

## Application of the Teaching Factory Model to the Learning Outcomes of Class XI Students in the Heavy Equipment Engineering Department

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### Abstract

The dream of a 'link and match' between schools and industry to become a reality is a big target to be achieved by the government. For that we need the support of superior human resources (HR) so that development can run well. One of the concepts of the learning approach carried out by the Ministry of Education and Culture is for schools to produce superior human resources in accordance with the needs of the industrial world through the teaching factory (TEFA) program. Recent research has demonstrated an urgent need for future engineers. This research is a continuous experimental study for 2 semesters by applying it to all samples, to see if there is a significant effect on TEFA. Research that uses the Ex-Post Facto approach. The population in this study were students of the Heavy Equipment Engineering Department at SMK Negeri 1 Guguak. The sample is class XI students of the Heavy Equipment Engineering Department who have obtained the Teaching Factory Learning Model as many as 32 people who were selected using a non-probability technique, namely Purposive Sampling. The data analysis technique used is descriptive analysis. The result of t-test is smaller than t-table ( $-0.381 < 1.697$ ). This shows that the negative effect of the application of (TEFA) on the Learning Outcomes of Class XI Students in Powertrain and Undercarriage subjects is not only insignificant or very small, it can even be said to have no effect.

**Keywords:** Teaching Factory, Learning Outcomes, Powertrain and Undercarriage, Heavy Equipment

### 1. Introduction

Vocational High School (SMK) is a vocational education unit at the secondary education level which aims to prepare students to be able to work, either independently or to fill existing job vacancies as middle-level workers in accordance with their competencies [1], [2]. In fact, in Indonesia, SMK graduates have low quality.

In August 2018, out of 131.01 million people who entered the workforce, there were 124.01 million people who worked, and the remaining 7 million people were confirmed to be unemployed. Where graduates from SMK are in the highest rank, namely 11.24 percent compared to SMA, which is 7.95 percent. But in reality what happened was not in accordance with the goals and expectations of the existence of the SMK. In some industries, for example, there are still many graduates from the Heavy Equipment Engineering Vocational School who are not ready if they have to go directly to workshops or industry. The competencies possessed by graduates are not in accordance with the competencies required by the industry [3]. In accordance with the program carried out by the Ministry of Education and Culture through the Directorate General of Vocational Education, so that there is a 'link and match' between schools and industry, it is necessary to support superior human resources (HR) so that development can run well. One of the concepts of the learning approach so that schools are able to produce superior human resources to suit the needs of the industrial world is through the teaching factory (TEFA) program.

Competencies include knowledge, understanding, skills, values, attitudes and interests. In the concept of competency-based training, it is explained that competence is a combination of skills, knowledge and attitudes [4], [5]. Competence is used to assess standards, provide clear indications of success in development activities, establish a development system and can be used to compile one's job descriptions. So that training or training is needed that takes a long time so that graduates from this vocational school are really ready to jump in and work in the industry. Thus, education in SMK can be interpreted as not running effectively and efficiently when compared to the objectives of vocational education in SMK itself [6].

The government develops vocational education in vocational schools with a teaching factory program with the aim of aligning what is taught in vocational schools with what is needed in the industrial world. The Directorate of Vocational Development explained that the teaching factory was a development of the existing production units in the SMK. In the Learning Materials for the School/Madrasah Production and Service Activities Program by stating that the production unit is a business activity process carried out by the school/madrasah on an academic and business basis by empowering the school/madrasah community and the environment in the form of a production/service business unit that is managed sustainably professional [7], [8].

Following up on Presidential Regulation Number 9 of 2016, explained that the Ministry of Education and Culture has the authority to perfect and harmonize the Vocational curriculum in accordance with the competence of graduates so that SMK graduates have competitive insights or attitudes, such as work ethic, achievement motivation, mastery, competitiveness, understanding the meaning of money management, and saving attitude. the percentage of success of the learning process at school is the learning model used [9], [10].

