3D Blender Animation Media as Self-Assessment Implementation in Corrosion Engineering Course

Aisyah E. Palupi[1,*] Arya M. Sakti[1] Bellina Yunitasari[1] Suparji[2] Setya C. Wibawa[3]

[1]*Department of Mechanical Engineering, Universitas Negeri Surabaya, Surabaya, East Java, Indonesia*
[2]*Department of Civil Engineering, Universitas Negeri Surabaya, Surabaya, East Java, Indonesia*
[3]*Department of Engineering Informatics, Universitas Negeri Surabaya, Surabaya, East Java, Indonesia*
[*]*Corresponding author. Email:aisyahpalupi@unesa.ac.id*

ABSTRACT

In the midst of an increasingly widespread coronavirus (COVID-19), online lectures are a solution to keep running teaching and learning activities instead of class meetings. The purpose of this study was to create learning media using a 3D blender animation media and a self-assessment platform as well as knowing student learning outcomes. This research method used is developmental research by developing teaching materials, 3D blender animation media, and self-assessment. The results of this development were then trialed in the classroom. The subjects of this study were students of the Department of Mechanical Engineering. Data collection techniques using questionnaires and tests. The instruments used were questionnaires and tests/quizzes. Data analysis uses quantitative descriptive analysis. Descriptive analysis results from the outcomes of the first meeting with the material of crevice corrosion obtained an average value of 72.8 with a distribution of 100 scores of 8 students (32%), 80 of 6 students (24%), 60 of 6 students (24 %), 40 by 16%, and 20 by 4%. At the second meeting with cathodic protection material, an average score of 66.7 was obtained with a distribution that received 100 marks by 3 students (11.1%), 80 by 11 students (40.7%), 60 by 8 students (29, 6%), 40 were 2 students (7.45%) and 20 were 3 students (11.1%). In the third meeting with the material inhibitors obtained an average value of 93.1 with a distribution that scored 100 as many as 18 students (69.2%), 80 as many as 7 students (26.9%), and 60 as many as 1 students (3.8%). With the results of an average value above 66.7, online learning with 3D blender animation media can be used as an option for performing distance learning.

Keywords: *3D Blender Animation Media, Learning Outcomes, Self Assessment Platform, Crevice Corrosion, Cathodic Protection, Inhibitor Corrosion*

1. INTRODUCTION

Since the beginning of March 2020, the world has been shocked by the COVID-19 outbreak which has caused various panics, one of which affects the higher education system that includes UNESA (Universitas Negeri Surabaya). The campus conducts a strict protocol to layoff all the lecturers, staffs, and students for an uncertain period. Lectures who are normally implements face-to-face system in class, now during the pandemic they need to shift it into the online lectures. For lecturers, students, and campus institutions who are familiar with the online lectures, the lecture formats by using internet-based information technology is not an issue. They just need to add some portions of their online meetings. On the other hand, those courses that require a further

experiments to explain the materials to students, replacing it with an online and indirect presentation would make it hassle as they need a specific program to describe and explain the details through the media that integrates with assessments given in accordance to the materials being taught.

In this matter the lecturer can re-modify the learning plan to adjust the proportion of assignments with the capacity of lecturers and students. Learning materials are generally flexible because they can be shared via online platforms which also takes form as practical videos.

One of the methods chosen to provide materials which have a certain quality so that it can resemble real practicum conditions and integrated with the assessment instruments at the same time, for instance, 3D Blender Animation media. By using this software all the features needed to create super-realistic 3D models for animation

can be provided with a better picture of course material as a substitute for practicum as it will be applied for the students of the Department of Mechanical Engineering Education who take Corrosion Engineering Courses in the Even Semester of 2019/2020.

The purpose of this research was to (1) create learning media by using a blender 3D animation program applied to Corrosion Engineering course material for Mechanical Engineering Department students during online lectures during the pandemic; (2) Creating a self-assessment platform (self-assessment instrument) that is integrated with blender 3D animation media to evaluate the achievement of understanding the course material according to the targets in the semester academic plan (SAP); (3) Describe students' perceptions of the use of Blender 3D Animation Media as a substitute for lectures in class. The results of this study are expected to provide benefits including qualified and good online lecture materials and an integrated online assessment system.

