

Development Of Video Tutorials AutoCAD Learning in Software Applications and Building Interior Design Lessons With 4D Development Model

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Abstract. This study aims to develop a valid and practical AutoCAD tutorial learning video so that it can be used in software applications and building interior design lessons. This is a research and development study using a 4D (four-dimensional) model to develop the product. The first stage is doing a needs analysis through observation and interviews; the second stage is planning storyboards, compiling materials, and designing the video view; the third stage is developing videos and doing validation by expert judgment; the last stage is the dissemination stage. The feasibility of the product is tested using a validity assessment questionnaire through a focus group discussion forum. Meanwhile, to find out the practicality of the product, using a practicality assessment questionnaire by product users, in this case, the students of class XI DPIB 3 SMKN 2 Medan. Based on the results of the needs analysis, it is known that the learning media product that needs to be developed is the material for instructions on software applications for 2D drawing. The research results obtained are the assessments of an expert's judgment categorized as "very feasible" with an average score of 4.19 on a 5-point scale. The user's assessment of the practicality of the product was obtained by 79.8% and categorized as "practical".

Keywords: Media development, tutorials video, AutoCAD, 4D.

1 Introduction

With the rapid development of science and the advancement of science and technology, the world of education needs to innovate or renew in various fields, including learning implementation strategies. To increase students' interest in learning, teachers need to be more creative to encourage students to use innovative methods, teaching aids, and other learning media for the best learning in independent learning and classroom learning. Media is part of the communication carried out in the teaching and learning process. So, it can be concluded that in order for communication between teachers and students to take place well and the information conveyed by the teacher to be accepted by students, the teacher must use appropriate learning media [1]. One of the subjects that requires appropriate learning media is software applications and building interior design. In Indonesia, this subject is abbreviated as APLPIG. APLPIG is a practical subject in which, in the end, students are expected to be able to produce 2-dimensional drawings of building construction using AutoCAD applications. Due to the current pandemic conditions, the learning process is very disrupted, especially practical learning such as APLPIG, which should be carried out face-to-face in the computer lab so that students cannot carry out practice and only discuss the theory. Therefore, to support students' understanding of the APLPIG subject, learning should be assisted by video media.

As one of the audiovisual media, video can display motion, sound, and images simultaneously. In the world of vocational schools, video has become a medium that is often used to overcome the limitations of vocational school practicum tools. SMK Negeri 2 Medan is an educational institution that teaches various fields of engineering. Vocational Design, Modeling, and Building Information is one of the departments that occur in SMK Negeri 2 Medan. From the results of observations made on March 12, 2020, there were various kinds of obstacles that hinder students' understanding of the subjects of software application and building interior design. They had difficulty memorizing toolbar functions; students can only follow the instructions contained in the module and the material on the existing video as expected. So, the researchers tried to provide problem-solving by offering three choices of media to be developed, namely: the Internet, modules, and video tutorials. According to the three choices, video tutorials get the highest score.

Based on the problems, the purpose of this research is to develop a video tutorial for AutoCAD learning in software applications and building interior design subjects that is valid and practical for use in software application subjects and building interior design subjects for students of SMK Negeri 2 Medan class XI.

2 Literature Review

2.1 The definition of learning outcomes

Learning outcomes are abilities possessed by students after gaining learning experiences [2]. Another definition of learning outcomes is changes in the behavior of someone who has studied, which are due to changes in knowledge, skills, and attitudes [1]. In more detail about learning outcomes, see [3]:

- 1) Learning outcomes in the cognitive domain are oriented toward the ability to "think," including the ability to solve problems.
- 2) Affective domain learning outcomes are connected with "feelings", "emotions," and "value systems" that display acceptance or rejection of something.
- 3) Learning outcomes in the psychomotor domain are oriented toward motor skills that are connected to body parts or actions that coordinate nerves and muscles.

Based on the opinions above, it can be concluded that learning outcomes are abilities possessed by students after they receive their learning experiences, either in the form of cognitive, affective, or psychomotor abilities.

2.2 The definition of learning

Gagne et al. said that learning is a system that has the aim of helping the student learning process and has been regulated so that it supports the student learning process. There are five principles that form the basis for understanding learning, namely [4]:

- 1) Learning as an effort to obtain behavior change.
- 2) Learning outcomes are marked by a change in overall behavior.
- 3) Learning is a process.
- 4) Learning is created because there is something that encourages and there is a goal to be achieved.
- 5) Learning is a form of experience.

