



## Development of 3D Animation Video-Based Learning Media Using SketchUp in Building Construction and Utility Subjects

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### Abstract

The problems found by researchers through observations of the learning process at SMK Negeri 1 Lotu, namely the learning process using media is still not optimal. The aim is to develop learning media in class XI-DPIB based on 3D animated videos using SketchUp in the subject of Building Construction and Utilities to understand the Feasibility, Practicality, and Effectiveness of Media Products. This type of research uses the ADDIE model (Analyze, Design, Development, Implementation, Evaluation). The instruments used in this research were validation questionnaires for feasibility tests, student response questionnaires for practicality tests, and essay tests to test the effectiveness of learning outcomes. The results of this study are in the form of animated video-based media using SketchUp in the Building Construction and Utilities subject. Very Eligible Criteria based on the assessment of material experts 93%. Based on the assessment of linguists 92%. Based on the design expert's assessment of 90.59%. Practicality The media is categorized as very practical based on 91% individual trials and 93% field trials. The criteria are very effective with an effective percentage of 93% media. So it can be concluded that the 3D animated video-based learning media using SketchUp that was developed is very feasible, practical and effective for use in the learning process. suggestions from researchers (1) for students, it is hoped that the presence of 3D animated video-based media can increase effectiveness and critical thinking in visible image material, (2) for teaching staff it can add innovation in using media (3) for researchers, they can use this research as the next research to determine the feasibility of the product.

**Keyword: SketchUp, Learning Media**

### Abstrak

Permasalahan yang ditemukan oleh peneliti melalui pengamatan pada proses pembelajaran di SMK Negeri 1 Lotu, yaitu proses belajar menggunakan media masih belum optimal. Adapun tujuan mengembangkan media pembelajaran dikelas XI-DPIB Berbasis video animasi 3D menggunakan *SketchUp* pada mata pelajaran Konstruksi dan Utilitas Gedung untuk mengetagui Kelayakan, Kepraktisan, dan Keefektifan Produk Media. Jenis penelitian ini menggunakan model ADDIE (*Analyze, Design, Develompment, Implementation, Evaluation*). Instrumen yang digunakan dalam penelitian ini adalah angket validasi untuk uji kelayakan, angket respon peserta didik untuk uji kepraktisan, dan esai tes untuk uji keefektifan hasil belajar. Hasil penelitian ini berupa media berbasis videoa animasi menggunakan *SketchUp* pada mata pembelajaran Konstruksi dan Utilitas Gedung. Kriteria Sangat Layak berdasarkan penilaian ahli materi 93%. Berdasarkan penilaian ahli bahasa 92%. Berdasarkan penilaian ahli Desain 90,59%. Kepraktisan Media dikategorikan sangat praktis berdasarkan uji coba perorangan 91% dan uji coba lapangan 93%. Kriteria sangat efektif dengan presentase efektif media 93%. Maka dapat disimpulkan bahwa media pembelajaran berbasis video animasi 3D menggunakan *SketchUp* yang dikembangkan sangat layak, praktis, dan efektif digunakan didalam proses pembelajaran. saran dari peneliti (1) bagi peserta didik diharapkan dengan adanya media berbasis vedeo animasi 3D untuk meningkatkan keefektifan serta berpikir kritis dalam materi gambar tampak, (2) bagi tenaga pendidik dapat menambah inovasi dalam menggunakan media (3) bagi peneliti, dapat menggunakan penelitian ini sebagai penelitian berikutnya untuk mengetahui kelayakan produk.

**Kata Kunci: SketchUp, Media Pembelajaran**

## **Introduction**

Some developed countries in the world of education have entered the 5.0 industrial revolution, and Indonesia is at the point of the 4.0 industrial revolution which will also enter 5.0. Along with the times where all human activities are almost controlled by technology, so is the world of education which cannot be separated from technology.

Education and learning are also inseparable from each other because learning is a process and a fundamental element in each level, therefore there are several definitions of learning according to the opinions of experts as follows:

1. "Learning is a process of deliberate action, which then causes changes, which are different from changes caused by others. The nature of the change is relatively permanent, will not return to its original state. It cannot be applied to changes due to momentary situations, such as changes due to fatigue, illness, drunkenness, and so on" Ernest R. Hilgard in (Sumardi Suryabrata, 1984: 32) quoted by Siti Marifah Setiawati.

