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**Implementation of Multimedia Animation Engineering Drawing (MMAED) for Vocational High School Students**

*Mujiarto1\*, A Djohar2, M Komaro2, AS Pratiwi3, T Muhammad (d)*

1Department of Mechanical Engineering, Universitas Muhammadiyah Tasikmalaya, Indonesia  
 2Department of Mechanical Engineering, Faculty of Vocational Education and Technology, Universitas Pendidikan Indonesia, Indonesia  
 3Department of Elementary Teacher Education, Universitas Muhammadiyah Tasikmalaya, Indonesia  
 4Department of Information Technology Education, Universitas Muhammadiyah Tasikmalaya, Indonesia

**Abstract**

The use of animated multimedia in vocational schools in Indonesia is still not optimal, this is due to the lack of innovative teaching materials, especially multimedia-based instructional materials. This study aims to apply the results of the development of innovative teaching materials based on engineering animated image Multimedia for Vocational High Schools especially in the competence of Mechanical Engineering expertise. The method used in this application is using the Experimental method, namely by directly testing the product of Multimedia Animation Engineering Drawing (MMAED) to schools that have mechanical engineering competencies in Indonesia. From the application of Multimedia Animation Engineering Drawing (MMAED), students can increase their competencies in engineering material, especially orthogonal projection material. **(Approx. 113 words)**

**Keywords:** MMAED, Multimedia, Animation

**Topic:** Engineering and Technology

**Type:** Oral Presentation

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Date: 10 July 2019

## Letter of Acceptance for Abstract

Dear Authors: Mujiarto<sup>1\*</sup>, A Djohar<sup>2</sup>, M Komaro<sup>2</sup>, AS Pratiwi<sup>3</sup>, T Muhammad (d)

We are pleased to inform you that your abstract (ABS-222, Oral Presentation), entitled:

**"Implementation of Multimedia Animation Engineering Drawing (MMAED) for Vocational High School Students"**

has been reviewed and accepted to be presented at ICComSET 2019 conference to be held on 15-16 October 2019, in Banten, Indonesia.

Please submit your full paper and make the payment for registration fee before the deadlines, visit our website for more information.

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<sup>1</sup>Department of Mechanical Engineering, Universitas Muhammadiyah Tasikmalaya, Indonesia

<sup>2</sup>Department of Mechanical Engineering, Faculty of Vocational Education and Technology, Universitas Pendidikan Indonesia, Indonesia

<sup>3</sup>Department of Elementary Teacher Education, Universitas Muhammadiyah Tasikmalaya, Indonesia

<sup>4</sup>Department of Information Technology Education, Universitas Muhammadiyah Tasikmalaya, Indonesia

\*mujiarto@umtas.ac.id

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## 1. Introduction

The 21st century has changed all aspects of the learning process in the classroom, so face-to-face learning in the classroom is not an effective learning solution [1]. The achievement of vocational competence is one indicator of student success in the learning of Vocational High School (SMK) students. Students are competent means that students who have a proven ability to use knowledge, skills and personal, social and methodological abilities in work or study situations and professional development [2]. Vocational High Schools (SMK) aim to produce graduates who have certain skills so that they can improve their quality of life [3].

Engineering drawing is the main language in engineering. Every production process always requires a picture as a reference. Every practitioner in engineering must be able to read and draw technical drawings. However, there are currently concerns from industry and higher education institutions regarding the decline in technical drawing standards due to a lack of understanding of the basic principles that support practice [4]. Therefore, modern technology education is needed to improve competent human resources including the ability to draw techniques [5]. Vocational student competencies can be recognized if students have competencies according to industry needs. Development of learning models must always be updated or curriculum innovations are carried out so that schools can synergize with the business world and the industrial world (DUDI) [6].

In Indonesia, vocational education generally has not used much learning technology such as the use of multimedia [7]. Lack of practical learning materials and lack of study hours at school are some

of the problems that are often faced by vocational students so that the impact on student competencies is not achieved [3]. Also, one of the causes of technology-based learning in schools is still lagging is the lack of digital competence of teachers [8].

The use of information and communication technology in learning has proven to be effective in increasing the competency of vocational students, such as the use of multimedia e-books animated drawing techniques at YAF Banjar Indonesia Vocational Technology [9]. Multimedia-assisted teaching materials can help teachers in teaching and improve students' independent learning that computer multimedia teaching has become an alternative teaching tool outside of traditional learning [10]. As the results of the study of Chen et al (2018) which states that satisfaction and learning outcomes are increased in vocational students after being given visual reality technology [10]. While the results of other studies indicate that the application of multimedia using e-learning with video tutorials and video reports can produce vocational graduates who are better prepared, qualified, and able to compete in the world of work. Because students are always invited to practice and be trained in critical thinking [1].

## 2. Methods

In this research, the questionnaire is an embodiment of the questionnaire, which is used to convert information from respondents into data that can be used to measure what is known, liked/disliked, and thought of someone. In this study, questionnaire instruments include 1) Student responses to learning technical drawing (for preliminary studies); 2) Concept mastery test; 3) Student responses to Multimedia Animation Engineering Drawing (MMAED); and 4) Student responses to engineering drawing learning with multimedia animation engineering drawing (MMAED) learning model.