Based on the opinions above, it can be concluded that learning is a process carried out by teachers in educating students with various kinds of existing teaching materials so that changes in behavior occur in a good direction.

2.3 Characteristics of Software Applications and Building Interior Design Subjects

APLPIG is a subject that studies and plans interior spaces in buildings using computer software. APLPIG subjects are taught from semester 3 to semester 6 on an ongoing basis, with the output of students being able to plan and design exterior and interior images of buildings digitally using certain software, both in 2D and 3D. The subjects that will be studied include principles and commands, interior elements, the application and selection of materials, ornaments, decoration, finishing, lighting, and interior acoustics, mastery of software in the application of 2D and 3D images, and interior mock-ups.

2.4 Learning media

Learning media is a means of intermediary in the learning process, namely the media used as tools and materials for learning activities [5]. Another opinion says that learning media are everything that can deliver information from the sender in a planned manner, so that there is a supportive learning atmosphere where the recipient can learn efficiently and effectively [6]. Based on the above opinion, it can be concluded that learning media are everything that can be used to send or convey information so that the recipient can carry out the learning process effectively.

2.5 Development of learning tutorial videos

Learning video is a medium that displays sound and images containing learning materials in the form of concepts, procedures, principles, and theories of knowledge in order to help students understand the learning material [7]. Another definition of a video tutorial is a series of life pictures displayed by the teacher that contain learning information to help understand the learning material, as a guide or student teaching material [8]. So, it can be concluded that learning video tutorials are one of the presentation methods in the form of audio and visuals that are shown by a teacher to describe concepts, processes, and steps in working on something related to learning. This learning tutorial video can be played over and over again to help with understanding in the learning process.

1) The advantages of learning videos

Video has advantages, including [9]:

- a) Can attract attention for a short time from other external stimuli.
- b) With a video recorder, viewers can get information from the experts
- c) Can demonstrate difficult things, so that when the teacher teaches, they can focus on the video.
- d) Save time and can be played many times.
- e) The existing sound can be adjusted and adapted to the circumstances.
- f) Images can be paused or dismissed for viewing.

Because of these advantages, the material recorded in the video can be used both for face-to-face (direct) and long-distance learning processes without the presence of a teacher.

2) The disadvantages of learning videos

Video also has the following weaknesses [5]:

- a) Fine details: Can display objects to the smallest perfectly.
- b) Size information: Cannot display objects equal to their original size.
- c) Third dimension: Requires photo-taking settings, property location, and lighting settings to make it look like 3D
- d) Opposition: Taking a bad picture can cause the audience to be confused.

- e) Setting: The author is obliged to write down where the incident took place or the object is located.
- f) Supporting materials: A projection tool is needed to be able to display the images contained in it.
- g) Budget: Requires a lot of money, especially to pay players, rent or buy equipment and other support personnel.

3 Research Method

This research was conducted at SMK Negeri 2 Medan – North Sumatra in the even semester of the 2020/2021 academic year. The time used for this research is from March 2021 to April 2021. The development model used in this study is the 4D model because it is adapted to the product to be produced. Thiagarajan's 4D development model can be adapted into 4Ps, namely: definition, design, development, and deployment [10]. The development flow used is adjusted to the 4D model in Figure 1.

