

# Development of Model Teaching Factory in Vocational High Schools

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**Abstract**—This study aims to develop a Teaching factory model on learning practices at the Vocational High School in the Light Vehicle Engineering Expertise Program. This study uses quantitative research conducted on class XI students of Light Vehicle Engineering majoring in ITABA Vocational School Gedangan Sidoarjo. The method used in this study is Research and Development (R & D). This research was conducted through five phases, namely: initial investigation, design, relocation/construction, tests, evaluation and revision, field testing/implementation. The results of the competency test for 19 students are: (a) the highest Tune Up value (98.82), the lowest value (89.41) and the average value (95.23), (b) the Over Haul highest score (90, 67), the lowest value (82.67) and the average value (85.55), (c) the Starter System the highest value (80.00), the lowest value (77.33) and the average value (78.00).

**Keywords**—teaching factory; light vehicle engineering; vocational high schools

## I. INTRODUCTION

Vocational education according to Hughes is special education whose programs or subject matter are chosen for anyone interested in preparing to work alone, or to work as part of a work group [1]. Vocational education is an educational institution that seeks to provide both affective, cognitive and psychomotor experiences in preparation for students entering the world of work and to support someone in their career in the world of work. Clarke and Winch state that vocational education is an effort to develop social workforce, maintain, accelerate, and improve the quality of certain workers in order to increase the productivity of society [2]. Affirmed by Byram and Wenrich that vocational education is teaching people how to work effectively [3]. Vocational High School (SMK) is one form of formal education unit that organizes vocational education at the secondary education level. Vocational curriculum and learning model are made so that students are ready to work directly in the world of work. This is done so that students do not experience significant difficulties when entering the workforce. With a study period of around three or four years, vocational graduates are expected to be able to work according to their expertise. Based on the concept above, it can be concluded that vocational high school is an educational institution that has the aim of educating and creating human resources who have good abilities in the fields of affective, cognitive and psychomotor so that they are ready to enter the world of work with a good level of competence.

The effort taken to prepare competencies that are ready for work is through the appropriate learning process. One of the learning policies in vocational high schools that the government echoes with the link and match policy has not been able to answer the problems at the lower levels. According to Hidayat the many challenges and problems, link and match is changed by the term we serve the real world, meaning that what is issued by educational institutions can be served by the world of work [4]. Vice versa, what is desired by the world of work can be served by graduates of educational institutions, especially graduates of vocational high schools. herefore, learning models must be sought with an integrated learning approach. By using facilities owned by the school, the school creates an industrial atmosphere without having to directly involve the industry. However, students feel the atmosphere in the industry, built life skills (life skills), and achieved work competencies in the industrial atmosphere in the school. Teaching factory is a concept that combines learning and a realistic work environment and to bring up relevant learning experiences [5]. Alptekin explained that the teaching factory has a dual purpose. One of them is to enable students to develop small-scale industrial products or consumer goods [6].

Hadlock explained that the purpose of the teaching factory is to realize that teaching students should be more than what is contained in a book [7]. Students not only practice soft skills in learning, learn to be able to work in teams, practice communication skills interpersonally, but get hands-on experience and practice working to enter the workforce later. Teaching factory learning teaches students how to find problems, build prototypes, learn to make business proposals, and learn to present their solutions. Factory teaching learning process learners learn about skills that are important to master, such as how to meet the level of time and expectations that might arise, build and work in teams and work with a variety of people who have diverse abilities and talents.

Sukardi explained the development of an integrated practice workshop model in the Mechanical Engineering Department of the Vocational High School of Technology by adopting the concept of teaching factor [8]. The model of practical workshops includes: practice material management; (2) management of machine tools and other practical equipment; (3) system for repairing machine tools and other

practical equipment; (4) student engagement organization; (5) teaching staff and technicians working in practical work; (6) good work safety management; (7) use of the use of practical machine tools and practice procedures; (8) leadership patterns; and (9) management of the learning process in practical workshops. This study tried to develop a practical learning model with a teaching factory model at the vocational high school light vehicle engineering expertise program by utilizing the production units owned by the school as a place to conduct teaching factories.