Describe their view of the learning model as a planning design, describing the detailed process of creating an environment for students to develop or change themselves [11]. The learning model can also be interpreted as a basic concept that describes the systematic procedures for implementing a learning system in order to achieve a certain learning goal, as well as providing a reference for teachers and learning designers in the design and implementation of teaching and learning activities [12]. So it can be concluded that the learning model is the basic reference used by the teacher during teaching and learning activities [13].

In a simple concept Teaching factory is a learning concept in a real atmosphere, so that it can bridge the competency gap between industrial needs and school knowledge [14] This is in line with what was expressed [15], [16] that Vocational High Schools are still having difficulty implementing production-based education and training. The process of implementing teaching factory learning is to combine business concepts and vocational education in accordance with the relevant expertise competencies [17]. While according to [18] The teaching factory is a learning concept in a real situation to bridge the competency gap between the knowledge provided by the school and the needs of the industry. The production unit is the development of the school's business sector in addition to increasing school income which can be used in efforts to maintain equipment, increase human resources, etc. as well as to provide students with real work experience.

It can be concluded that the teaching factory is the development of the school's business sector in addition to increasing school income which can be used in efforts to maintain equipment, increase human resources, etc. as well as to provide students with real work experience. Teaching factory learning will help students improve their competencies to align with what is needed by the industrial world [19], [20]. In addition to developing competence, learning through the teaching factory will stimulate the growth of character and also a work ethic of discipline, responsibility, honesty, cooperation, leadership, and others according to what is needed by the industry [21]. It is hoped that the creation of competence, character and work ethic for SMK graduates is ready to welcome the competition from the ASEAN Economic Community (MEA) [22].

The process of implementing the factory teaching program is to combine the concept of business and vocational education in accordance with the relevant competency skills, for example at SMK Negeri 1 Guguak, Department of Heavy Equipment Engineering. SMK Negeri 1 Guguak is one of the new schools to apply the teaching factory method.

## 2. Research Methodology

This research is included in quantitative research because this research uses a lot of numbers, starting from data collection, data interpretation, and displaying the results of this research which is manifested in numbers. In addition, this type of research is a continuous experimental study for 2 semesters by applying it to all samples, to see if there is a significant effect on TEFA. This research is a research that uses the Ex-Post Facto approach because the data obtained are data generated from events that have occurred. so that the researcher only reveals facts based on the measurement of symptoms that already exist in the respondent [23]. This research is a comparative casual research because it intends to reveal the effect of the independent variables on the dependent variable. The sample in this study was class XI students of the Heavy Equipment Engineering Department at SMK Negeri 1 Guguak who had attended the Powertrain and Heavy Equipment Undercarriage subjects as many as 32 students.

The dependent variable (Y) is a variable that is influenced or becomes the result of an independent variable or independent variable [24]. The dependent or dependent variable in this study is the learning outcome. The independent variable (X) is the variable that affects or is the cause of the change or the emergence of the dependent or dependent variable [24] The independent or independent variable in this research is industry-based learning (teaching factory).

### 2.1 Data collection technique

Data collection techniques are intended to facilitate researchers in collecting data or seeking information and obtaining relevant, accurate, and reliable data. In this study, the data collection technique used was the assessment of the final learning outcomes of each students in the first semester and second semester. The assessment of learning outcomes is a learning process for students of SMK Negeri 1 Guguak Class XI Heavy Equipment Engineering Department during the teaching factory implementation. Data collection techniques are carried out by giving multiple choices to respondents to answer [24]. The data collection technique is through a number of written questions that are used to obtain information from respondents in the form of reports about their personality, or things they know.