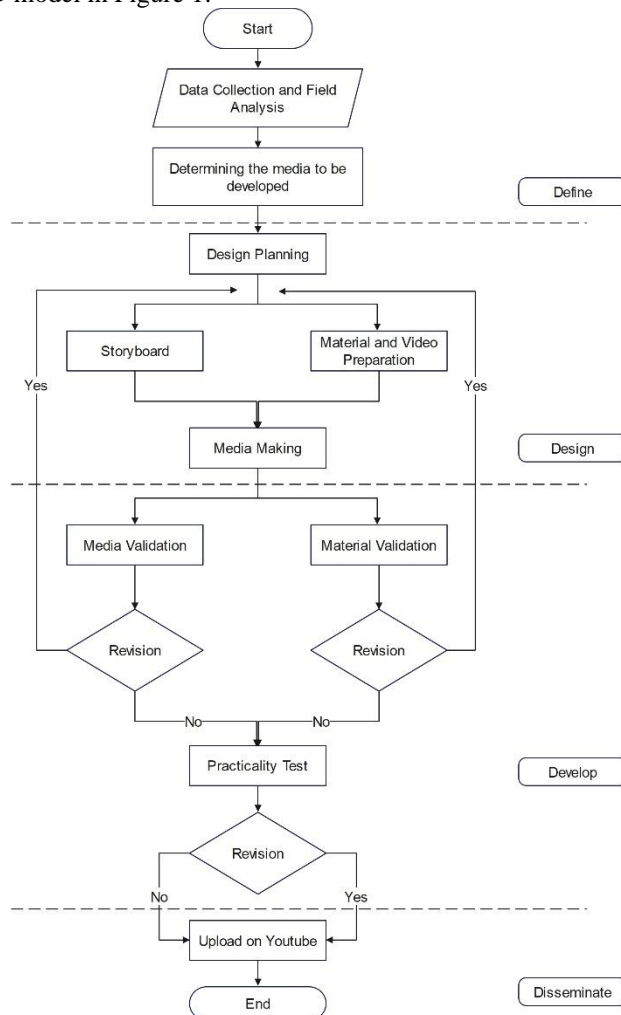


Figure 1. Learning Video Development Flowchart

- 1) Define. The analysis stage is the stage of identifying product development needs in accordance with learning objectives and students [11].
- 2) Design. Making the initial video design using AutoCAD software as the main software and Bandicam, Adobe Premiere Pro CC 2015, Carnac as supporting software.
- 3) Develop (development). At this stage, validity and practicality tests will be carried out in order to produce valid and practical products.
- 4) Disseminate (Spread). Products that have been declared valid and practical are then distributed by uploading them on YouTube so that everyone can watch and learn about them.

The tools and materials used in this research are: Laptop, Mouse, Student Needs Analysis Instrument, Syllabus, Lesson Plan, Module, Validity Instrument, Practical Instrument, AutoCAD 2007, Bandicam, Adobe Premiere Pro CC 2015, and Carnac.

3.1 Data collection technique

Data collection techniques used in this study are observation, product validity assessment instruments, and product practicality assessment instruments. Data analysis techniques used in this study are:

- 1) Product validity analysis

The data analysis technique used is descriptive statistics. The score obtained will be calculated and the average score (Mean) is taken using the formula:

$$X = \frac{\sum x}{n}$$

X : Eligibility score for each aspect of the assessment

$\sum x$: Total score for each aspect of the assessment

n : Number of sub variables

The results obtained are then compared with Table 1.

Table 1. Validity Interpretation Criteria [12]

No	Interval <i>Mean</i> Score	Interpretation
1	1,00 – 2,49	Not feasible
2	2,50 – 3,32	Not worth it
3	3,33 – 4,16	Worthy
4	4,17 – 5,00	Very worth it

- 2) Product practicality analysis

The data analysis technique used to calculate the percentage value. The score obtained will be calculated using the following formula [13]:

$$P = \frac{\sum f}{n} \times 100\%$$

P : Final score

$\sum f$: Score obtained

n : Maximum score

The results obtained are then compared with the Arikunto category from Table 2.

Table 2. Practical Interpretation Criteria

No	Achievement Level (%)	Interpretation
1	81 – 100	Very Practical
2	61 – 80	Practical
3	41 - 60	Less Practical
4	21 - 40	Not Practical
5	< 21	Very Impractical

4 Results and Discussion

This research is a type of research with the method of development (Research and Development). The results of this research and development are learning media products in the form of AutoCAD video tutorials with material commands on software applications for 2D drawing. The resulting video tutorial will be divided into 2 videos so that it can be used for 2 meetings with a duration of ± 9 minutes and a duration of ± 17 minutes.

There are several problems behind the development of this medium. These problems include: (1) The learning process needs to be harmonized to improve student learning achievement, (2) The learning process is disrupted due to the pandemic situation so it must be done online, (3) The learning outcomes of class XI students at SMKN 2 Medan are for describing materials using devices. The software is much below the passing standard, which is 46.87 percent; (4) the existing learning videos are still not able to improve student learning outcomes; and (5) the learning media used are still focused on the module.

With the problems found, try to solve the problem by developing video tutorial media because videos can be used anywhere, even without teacher guidance during the learning process. This media is also desired by students because according to students, this media can be used anytime even though the teacher is not in class. This research is also supported by several previous studies that got very decent scores from validators and students in testing using 4D models in their development.

