Implementation of learning instrument based on Lumion animation video to improve student learning outcome in building construction and utility course in SMKN 2 Garut

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Abstract. Learning Instrument based on animation video is an intermediary tool that may display certain object replica in form of moving animation. The use of properties in learning may stimulate visual of student to work actively absorbing whole material presented. The problems happened continuously on students of XI class in SMKN 2 Garut that do not comprehend the material optimally. The lecture and slide presentation method of learning that still rely on hearing sense tend to be outmoded. As a result, the instrument development is needed in order to overcome with the problems. The development of learning instrument based on animation video goals to improve student comprehension in basic competencies of bathroom/toilet detailed drawing, so that improve the learning outcome. The method used is Borg and Gall research and development method. The result is in form of instrument appropriateness that may be measured by the validation of instrument and material expert. The results are 88.75% for instrument and 92.50% for material in which is in category of “very descent”. Further, the usage test was conducted to find out the student response and outcome. The response shows that 24 students claimed “very agree” with an average percentage of 80.68%. Meanwhile, the average score of students’ outcome increased from 39.58 to 77.73. In conclusion, the usage test resulted gain index of 0.63 in improvement score of “Medium” range category.

1. Introduction

In fact, the material delivery through lecturing method and slide presentation that often be held by teacher is still less to improve the student comprehension. It may be caused by the students that more often involve their sense of hearing which is often boredom and hardly examine the material discussed. The limited available property in that subject is one of the factors that has an impact on students’ lack of understanding of construction materials and building utilities. According to Azhar, there are four factors that may impact the learning overcome, which are EQ, interest and talent, learning method, facilities and infrastructure [1]. From those factors, learning method as an introduction in a material delivery becomes a factor that must be considered for review. As a result, each delivered material can be understood by student very well.

DePorter, Reardon, and Singer-Nourie has written “one picture is worth a thousand words” [2]. It means that the use of props in starting a learning process may stimulate visual modality and turn on the nerve lane. As a result, it may arise thousands of association in student’s consciousness. In other words,
learning material will be more easily accepted by the students if a teacher may involve student’s visual 
to actively work absorbing each material provided.

According to description of the problems above, researcher will try to develop learning media based 
on lumion animated video as one of the alternative ways that may give a solution in those problems. 
Considering that animated video is the spectacle that many students like, and lumion application as an 
application that is often used in architecture. This application provides several features that may display 
more realistic effect in animated video that will be developed.

2. Method
Research design in development of this learning media based on lumion animated video was adopted 
regarding to research procedure and R&D development (Research & Development) Borg and Gall [3]. 
The implementation stages of this research may be explained in the explanation below:

| Potention and Problems | Product Trial | Design Revision |
|------------------------|--------------|-----------------|
| Data Collection        | Design Revision | Trial of use |
| Product Design         | Design Validation |

![Figure 1. The implementation stages.](image)

Research instruments used are expert’s validation paper, questionnaire sheets, and questions 
instruments. The expert’s validation paper and student’s questionnaire will be calculated using the 
formula below:

\[
\text{Appropriateness percentage} = \frac{\text{Score gained}}{\text{Score expected}} \times 100
\]

| Appropriateness Percentage | Value Scale | Qualification | Conversion |
|----------------------------|-------------|---------------|------------|
| 75%-100%                   | 4           | Very good     | Very Feasible |
| 50%-74,99%                 | 3           | Good          | Feasible   |
| 25%-49,99%                 | 2           | Poor          | Infeasible |
| 0%-24,99%                  | 1           | Very Poor     | Very Infeasible |

Table 1. Conversion of appropriateness scales in expert’s validation overcome.

On the other hand, students learning overcome will be analyzed using gain index with the formula 
below:

\[
\text{Gain Index} = \frac{\text{Post test} - \text{Pretest Score}}{\text{Maximum Score} - \text{Pretest Score}}
\]

Table 2. Criteria for the category of improvement in learning outcomes.

| Percentage | Category |
|------------|----------|
| g ≤ 0,30   | Low      |
| 0,30 ≤ g ≥ 0,70 | Medium |
| g ≥ 0,70   | High     |

Source: Hake, 1999
3. Result and discussion

3.1. Development of learning media based on Lumion animated video

3.1.1. Identifying problems and potency. Submission of material using the lecture method and presentation slides seems not enough to optimize student understanding of the material being taught later. The interview overcomes show that most of the students feel saturated either with the lecture learning method or slide presentation the teacher used. According to the result, the researcher suggest to use learning media based on student understanding regarding to learning material will be used.