2. RESEARCH METHOD

The implementation of this research was carried out by following the steps below.
a. Determine the lecture material;
b. Creating a blender animation 3D media consisting of:
   1) learning outcome assessment sheet with multiple choice questions and descriptions;
   2) answer key and scoring rubric;
   3) self assessment platform.
c. Validation of 3D blender animation software and assessment instruments in parallel to create an online course website based on Moodle;
d. Application of 3D blender animation media and data collection.
e. Analysis of research data

The research data were analyzed using quantitative descriptive which can provide a quantitative description of the results of this study and its benefits. The analysis was carried out in a descriptive quantitative manner by calculating the mean, ideal mean, standard deviation and ideal standard deviation, then grouping the tendency of the conditions of each variable. The tendency of each variable is grouped using the following categories.

Table 1. Criteria for Trends

Group	Category
$X \geq M + 1{,}5\,SB$	Very High
$M + 1{,}0\,SB \leq X < M + 1{,}5\,SB$	High
$M - 0{,}5\,SB \leq X < M + 1{,}0\,SB$	Moderate
$M - 1{,}5\,SB \leq X < M - 0{,}5\,SB$	Low
$X < M - 1{,}5\,SB$	Very Low

Explanation:
X   : Mean
M   : Ideal Mean
SD   : Standard Deviation

3. EXPERIMENTAL SETUP
3.1. Creating Corrosion

Engineering course materials using 3D blender animation media on the subject of crevice corrosion, cathodic protection, and inhibitor corrosion which are equipped with multiple choice questions, description questions, and student self-assessment of learning outcomes, the learning media used, the competence of teaching lecturers, the implementation of online lectures, the completeness of learning outcomes, and how to learn.

3.2. Creating 3D Blender Animation Media

At this stage, the selected material is assembled in 3D blender animation media, which is equipped with interesting music.

Figure 1 A Display of one of the lesson topics created by 3D blender animation media

3.3. Making Self Assessment Platform

This instrument is used for students to assess themselves in their mastery and understanding of the course material presented in Blender 3D Animation media. This assessment is coupled with animated media and a quiz consisting of multiple choice questions and descriptions.

3.4. Validation of Media and Self Assessment Instruments

After the animation media and assessment instruments are complete, before they are given to students, the lecture device is validated by learning and learning media's experts to obtain input for improving the instrument.

3.5. Application of Blender 3D Animation Media to Mechanical Engineering students.

The 3D blender animation media is linked with VINESA (Virtual Learning Unesa) by a lecturer who teaches corrosion engineering courses to be taught to students online, with a time that has been adjusted to the lecture schedule.

3.6. Analysis of Research Results

The results of this research are grouped into seven part which are: (1) learning outcomes; (2) self-assessment of learning outcomes; (3) assessment of the learning media; (4) assessment of lecturer competence; (5) assessment of online lectures; (6) assessment of the completeness of learning resources; and (7) students' assessment of how to learn.

4. RESULT AND DISCUSSION

4.1. Learning outcomes

Student learning outcomes in the first material, which is crevice corrosion, get a mean score of 71.6, the second material, cathodic protection, gets a mean score of 76.9, and the last material is inhibitor, gets a mean score of 84.6. Students get a mean score that continues to increase, it can be assumed that the media provided is more attractive to students, and makes it easy to understand the material being studied. This is supported by the theory of Sudjana, 2010 [19], which states that learning outcomes are the abilities students have after receiving learning experiences. Like Suparji's (2017) research on the Implementation of Innovative Learning Models to Develop Creative Thinking Skills in Vocational Education [20].
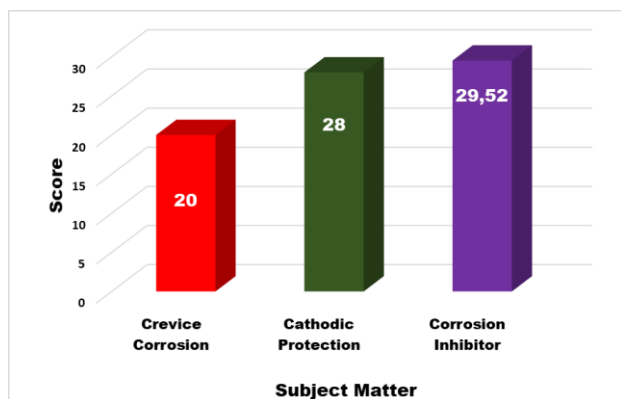