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### 3.1. Media form trials (student responses)

E-MMAED that has been made in this study were tested limited to determine students' responses or opinions regarding the use of animated animation in learning activities. The results are shown in table 1.

**Table1.** Student responses to MMAED

No	Aspect	Response / Assessment			
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3	Material on MMAED is easy to understand	0	0	16	9
4	Animation Image is easy to understand	0	0	11	14
5	MMAED easy to operate	0	1	15	9
6	Links to MMAED work well	0	1	16	8
7	Sources and learning media with this MMAED make it easy for students to learn	0	0	13	12
8	Sources and learning media with this MMAED make it easier for students to understand the material?	0	1	15	9
9	Learning resources and media with this MMAED is required for students	0	0	15	10
Total		0	5	132	88
Percentage (%)		0,0	2,2	58,7	39,1

Note:

SST = Strongly Disagree

TS = Disagree

S = Agree

SS = Strongly Agree

### 3.2. Processing student response results

Based on an analysis of the results of the questionnaire given to 25 students in the experimental class. The number of items in the questionnaire responses of students as many as nine statements, from the



questionnaire responses of students after using MMAED obtained as much as 0% Strongly disagree, 2.2% Disagree, 58.7% Agree, and 39.1% Strongly agree. So from these results, it can be seen that as much as 58.7% Agree, and 39.1% Strongly agree that using MMAED is more interesting, and certainly makes it easier to understand technical drawing material. Thus that learning with multimedia animation on technical drawings will facilitate the learning process of students.

In general, students' responses either by assuming or giving an assessment agree or strongly agree with the use of MMAED, the total reaches 97.8% of students assessing MMAED is good, interesting, easy to understand, easy to operate, makes it easy for students to learn, makes it easy for students to understand the subject matter, so This MMAED is required by students. Associated with the results of the preliminary study, the use of MMAED seems very desirable by students, because students want the development of material that is easily obtained, interesting, and not boring. In terms of learning resources and learning media that have so far been used by teachers, in general use books, so that MMAED becomes thirsty freshwater for students who have been wanting something new and better and interesting. In terms of motivation, and confidence to master the material better, MMAED is the first choice for students.

#### 4. Conclusions

The design for producing Multimedia Animation Engineering Drawing (MMAED) is focused on the initial product development, which is preceded by preliminary research to determine the form of MMAED student's needs, which is finally tested to determine its reliability before it is used. While the MMAED form produced functions as a learning resource and learning media. As a learning resource, MMAED has the following characteristics:

- a. Easy to have in a simple form, inexpensive but high capacity.
- b. It contains complete material, Indonesian language that is easy for students to understand. Meanwhile, as a learning medium, it is shaped as:
  - a. Multimedia Animation created, and derived from the syllabus, Learning Implementation Plan (RPP), and Indicators of Competency Achievement.
  - b. Media with special characteristics that are *accessible*, by orthogonal projection material that requires imagination.
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**Authors** Mujiarto1\*, A Djohar2 , M Komaro2 , AS Pratiwi3 , T Muhammad (d)

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The organizing committee of ICComSET 2019 acknowledges the following payment for registration fee,

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**Authors**          Mujiarto1\*, A Djohar2 , M Komaro2 , AS Pratiwi3 , T Muhammad (d)

**Paid Amount**    IDR 2,850,000

**Paid By**          Dr. Mujiarto Mujiarto

Thank You.

Best regards,

A handwritten signature in black ink, appearing to read 'AS Pratiwi', with a stylized flourish at the end.

Anggia Suci Pratiwi, M.Pd.  
ICComSET 2019 Finance Manager

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# Implementation of Multimedia Animation Engineering Drawing (MMAED) for Vocational High School Students

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**Abstract.** The use of animated multimedia in vocational schools in Indonesia is still not optimal, this is due to the lack of innovative teaching materials, especially multimedia-based instructional materials. This study aims to apply the results of the development of innovative teaching materials based on engineering animated image Multimedia for Vocational High Schools especially in the competence of Mechanical Engineering expertise. The method used in this application is using the Experimental method, namely by directly testing the product of Multimedia Animation Engineering Drawing (MMAED) to schools that have mechanical engineering competencies in Indonesia. From the application of Multimedia Animation Engineering Drawing (MMAED), students can increase their competencies in engineering material, especially orthogonal projection material.

## 1. Introduction

The 21st century has changed all aspects of the learning process in the classroom, so face-to-face learning in the classroom is not an effective learning solution [1]. The achievement of vocational competence is one indicator of student success in the learning of Vocational High School (SMK) students. Students are competent means that students who have a proven ability to use knowledge, skills and personal, social and methodological abilities in work or study situations and professional development [2]. Vocational High Schools (SMK) aim to produce graduates who have certain skills so that they can improve their quality of life [3].