3.1.2. Pre-test implementation. Based on the results of the pre-test conducted in class XI DPIB 2 it is obtained the number of values with an average of 39.58. The results of the pre-test will be the initial data that will later be compared with the results of the post-test after using learning media based on video animation Lumion.

3.1.3. Data collection. This data collection process is carried out by asking directly to teachers of construction subjects and building utilities. Some data obtained are the construction syllabus and building utilities along with their Basic Competencies, Learning Implementation Plan, and module books on bathroom/toilet detailed drawing procedures.

3.1.4. Product design. Product design of this learning media was created with the Lumion animation application and the support of several other applications, resulting in the following product designs:

![Figure 2. Splash screen.](image-url)
Figure 3. Home page.

Figure 4. Home page.

Figure 5. Standard competition page.
Figure 6. Material menu page.

Figure 7. The display of animated video.

Figure 8. Display of answering the knowledge test.
3.1.5. Design validation

- Validation of media expert. The assessment of the feasibility of media experts was carried out by Mr. Restu Minggra, S.Pd., M.T. Lecturer at the Department of Architecture Education FPTK UPI. The results of validation by media experts can be seen in table 3.

| No  | Criteria            | Percentage | Category   |
|-----|---------------------|------------|------------|
| 1   | Program Presentation| 100%       | Very Good  |
| 2   | Text                | 93.75%     | Very Good  |
| 3   | Display             | 100%       | Very Good  |
| 4   | Audio               | 87.50%     | Very Good  |
| 5   | Language            | 78.12%     | Very Good  |
|     | Average Score       | 88.75%     | Very Feasible |

- Validation by media expert. Material expert feasibility assessment was carried out by Ms. Dra. Nistiana, M.M. Building Construction and Utilities Teacher in SMK 2 Garut. The results of the validation by material experts can be seen in table 4.

| No  | Criteria            | Percentage | Category   |
|-----|---------------------|------------|------------|
| 1   | Material Suitability| 91.66%     | Very Good  |
| 2   | Material Accuracy   | 90.62%     | Very Good  |
| 3   | Material Updating   | 91.66%     | Very Good  |
| 4   | Language Aspect     | 100%       | Very Good  |
|     | Average Score       | 92.50%     | Very Feasible |

3.1.6. Design revision. The design revision is based on suggestions and comments given by media experts and material experts. The results of product design improvements can be seen in table 5.
Table 5. Design revision.

| Before the revision                                                                 | After the revision                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Display on the types of bathroom are displayed in different times.                   | Display on the types of bathrooms displayed at the same time so students can see the difference directly. |
| Placing of sanitation equipment is not accompanied by examples of incorrect placement. | Added example image of incorrect placement of sanitary equipment.                    |
| Animations are not accompanied by 2D piece images.                                   | Adding 2D images before showing 3D animation.                                       |

3.1.7. Product trial. Small-scale product trials are used to identify shortcomings of initial products that have been designed and assessed by experts. Product trials were conducted on 5 students of class XI DPIB 1 SMK 2 Garut. Data on the results of this product trial in the form of student responses to the developed learning media products. The results of student responses can be seen in table 6.
Table 6. Student response results on product trials.

| No  | Criteria          | Percentage | Category     |
|-----|-------------------|------------|--------------|
| 1   | Material presentation | 86.25     | Very Good    |
| 2   | Media              | 78.75      | Very Good    |
| 3   | Media Display      | 78.00      | Very Good    |
|     | Average Score      | 80.38      | Very Feasible|

Source: Research Analysis Result, 2019

3.1.8. Product revision. Product revisions are made after the small-scale trial phase. Revisions are made based on suggestions from respondents or students. The following suggestions for improvement and results of improvements from respondents can be seen in table 7.

Table 7. Improvement suggestions and result.

| No  | Revision Suggestion | Feedback                                                                 |
|-----|---------------------|---------------------------------------------------------------------------|
| 1   | In some parts the video is too fast | The improvement is that some parts of the video are slowed down |
| 2   | Lumion display is not good | Video quality added |
| 3   | The presentation was improved to make it more interesting | The material is neatly trimmed and added scene/view |
| 4   | Back sound is too loud | The back sound of the music is reduced |

3.1.9. The trial run. A large-scale trial was conducted to determine student responses which were samples from this study namely XI-DPIB 2. The results of student responses can be seen in table 8.