2. The definition of learning quoted by Siti Marifah Setiawati is "a process of effort made by individuals to obtain a change in overall new behaviour, as a result of the individual's own experience in interaction with the environment" (Moh. Surya 1981: 32).

Based on the description of opinions according to the experts above, the researcher concludes that learning is a process or effort made by each individual to get changes in behaviour, both in the form of knowledge, skills, attitudes and positive values as an experience of various materials that have been studied. The definition of learning can also be interpreted as all psychological activities carried out by each individual so that his behaviour is different between before and after learning. Changes in behaviour or responses, due to new experiences, having intelligence / knowledge

after learning, and practicing activities and this is inseparable from the role of the teacher during the teaching and learning process so that the learning material is easily understood by students.

Learning is an activity that is inseparable from human life. Learning is identical with the presence of students (as learners) and teachers (as educators). Learning, which is identified with the word "teaching", comes from the basic word "ajar" which means instructions given to people to be known (obeyed) added with the prefix "pe" and the suffix "an" to become "learning", which means the process, action, how to teach or teach so that students want to learn. Learning is the process of student interaction with educators and learning resources in a learning environment.

Learning is also assistance provided by educators so that the process of acquiring knowledge and knowledge, mastering skills and character, and forming attitudes and beliefs in students through the learning process can occur. By learning, humans can develop the potentials brought from birth. Without learning, humans cannot fulfil their needs. In learning the teacher acts as a facilitator which results in the teacher needing to create an effective learning environment so that students can learn well and achieve optimal results.

Education is essentially a process. The process is the transformation of knowledge values, technology and skills. The recipient of the process is a child or student who grows and develops towards growing as a person and mastering knowledge. In addition, education is a cultural process that aims to improve human property and dignity, which is achieved as a result of a long process and continues throughout life.

Education is a conscious effort to realise a cultural inheritance from one generation to another. "Education is a very important factor in the intellectual life of the nation" (Harefa

Envilwan Berkat, 2021). Education makes this generation a role model of the previous generation's teaching. Until now, education has no boundaries to explain the meaning of education completely because of its complex nature like its target, namely humans. Its complex nature is Often called education science, education science is a continuation of education. Educational science is more related to educational theory that prioritises scientific thinking. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character and skills needed by themselves and society.

In learning Building Construction and Utilities a teacher needs tools to support teaching and learning activities. One of the tools that can be used by teachers in the classroom learning process is learning media. The learning process will be more effective and efficient if the teacher uses learning media in teaching to convey subject matter in detail and briefly, because students will be more active to learn. In the learning process, communication occurs between teachers and students. The teacher acts as a sender of information while the student acts as a receiver of information. This process will work well if both go smoothly, where the teacher is able to convey information well to students and students have the ability to receive the information well too. To perfect the communication between the giver and receiver of information in order to create effective communication, communication tools or media are needed.

One of the efforts to become a great school, it requires the quality of Human Resources (HR) that has excellence in the field of skills. The benchmark for the success of vocational education or expertise is seen through the preparation of learning methods in shaping the quality of students who are ready to work individually or in groups with good abilities in

their fields. Vocational education, especially the Building Engineering Department, still has its own difficulties in understanding two-dimensional working drawings, so students need to help students understand. Educators are the most important element in the continuity of teaching and learning activities in the classroom. The success in achieving good learning outcomes means that educators need media in delivering material.

### **Research Methods**

ADDIE is an acronym for Analysis, Design, Development, Implementation and Evaluation. The concept of the ADDIE model applies to building basic performance in learning, namely the concept of developing a learning product design. ADDIE is an instructional design centred on individual learning, has immediate and long-term phases, is systematic, and uses a systems approach to knowledge and human learning. Effective ADDIE instructional design focuses on authentic tasks, complex knowledge, and original problems. As such, effective instructional design promotes high fidelity between the learning environment and actual work settings. The ADDIE learning model is based on an effective and efficient systems approach and the process is interactive between students, teachers and the environment. The results of the evaluation of each learning step can lead to the development of learning in the next step or phase. We used the ADDIE procedure developed by two influential experts, Reiser and Molenda. Although both have different formulations in visualising ADDIE. Reiser's formulation of ADDIE uses verbs (Analyze, design, develop, implement, evaluate). Reiser's description revises the steps or phases in the ADDIE model. Meanwhile, Molenda's description of the ADDIE components uses more nouns (analysis, design, development, implementation, evaluation) regarding the ADDIE components.