Engineering drawing is the main language in engineering. Every production process always requires a picture as a reference. Every practitioner in engineering must be able to read and draw technical drawings. However, there are currently concerns from industry and higher education institutions regarding the decline in technical drawing standards due to a lack of understanding of the basic principles that support practice [4]. Therefore, modern technology education is needed to improve competent human resources including the ability to draw techniques [5]. Vocational student competencies can be recognized if students have competencies according to industry needs. Development of learning models must always be updated or curriculum innovations are carried out so that schools can synergize with the business world and the industrial world (DUDI) [6].

In Indonesia, vocational education generally has not used much learning technology such as the use of multimedia [7]. Lack of practical learning materials and lack of study hours at school are some



of the problems that are often faced by vocational students so that the impact on student competencies is not achieved [3]. Also, one of the causes of technology-based learning in schools is still lagging is the lack of digital competence of teachers [8].

The use of information and communication technology in learning has proven to be effective in increasing the competency of vocational students, such as the use of multimedia e-books animated drawing techniques at YAF Banjar Indonesia Vocational Technology [9]. Multimedia-assisted teaching materials can help teachers in teaching and improve students' independent learning that computer multimedia teaching has become an alternative teaching tool outside of traditional learning [10]. As the results of the study of Chen et al (2018) which states that satisfaction and learning outcomes are increased in vocational students after being given visual reality technology [10]. While the results of other studies indicate that the application of multimedia using e-learning with video tutorials and video reports can produce vocational graduates who are better prepared, qualified, and able to compete in the world of work. Because students are always invited to practice and be trained in critical thinking [1].

## 2. Methods

In this research, the questionnaire is an embodiment of the questionnaire, which is used to convert information from respondents into data that can be used to measure what is known, liked/disliked, and thought of someone. In this study, questionnaire instruments include 1) Student responses to learning technical drawing (for preliminary studies); 2) Concept mastery test; 3) Student responses to Multimedia Animation Engineering Drawing (MMAED); and 4) Student responses to engineering drawing learning with multimedia animation engineering drawing (MMAED) learning model.

## 3. Result and discussion

### 3.1. Media form trials (student responses)

E-MMAED that has been made in this study were tested limited to determine students' responses or opinions regarding the use of animated animation in learning activities. The results are shown in table 1.

**Table1.** Student responses to MMAED

No	Aspect	Response / Assessment			
		STS	TS	S	SS
1	Display MMAED is good and interesting	0	1	16	8
2	Contents of MMAED are good and interesting	0	1	15	9
3	Material on MMAED is easy to understand	0	0	16	9
4	Animation Image is easy to understand	0	0	11	14
5	MMAED easy to operate	0	1	15	9
6	Links to MMAED work well	0	1	16	8
7	Sources and learning media with this MMAED make it easy for students to learn	0	0	13	12
8	Sources and learning media with this MMAED make it easier for students to understand the material?	0	1	15	9
9	Learning resources and media with this MMAED is required for students	0	0	15	10
Total		0	5	132	88
Percentage (%)		0,0	2,2	58,7	39,1

Note:

SST = Strongly Disagree

TS = Disagree

S = Agree

SS = Strongly Agree

### 3.2. Processing student response results

Based on an analysis of the results of the questionnaire given to 25 students in the experimental class. The number of items in the questionnaire responses of students as many as nine statements, from the

questionnaire responses of students after using MMAED obtained as much as 0% Strongly disagree, 2.2% Disagree, 58.7% Agree, and 39.1% Strongly agree. So from these results, it can be seen that as much as 58.7% Agree, and 39.1% Strongly agree that using MMAED is more interesting, and certainly makes it easier to understand technical drawing material. Thus that learning with multimedia animation on technical drawings will facilitate the learning process of students.

In general, students' responses either by assuming or giving an assessment agree or strongly agree with the use of MMAED, the total reaches 97.8% of students assessing MMAED is good, interesting, easy to understand, easy to operate, makes it easy for students to learn, makes it easy for students to understand the subject matter, so This MMAED is required by students. Associated with the results of the preliminary study, the use of MMAED seems very desirable by students, because students want the development of material that is easily obtained, interesting, and not boring. In terms of learning resources and learning media that have so far been used by teachers, in general use books, so that MMAED becomes thirsty freshwater for students who have been wanting something new and better and interesting. In terms of motivation, and confidence to master the material better, MMAED is the first choice for students.

#### 4. Conclusions

The design for producing Multimedia Animation Engineering Drawing (MMAED) is focused on the initial product development, which is preceded by preliminary research to determine the form of MMAED student's needs, which is finally tested to determine its reliability before it is used. While the MMAED form produced functions as a learning resource and learning media. As a learning resource, MMAED has the following characteristics:

- a. Easy to have in a simple form, inexpensive but high capacity.
- b. It contains complete material, Indonesian language that is easy for students to understand. Meanwhile, as a learning medium, it is shaped as:
  - a. Multimedia Animation created, and derived from the syllabus, Learning Implementation Plan (RPP), and Indicators of Competency Achievement.
  - b. Media with special characteristics that are *accessible*, by orthogonal projection material that requires imagination.
  - c. Media that meet the needs of students, namely: easy to obtain, interesting, not boring, can be learned by yourself repeatedly, increase motivation to learn, and improve learning outcomes.

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