Figure 2 Mean Learning Outcomes

4.2. Self-Assessment of Learning Outcomes

Based on the results of student self-assessment, the first material obtained a mean score of 20.00, the second meeting was 28.00, and the third meeting was 29.2. The mean score illustrates that the more students find it easier to understand the material and the more they benefit from such models and learning media.
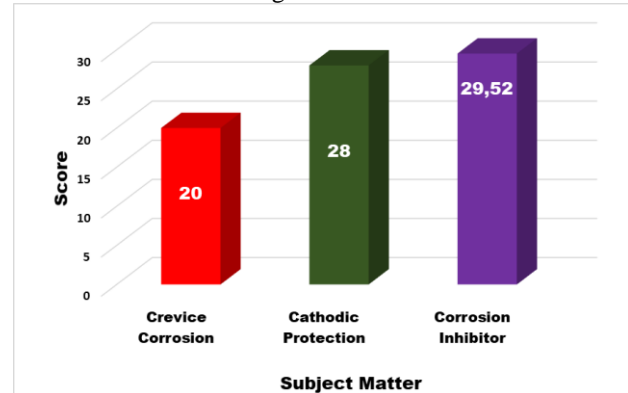

Figure 3 Self Assessment of Learning Outcomes

4.3. Assessment of the Media

When viewed from the mean score obtained against student opinions about the 3D blender animation media used in this learning, it shows that it has decreased from the first meeting to the third meeting. This is due to the increasing complexity of the material presented, including the media created.

In accordance with the research of A'ini and Kusnan [1], who found that the feasibility of learning media of 85% of the validation results, it results in a very significant difference in student results. Because of this, the use of media is important.
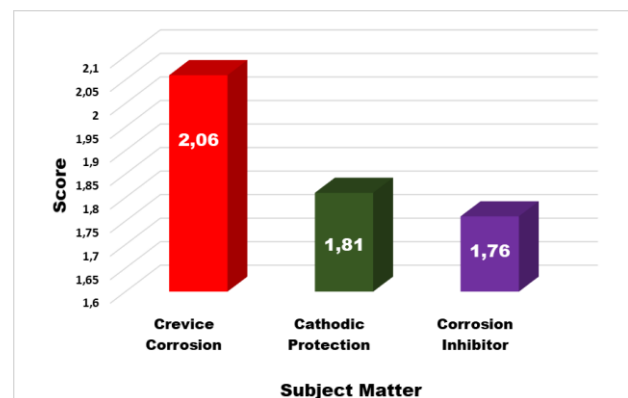

Figure 4 Mean Ratings of Media Assessment

4.4. Assessment of Lecturer Competence

Student assessments of lecturer competence obtained a mean score of 3.56 at the first meeting, 3.67 at the second meeting, and 3.56 at the third meeting. By obtaining this data, it can be explained that students give their opinion on the competence of lecturers very well, which means that the competence of lecturers has an influence on student learning outcomes.
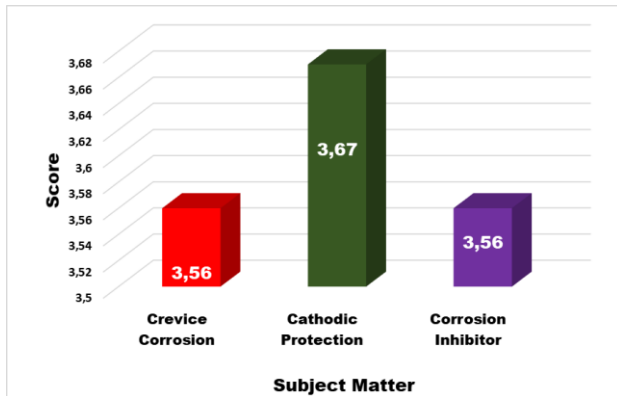

Figure 5 Mean Lecturer Competence Assessment

This also shows that the lecturer in this corrosion engineering course has good skills in using online media, Vinesa (Virtual Learning Universitas Negeri Surabaya) and good mastery of material.