## II. METHOD

The method used in this study was Research and Development (R & D) which adopted the approach as proposed by Plomp (1997). Development is carried out through several stages, including: (1) initial investigation; (2) design; (3) realization/construction; (4) tests, evaluations and revisions; and (5) field testing/implementation [8]. The development phase flow chart is illustrated in the following. Figure 1:

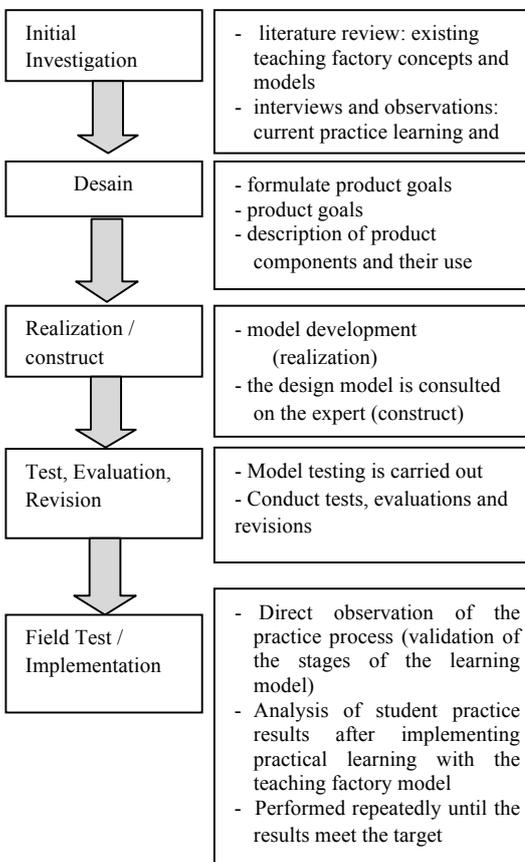


Fig. 1. Stages of development

From Figure 1, it is known that at the initial investigation stage, initial data collection was carried out as a basis for determining the model to be applied in the management of automotive workshop facilities and infrastructure. Determination of the appropriate management model is expected to result in an increase and effectiveness in the use of workshop facilities and infrastructure as a supporting tool

for a practical learning process. Data collection or initial information through literature review, and observations related to data sources that need to be known. Based on the data obtained then an assessment of the model was applied so that a model was developed in the workshop of the ITABA Vocational School in Gedangan Sidoarjo. Based on the results of the data obtained in the initial investigation phase (data and information collection), then the design of a practical learning model that is suitable in the automotive workshop of the ITABA Vocational School in Gedangan Sidoarjo is carried out. In this design phase, several things must be done, namely: (1) formulating product objectives; (2) product targets; and (3) description of product components and their use. The next stage is realization / construction which is carried out simultaneously with evaluation and revision stages. After the revision is done, the next step is to carry out the field test / implementation stage until the results are as targeted.

This research was conducted at ITABA Sidoarjo Vocational School, located on Jl. RA Mustika, Tebel Gedangan Village, Sidoarjo. The research subjects consisted of: Head of Workshop, Laboratory, Instructor and automotive student majoring in Light Vehicle Engineering (TKR). Analysis of direct observation data was carried out when the researcher was in the field and carried out as a tool in the development process to determine the model to be developed as well as one of the strategies used to monitor the implementation of the process carried out. Data collection on the development process is carried out by direct observation by the researcher, while the data for the results of the process carried out is by testing several competencies that have been carried out when the students practice. In the process of analyzing the data the results of students' practice test tests are based on the criteria that have been made then analyzed descriptively quantitatively to see the success of the model process developed.

## III. RESULTS AND DISCUSSION

The development of the model implemented is the application of the model teaching factory in the workshop of the ITABA Vocational School in Gedangan Sidoarjo. The model in question is a practice model in automotive workshops majoring in Light Vehicle Engineering designed based on the concept of the teaching factory. The process of developing the model begins with conducting a pre-survey to obtain an overview of the usual practice models at ITABA Vocational School. Based on the observations of the supporting data for the preparations carried out at the study site, it was concluded that the ITABA Vocational School had fulfilled the requirements to implement the teaching factory practical learning model. Some things that need to be designed related to the findings of the initial investigation, namely: (1) formulating product objectives; (2) product targets; and (3) description of product components and their use. The product goal is to get a teaching factory model in the management of facilities and infrastructure as well as good and appropriate practice learning in automotive workshops to improve the results of practice in the automotive workshop of the Itaba Vocational School. The expected product components include: (1) management of facilities and

infrastructure, their use as guidelines in the management of facilities and infrastructure in accordance with the processes and conditions of practical learning carried out, concerning the process of structuring, the process of borrowing tools and the process of using tools; and (2) management of practical learning (the learning process in the workshop) as a guideline for implementing practical learning.