## Result and Discussion

The role of learning media in the learning and teaching process is a unity that cannot be separated from the world of education. Learning media is anything that can be used to channel the sender's message to the receiver, so that it can stimulate the thoughts, feelings, attention, and interest of students to learn. In line with what is said by (Ruth Lautfer, 1999) that learning media is one of the teaching aids for teachers to convey teaching material, increase student creativity and increase student attention in the learning process. According to (Nunu Mahnun, 2012) cited by Talizaro Tafonao states that "media" comes from the Latin "medium" which means "intermediary" or "introduction". Furthermore, the media is a means of channeling messages or learning information to be conveyed by the source of the message to the target or recipient of the message. The use of teaching media can help achieve learning success. According to AECT (Association of Education and Communication Technology) quoted by (Basyaruddin, 2002) and continued quoting by Talizaro Tafonao "media is any form used for the process of distributing information". Meanwhile, according to (Steffi Adam and Muhammad Taufik Syastra, 2015) quoted by Talizaro Tafonao that learning media is everything both in physical and technical form in the learning process that can help teachers to make it easier to convey subject matter to students so as to facilitate the achievement of learning objectives that have been formulated.

### Functions and Benefits of Learning Media

Every human being needs to learn to develop their knowledge, talents and interests. In developing these abilities, a person needs other people to educate him. In addition, the role of the media is also very necessary in educating students.

Learning media according to (Oemar Hamalik, 1994) quoted by Talizaro Tafonao, has broad functions including:

- 1) The educational function of communication media, namely that every communication media activity contains educational properties because it provides educational influence.
- 2) The social function of communication media, communication media provides actual information and experience in various fields of social life of people.
- 3) The economic function of communication media, communication media can be used intensively in the fields of commerce and industry.
- 4) The political function of communication media, in the political field, communication media can function, especially the politics of development both material and spiritual.
- 5) The function of art and culture of communication media, developments in the fields of art and culture can be spread through communication media.

From several media functions according to the experts above, it can be concluded that the function of learning media is as a tool to make it easier to convey learning material to students who can easily understand the learning material presented.

Media utilisation, in learning activities is the systematic use of resources for learning. The process of utilising learning media is a decision taken by the learner (teacher) based on the learning design or design. Therefore, the principle of utilisation needs to be related to the characteristics or special characteristics of learners. (Hamalik 1986) suggests that the use of "teaching media in the teaching and learning process can arouse new desires and interests, arouse motivation and stimulation of learning activities, and even have psychological effects on students".

In general, the benefits of media in the learning process are to facilitate the interaction between teachers and students so that learning

will be more effective and efficient. But more specifically there are some more detailed benefits of the media (Kemp and Dayton 1985) for example, identify several benefits of media in learning, namely:

- 1) The delivery of subject matter can be uniformed.
- 2) The learning process becomes clearer and more interesting.
- 3) The learning process becomes more interactive.
- 4) Efficiency in time and energy.
- 5) Improve the quality of student learning outcomes.
- 6) The media allows the learning process to be carried out anywhere and anytime.
- 7) The media can foster positive student attitudes towards the material and the learning process.
- 8) Change the role of the teacher in a more positive and productive direction.

In addition to some of the benefits of media as stated by Kemp and Dayton, of course there are many other practical benefits. The practical benefits of learning media in the teaching and learning process are as follows:

- 1) Learning media can clarify the presentation of messages and information so that it can facilitate and improve the learning process and results.
- 2) Learning media can increase and direct children's attention so that it can lead to learning motivation, more direct interaction between students and the environment, and the possibility of students to study individually according to their abilities and interests.
- 3) Learning media can overcome the limitations of the senses, space and time.
- 4) Learning media can provide a common experience to students about events in their environment, and allow direct interaction with teachers, society, and the environment, for example through tourism.

