivered in .mp4 format and can be played on electronic devices such as smartphones, computers, or tablets owned by students. The video tutorial includes instructional content on operating 3D design software, covering several subtopics: Understanding the User Interface, Using Basic Tools, Creating Basic 3D Models, Texturing, and Materials.
2. The feasibility test based on material and media aspects conducted by experts yielded an average score of 4.35 from subject matter experts, categorized as "very feasible," and 3.98 from media experts, categorized as "feasible." The user response from the small group included an average score of 4.27 from the teacher (very feasible) and 4.23 from students (very feasible). The large group response resulted in a score of 4.11 (feasible). These results indicate that the developed video tutorial is highly feasible for use in teaching 3D design software to enhance students' knowledge.
3. The video tutorial-based learning was proven effective in improving students' knowledge of operating 3D design software, as evidenced by the effectiveness test. The experimental class achieved an average score of 72.65, while the control class scored an average of 57.18. This difference indicates that the treatment given to the experimental class contributed positively to the learning outcomes. A significant difference was found between the class that used video tutorial media and the class taught through conventional methods. Therefore, it can be concluded that there is a significant effect of using video tutorial learning media on students' understanding of the subject matter, as reflected in the learning outcomes of Grade XI DKV students at SMK Negeri 2 Malinau.

REFERENCES

1. Abu Farha, I. M., Al-Momani, I. M., & Salameh, A. K. (2020). The impact of educational video clips on students' performance in science learning. Journal of Educational and Social Research, 10(3), 84–90. https://doi.org/10.36941/jesr-2020-0045
2. C., P., Widodo, A., & Sholihin, H. (2024). Digital instructional videos: A learning alternative in vocational education. International Journal of Instructional Technology, 11(1), 45–58.
3. Mayer, R. E. (2021). Multimedia Learning (3rd ed.). Cambridge University Press.
4. Nurcahyono, E., Wahyuni, S., & Kustiono, K. (2020). Vocational curriculum alignment with industry needs in Indonesia. International Journal of Vocational and Technical Education Research, 6(3), 12–23.
5. Nusa, N. H. (2021). Integrating technological pedagogical content knowledge (TPACK) in digital-based learning. Journal of Educational Technology and Instruction, 1(1), 14–22.
6. Rahmawati, R., & Rodiyah, R. (2023). The role of infrastructure and media in supporting vocational learning effectiveness. Journal of Technical Education and Training, 15(1), 33–40.
7. Xiao, H., & Adnan, M. (2022). Educational videos and cognitive load: A study on effectiveness in self-directed learning. Education and Information Technologies, 27(2), 1753–1770. https://doi.org/10.1007/s10639-021-10713-8

8. Clark, R. C., & Mayer, R. E. (2016). E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning (4th ed.). Wiley.
9. Kay, R. H. (2012). Exploring the effectiveness of video podcasts in education: A comprehensive review of the literature. Computers in Human Behavior, 28(3), 820–831. https://doi.org/10.1016/j.chb.2012.01.011
10. Moreno, R., & Mayer, R. E. (2007). Interactive multimodal learning environments. Educational Psychology Review, 19(3), 309–326. https://doi.org/10.1007/s10648-007-9047-2
11. Sunar, M. S., Shaari, N., & Liew, S. J. (2019). 3D modeling software in education: A tool for creativity and innovation. Journal of Technical Education and Training, 11(1), 72–80. https://publisher.uthm.edu.my/ojs/index.php/JTET/article/view/2742
12. Hsin, W. J., & Cigas, J. (2013). Short videos improve student learning in online education. Journal of Computing Sciences in Colleges, 28(5), 253–259.