Data collection is also done through documentation. Documentation technique is a way of collecting data that produces important notes related to the problem under study, so that it is complete, valid, and not based on estimates, data will be obtained [25] Data collection techniques using documents, notes, and data related to the research material. The form of the document used in this study is the score obtained by class XI students of the Department of Heavy Equipment Engineering at SMK Negeri 1 Guguak who have attended Powertrain and Heavy Equipment Undercarriage lessons using the teachig factory method.

### 2.2 Data analysis technique

Descriptive analysis in this study was used to analyze the data obtained from the respondents through a questionnaire that had been filled out by the respondents during the research which was then presented in the form of a data description that was useful for knowing the state of the data based on each variable (independent variable and dependent variable).

In the descriptive analysis, the maximum value, minimum value, mean, standard deviation, median, and mode will be presented. The description of the data also presents the trend of the data on each variable along with the histogram image. Categories are arranged based on the normal distribution curve using the ideal score from the instrument results for each variable, with  $M_i = 1/2$  (maximum value + minimum value),  $S_{d_i} = 1/6$  (maximum value - minimum value). Descriptive analysis in this study using statistical software SPSS24 for Windows.

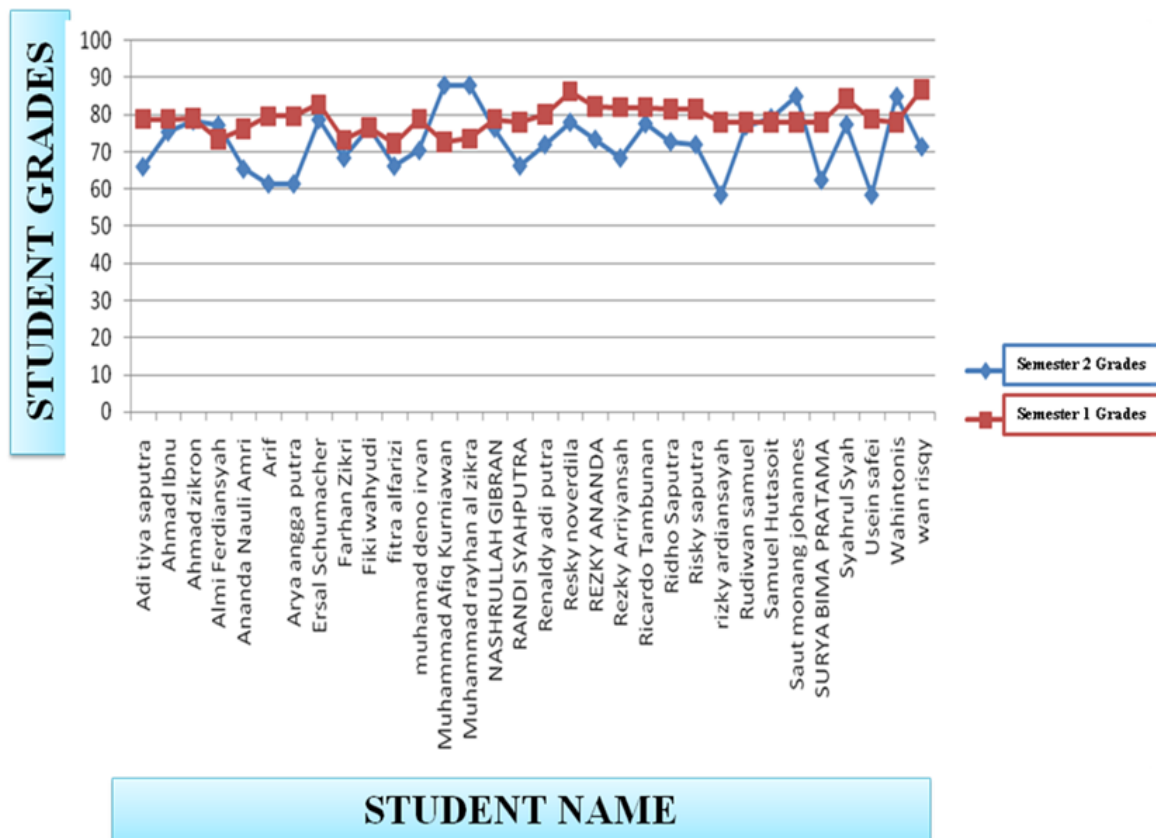
## 3. Result and Discussion

This study aims to determine the effect of the application of the Teaching Factory Learning Model (TEFA) on the Learning Outcomes of Class XI Students of Heavy Equipment Engineering at SMK Negeri 1 Guguak. Based on the data obtained from 32 respondents for the first semester and second semester, the final score of the Powertrain and Undercarriage learning outcomes obtained the following picture:

**Table 1** Descriptive Statistics of Research Data.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
SEMESTER_1	32	72.00	87.00	78.9688	3.63215
SEMESTER_2	32	58.00	88.00	72.7187	8.21970
Valid N (listwise)	32				

Table 1 explains that the number of samples is 32 students of class XI Heavy Equipment Engineering who carry out learning based on the TEFA concept. The average score obtained by the first semester students was 78.96 and decreased in the second semester, namely 72.71. For more details, see Figure 1.



**Figure 1** Detail of Students Grade.

To see the significance of the decline in students learning outcomes we can look at by comparing T grades and T tables as show in Table 2. The test results show that t arithmetic is smaller than t table (-0.381 < 1.697), so the influence of the teaching factory learning model on students learning outcomes in Class XI in Powertrain and Heavy Equipment Undercarriage Subjects, Heavy Equipment Engineering Department, SMK Negeri 1 Guguk is not significant. Study habits can be seen from the learning achievements that have been achieved by students. Learning outcomes or values indicate mastery of theory or material knowledge in learning.