4.5. Assessment of Online Lectures

Students assessed the implementation of online lectures with a mean score of 2.39 at the first meeting, 2.38 at the second meeting, and 2.32 at the third meeting. The mean score is almost certain to be constant, so it means that online implementation is still not good, because it is in the medium category. This happens because at the time of implementation there were still many constraints by poor internet networks, so the material was not well received. In addition, the ability of students to use information technology in accordance with the conditions desired by the lecturers is classified as poor. The results of the evaluation carried out after the implementation of learning, there are weaknesses in online learning, namely that the media used in learning is too fast, so that the speed of the students' memory cannot keep up.
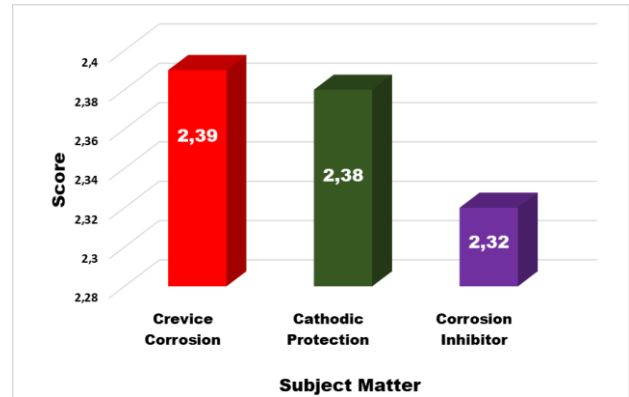

Figure 6 Mean Online Lectures Assessment

4.6. Assessment of Completeness of Learning Resources

The completeness of learning resources in the learning process at the first meeting got a score of 3.28, the second meeting was 3.48, and the third meeting was 3.48, the data was in the very good category. Of the three mean scores, it shows that students assess the completeness of the learning resources used as very good and complete. However, learning resources are important for learning, such as the results of research by Krisdianto & Suparji (2018) which found that learning resources had an influence on learning outcomes by 87%.
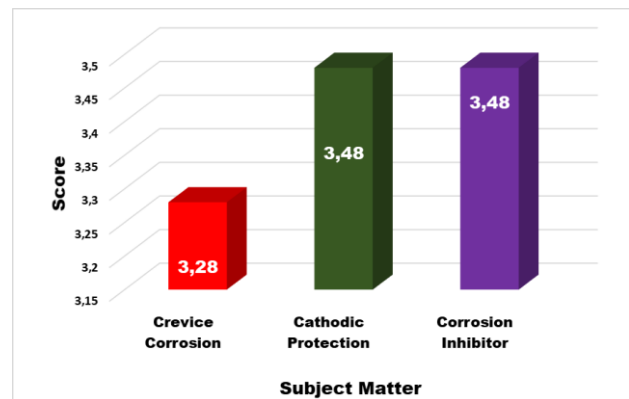

Figure 7 Mean Completeness of Learning Resources Assessment

4.7. *Assessment of Learning Method*

Students assess the way the lecturers do the learning in order to convey the material very well. This is supported by the mean score of the learning method assessment at the first meeting of 3.28, the second meeting of 3.48, and the third meeting of 3.48. The condition is that the learning method is considered very good by students, affects students' interest, concentration, and interest in the material presented, so that it affects learning outcomes. This condition is supported by the research results of A'ini and Kusnan [1], which found that learning methods or methods affect learning outcomes as evidenced by data that the experimental class learning outcomes are better than the control class that was not designed with a specific method.
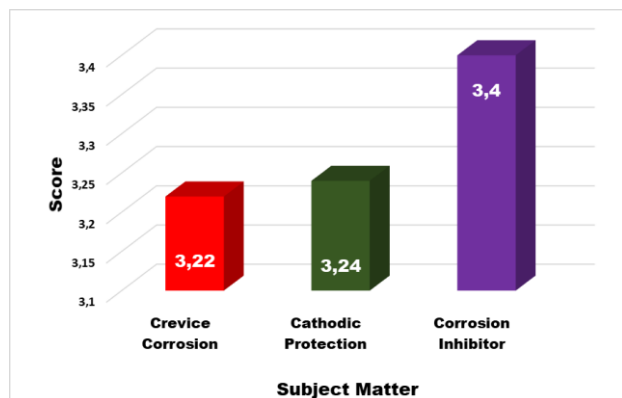

Figure 8 Mean Learning Methode Assessment

5. CONCLUSION

The results of this study indicate that:

1. Learning media using a 3D blender animation media which is applied to Corrosion Engineering course subject for students of the Department of Mechanical Engineering online provides a different color in the presentation of course material compared to other lecture media. However, due to the limited time for lectures, the impact on the presentation of course material is too fast, so that students cannot understand it clearly;

2. The self-assessment platform integrated with 3D blender animation media is effective enough for students to evaluate themselves in understanding the course material according to the planned targets;

3. The ability of the lecturer in mastering online lecture media through VINESA (Virtual Learning Unesa) really helps students to understand the material given; and

4. This online lecture can be carried out well according to the objectives if it is supported by innovative learning media and the competence of qualified teaching lecturers.

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