#### Types of Learning Media

The rapid development of education affects the development of learning psychology and the existing education system. This situation also encourages and results in advances in learning technology and new additions to learning media. Along with technological advances, the development of learning media is so fast, where each existing media has its own characteristics and abilities. From this, then grouping or classification according to the similarity of its characteristics or characteristics. The general characteristics of learning media according to (Oemar Hamalik, 1994), are:

- 1) Learning media is identical to the notion of demonstration which comes from the word "raga", meaning an object that can be touched, seen and heard and that can be observed through the five senses.
- 2) The main emphasis lies on objects or things that can be seen and heard.
- 3) Learning media is used in the framework of the relationship (communication) in teaching between teachers and students.
- 4) Learning media is a kind of teaching and learning aid, both inside and outside the classroom.

Based on the experts above about the characteristics of learning media, it can be concluded that the characteristics of learning media are something that can be seen, touched and can also be a method in learning that can be used both inside and outside the classroom. After understanding the characteristics of the media, determining the types of media is easier, as stated by Rudit Berz as quoted by (Arif Sadiman, 1993) and continued quoting by (Talizaro Tafonao) that he shared eight types of media, namely:

- 1) Motion audio visual media.
- 2) Silent audio visual media.
- 3) Semi-motion audio media.
- 4) Motion visual media.
- 5) Still visual media.
- 6) Semi-motion visual media.
- 7) Audio media.
- 8) Print media.

Meanwhile, according to Briggs, in quotation (Arif Sadiman, 1993) and continued quotation by Talizaro Tafonao that there are 13 kinds of media, namely:

- 1) Objects.
- 2) Model.
- 3) Direct sound.
- 4) Audio recordings.
- 5) Print media.
- 6) Programmed learning.
- 7) Whiteboard.
- 8) Transparency media.
- 9) Stringed film.
- 10) Frame film.
- 11) Films.
- 12) Television.
- 13) Picture.

From the various types of media proposed by the experts above, it can be concluded that learning media are means, methods and techniques used in order to identify communication and interaction between teachers and students in the learning process at school.

With the development of computer technology, various traditional animation techniques have changed using computers. Several software applications were created to support the production of 2D and 3D animations that can be utilised in various needs in various fields, especially in the field of education. Some 2D and 3D animation maker applications include Adobe Flash, Adobe After Effect, Macromedia Director, Aurora 3D presentation, Blender, Aurora 3D Animation Maker, Stykz. As for software that has the ability to draw 3D, especially in the field of architectural and structural drawings, among others: 3D Studio Max, Google SketchUp, AutoCAD 3D, AutoCAD Architecture, ArchiCAD, 3D Sweet Home, Rhinoceros, Lumion3D, Revit Architecture, Tekla.

Some software for 3D animation design, especially in the field of architecture and structure, is sometimes used for people who are

experts in their fields or professionals and also some software is not distributed with a free version (free) but with a commercial or paid version such as 3D Studio Max, Rhinoceros, Lumion3D, Tekla. However, there are also 3D animation maker applications that can be used with free versions such as 3D Sweet Home, Blender, Google SketchUp. Therefore, this learning media development tool is chosen using SketchUp.

### Conclusion

Based on the results of research and development of 3D animation video-based teaching media using SketcUp in the subject of Building Construction and Utilities, the researchers draw conclusions, namely:

1. The results of the development of learning media in class XI-DPIB can be done so that students' understanding of the material presented can be comprehensive.
2. Feasibility of 3D animated video-based media using SketcUp on visible drawing material, by material experts obtained 93% very feasible criteria, by linguists obtained 92% very feasible criteria, and by design experts obtained 90.59% very feasible criteria.
3. Practicality of 3D animated video-based media using SketcUp on visible drawing material, in the individual test obtained 90% very practical criteria, and in the field trial 93% very practical criteria.
4. The effectiveness of 3D animated video-based media using SketcUp on drawing material appears, reaching very effective criteria with a percentage of completeness of 93%.

So it can be concluded that the development of 3D animated video-based learning media using SketchUp for class XI-DPIB SMK Negeri 1 Lotu in the subject

of Building Construction and Utilities in building drawing material with the ADDIE model is very feasible, practical, and effective to use in the learning process at school.

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