Table 2 Comparing T grade dan T table.

Model	Coefficients <sup>a</sup>			t	Sig.	
	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta			
1	(Constant)	85.131	32.582		2.613	.014
	SEMESTER_1	-.157	.412	-.069	-.381	.706

a. Dependent Variable: SEMESTER\_2

Thus, this study shows that the influence of the teaching factory learning model on the learning outcomes of Class XI students in the Powertrain and Undercarriage subjects of Heavy Equipment Engineering Department of Heavy Equipment Engineering at SMK Negeri 1 Guguak is negative, but statistically the effect is not significant or not significant, so it can be concluded that It is said that this study does not have any meaning because the negative effect is not significant. The cause of the negative and insignificant influence obtained in this study was due to the limitations of researchers who only used students scores on the learning outcomes variable data where the values did not vary or were the same, in which the students learning outcomes variable could be investigated by direct observation so that this is likely what causes so the relationship is negative. This is similar in line with [25] research with the results of the study stating that the results showed that there was a positive influence on the Implementation of Teaching Factory (TEFA) on Class XI Students Learning Outcomes in Manual Arc Welding Subjects (SMAW) Department of Welding Engineering at SMK Negeri 3 Gowa but not significant or very small, it can even be said to have no effect.

#### 4. Conclusion

Based on the results of the discussion, the following conclusions can be drawn: The test results show that there is no significant positive effect between the implementation of the teaching factory (TEFA) on the learning outcomes of class XI students majoring in Heavy Equipment Engineering at SMK Negeri 1 Guguak. This study shows that most students view the teaching factory not as a factor that affects learning outcomes. For this reason, the role of teachers and schools is needed so that students understand the purpose of the teaching factory learning model considering that job readiness is important for students in finding jobs later. So that students can apply the knowledge and experience gained during teaching factory learning both in the business world and the industrial world in the future. Students are expected to continue to improve their skills and knowledge in the field of Powertrain and Heavy Equipment Undercarriage by participating in trainings related to the Powertrain and Heavy Equipment Undercarriage field and their area of expertise. In the future, teaching factory learning at SMK Negeri 1 Guguak needs to find a strategy to foster students interest and active role in these learning activities.

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