Table 8. Response result of students in trial run.

| No  | Criteria          | Percentage | Category     |
|-----|-------------------|------------|--------------|
| 1   | Material Presentation | 83.07     | Very Good    |
| 2   | Media              | 87.50      | Very Good    |
| 3   | Media Display      | 79.79      | Very Good    |
|     | Average Score      | 83.17      | Very Feasible|

Source: Research Analysis Result, 2019

3.1.10. Post-test implementation. Based on the results of the post-test followed by the study sample with 24 students in class XI DPIB 2, an average score of 77.73 was obtained. Data from the post-test results will be compared with the results of the pre-test to determine differences in learning outcomes using video animation learning media with slide learning methods presentations and lectures.

3.2. Implementation of learning media based on animated video

The implementation of Lumion animation video learning media implementation aims to determine student responses. The response referred to in this study is the response of students to the learning media products developed. According to Riyana and Susilana, stating students' responses to learning media can be seen from expressions, direct opinions about media interests, ease of understanding the message to be conveyed through the media, and how students' motivation after listening to information using the media [4]. Student responses can be influenced by several factors including experience, learning process, individual experience level, and personality values [5].

Implementation of animated video learning media is carried out in two stages. The first stage is carried out on small-scale product trials followed by 5 XI DPIB 1 students of SMK Negeri 2 Garut, from the results of the trial the product produces data in the form of student responses to learning media based on lumion animation videos, the results student responses obtained a percentage of 80.38% with the category "very good". Whereas in the second stage or the usage test phase, which was followed by a research sample with 24 students of class XI DPIB 2 of SMK Negeri 2 Garut. From the results of the
implementation of the use test obtained student responses with a percentage of 83.17 with the category "very good".

Based on the response to the instructional video animation media as a whole the students welcomed positively and strongly agreed with the new innovations in this learning. Practical learning media are used in class and are studied independently. In addition to the media format in the form .exe allows students to access it without having to install any application.

3.3. The improvement of students learning overcome

Improved student learning outcomes are focused on increasing the cognitive value of construction subjects and Building utilities. The acquisition of pre-test and post-test average score data and the results of N-gain calculation can be seen in table 9.

| Statistic | Pre-test Score | Post-test Score | N-gain |
|-----------|----------------|-----------------|--------|
| Total     | 950            | 1865            | 0.63   |
| Average   | 39.58          | 77.73           |        |

Based on table 9, the N-gain score is 0.63, which means that the N-gain classification or the category of improvement in learning outcomes is in the range of the "medium" category.

The increase in learning outcomes in class XI DPIB 2 is in line with the statement of Harun and Zaidatun that animation is able to convey a complex concept visually and dynamically [6]. This can make connections or links regarding a complex concept or process easier to map to the student's mind and so help in the process of understanding. All of them will help in the process of reducing the cognitive burden of students in accepting a subject matter or message to be conveyed by educators.

The use of animated video chasing media in construction subjects and building utilities makes students better understand the material presented, in accordance with the statement of DePorter, Reardon, and Singer-Nourie in learning media and computer books that the use of teaching aids in initiating the learning process will stimulate visual modalities and ignite nerve pathways so as to bring up thousands of associations in student awareness [2]. This is seen from the improvement in student learning outcomes after and before using animated video learning media. With the addition of moving animation to the presentation media making the learning atmosphere less rigid, learning becomes more effective with the presentation of objects and events that become material that can be visualized realistically to resemble the actual situation on the ground.

4. Conclusion

Based on research data regarding the development of Lumion animation video-based learning media that has gone through test validation (expert review). The validation of media experts obtained 88.75% percentage with the interpretation "Very Feasible" and the results of the validation of media experts obtained a percentage of 92.50% with the interpretation "Very Feasible" Based on the results of validation by experts, learning media products have been declared very feasible to try out to students.

The implementation of the instructional media implementation was previously carried out at the small-scale product trial phase, which was followed by 5 XI DPIB 1 grade students by producing data in the form of student responses of 80.38% with the interpretation of "Very Good". While the implementation of the product implementation using a research sample was carried out at the large-scale usage test stage, which was attended by 24 students of class XI DPIB 2, producing data in the form of student responses to the Lumion animation video based learning media. The percentage of student responses obtained was 83.17% with the interpretation "Very Good".

Student learning outcomes after the implementation of Lumion animation video- based learning media in the construction and utility subjects of the Building experienced a pretty good increase. This was proven based on the pre-test scores before the use of animated video learning media which only reached an average of 39.58. While on student learning outcomes after the use of video animation
learning media obtained an average of 77.73, which means an increase in learning outcomes obtained by 38.15. Based on the N-gain calculation from the pre-test and post-test results obtained a score of 0.63 which includes an increase in learning outcomes in the "Medium" category.

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