This research and development article explains that there are four stages in research and development, namely definition, design, development, and dissemination [10]. At this definition stage, it begins with analyzing and collecting data by means of observation, interviews, and distributing questionnaires on student needs. Furthermore, at the design stage, it begins with collecting teaching materials in accordance with KD 12 to be included in the media, then making a storyboard consisting of 5 columns, namely scene, shoot, board, narration, and time. After creating a storyboard, the initial video design can be made according to the following flow, as in Figure 2:

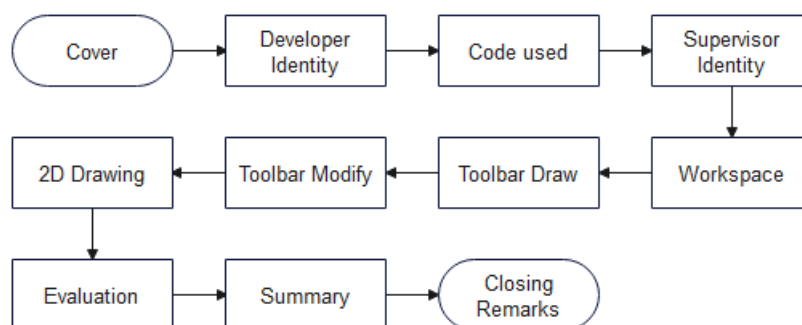


Figure 2. Learning tutorial video flowchart

Then enter the development stage, the video that has been designed is then tested for validity by the material validators and media validators. If the assessment given by the validator is still not valid, then the media must be revised according to the validator's suggestions until it gets a value that states it is valid. The final scores given by 2 media validators and 2 material validators can be seen in table 3.

Table 3. Total overall validity assessment

No	Evaluation	Score	Information
1	Theory	4,25	Very Worthy
2	Media	4,13	Worthy
Mean		4,19	Very Worthy

Based on Table 3, the average of the final assessment given by the validator is getting a score of 4.19 with the category "Very Valid/Very Eligible," which is calculated with descriptive statistics. After conducting the validity test, a practicality test was carried out by 1 DPIB class with a total of 28 students, the results of which can be seen in Table 4.

Table 4. Total practicality assessment

No	Assessment Aspect	Score Earned	Max Score	Percent (%)
1	Ease of use of media	679	840	80,8%
2	Time effectiveness	331	420	78,8%
3	Use of media	667	840	79,4%
Total/ Average		1677	2100	79,8%

Based on Table 4, the total score obtained from 28 students is 1677, which is divided by a maximum score of 2100, multiplied by 100%, and gets a result of 79.8%, so that this product can be categorized as "practical." Furthermore, because the video tutorials that have been developed have been included in the "very feasible" category and have proven practical for students to use in instructional materials in software applications for 2D drawing. So, the final step is to package the final product in the form of an AutoCAD learning tutorial video uploaded to YouTube so that all those who need it, both teachers and students of SMK Negeri 2 Medan, and other school students, can learn it too. The first video link regarding the draw toolbar commands and how to use them can be accessed at the following YouTube link: https://youtu.be/mipt9_zdd88 And the second video is about the modify toolbar commands and how to use them, which can be accessed at the following YouTube link: <https://youtu.be/hwLYGmFeMV>

Based on the results of the research that has been carried out on the product, it can be concluded that the product that has been developed is feasible and practical to use, but its effectiveness is not yet known due to the absence of testing the effectiveness of the product in increasing student scores in the subjects of software applications and building interior design.

5 Conclusions

Data from the results of the research that has been carried out and the discussion that has been described, namely this AutoCAD tutorial learning video, was developed using the 4D. At the definition stage, the needs analysis instrument and interviews were distributed through observation. The design stage is carried out by collecting material to be taught, making storyboards, and making initial product designs. In the development stage, the validity test

was carried out by lecturers and teachers, while the practicality test was carried out by the students of class XI DPIB 3. The results of the validity test assessment got a score of 4.19, which was categorized as "very feasible," while the practicality test assessment got a score of 79, of which 8% are categorized as "practical." The dissemination stage of the product that has been declared very feasible and practical is then completed by uploading it on YouTube.

There are some useful suggestions for improvement and further research. It is hoped that further researchers will be able to develop video tutorial learning media with the AutoCAD application with more complete material and a more attractive video display in accordance with input from students and teachers. In making a video, it is necessary to make some preparations, such as purchasing tools of sufficient quality, such as a microphone and a good image recording device, so that the audience is satisfied with the results, and preparing materials such as storyboards and scripts before starting the design.

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