The stages of realization / construct are the stages of developing practical learning models by adopting the teaching factory model. In general, these stages function the role of the workshop as a production unit and place of practice learning, and use structured stages of learning. The learning process is carried out in two parts, namely preparation and learning. Preparations made are: (1) management of facilities and infrastructure; (2) room management; and (3) determining the strategies and systems used in the practical learning process. Room management is adjusted to the shape of the building the school has without changing the physical shape of the building. The arrangement of the rooms is arranged neatly, the workspace, the waiting room, the headroom of the workshop, the teacher's room, the tools and materials, and other supporting facilities. Preparation of facilities and infrastructure in the form of tools and practice materials arranged neatly based on functions, making it easier to control, make it easy to reach and facilitate the determination of tools and materials to be used in practice.

In the implementation of the teaching factory model learning process there are several special parts that distinguish the non teaching factory practice model applied at Itaba Vocational School, namely: (1) students do real work according to SOP as in the industrial world; (2) practice material that is carried out, namely real objects or vehicles belonging to consumers; job based on problems found in consumer vehicles; (4) work based on work standards is supported by a type of vehicle service manual; (5) students are required to work based on time as well as working time in the industrial world; (6) work safety is increased by both tools, people and workpieces; and (7) greater sense of

responsibility, especially towards customer satisfaction. The process of implementing practical learning aims to produce a product in the form of a motorcycle service. Based on the products produced, the teacher or instructor can make an assessment of the competencies possessed by students by making direct observations of the practical processes carried out by students and the work results of these students. The expected achievement is that students have competencies that are not only able to practice in accordance with SOPs but students also have competence, experience, and the ability to solve problems with serviced motorcycles on time because the work becomes the biggest point for students to obtain practical grades.

After the construction is carried out and consulted with the expert, then the tests, evaluations and revisions are carried out. A solution developed must be tested and evaluated in practice. The observation process of the learning process, shows the activities of students carrying out work according to the established SOP. Due to the type of product produced in the form of a motorcycle service, the results of work or service carried out are very influential on customer satisfaction so students are required to be truly patient and thorough in serving. The success of students in carrying out motorbike service directly automatically becomes the initial capital of students in preparing themselves as professional mechanics after graduating from Vocational School.

Based on the data from direct observation of the development process carried out it can be concluded that the development process carried out has been going well, but there are several processes that have not been implemented so that revisions to the models that have been prepared previously are needed so that a practical model is suitable for Itaba Vocational School with limitations owned by the school.

Table 1 is the value data of the results of the practice of Tune Up, Over Haul, and starter system obtained by 36 Itaba Vocational High School Vehicle Engineering Department students, while practicing using the concept of teaching factory.

TABLE I. DATA ON VALUE OF PRACTICE RESULTS

No	Practice material	Average Value					Total Score	Value	The highest score	Lowest value
		Preparation	Work process	Work result	Work attitude	Time				
1	Tune up	4,93	4,59	4,53	4,99	5,00	80,95	95,23	98,82	89,41
2	Over Haul	4,33	4,43	5,00	3,89	4,00	64,16	85,55	90,67	82,67
3	Starter System	4,35	3,41	4,95	4,00	4,00	58,47	78,00	80,00	77,33

Based on the results of the acquisition of practical values when the practice of using the model teaching factory at Itaba Vocational School, which is shown through Table 1, illustrates that the value of student competency is at the level of good categories. By looking at the value of each student, in each sub-component of the test, students get a score of 3-5 and there are no students who score 0-2. So, if it is entered based on the calculation criteria of practical value, the highest and

lowest values obtained by students are in the category of good value (above 75).

Based on the results of the development process carried out from the preparation process, the process of practice and the evaluation process carried out is clear that the development process has been going well and the objectives of the development carried out are achieved well. The

development of the preparation process, practice process and evaluation process that has been carried out is then reviewed and revised. Revised matters include: (1) management of facilities and infrastructure; time of practice; and (3) utilization of facilities in the practical process related to the distribution of groups and practice schedules. Required management of facilities and infrastructure for more optimal lab needs. it is easily accessible to students when they need practical tools and materials.

From the results of the review and revision, a practical learning model was obtained which adopted the factory teaching in the management of practical facilities and infrastructure as well as the process of implementing practical learning in the automotive workshop of the Itaba Vocational School, as attached in Figure 2 below.

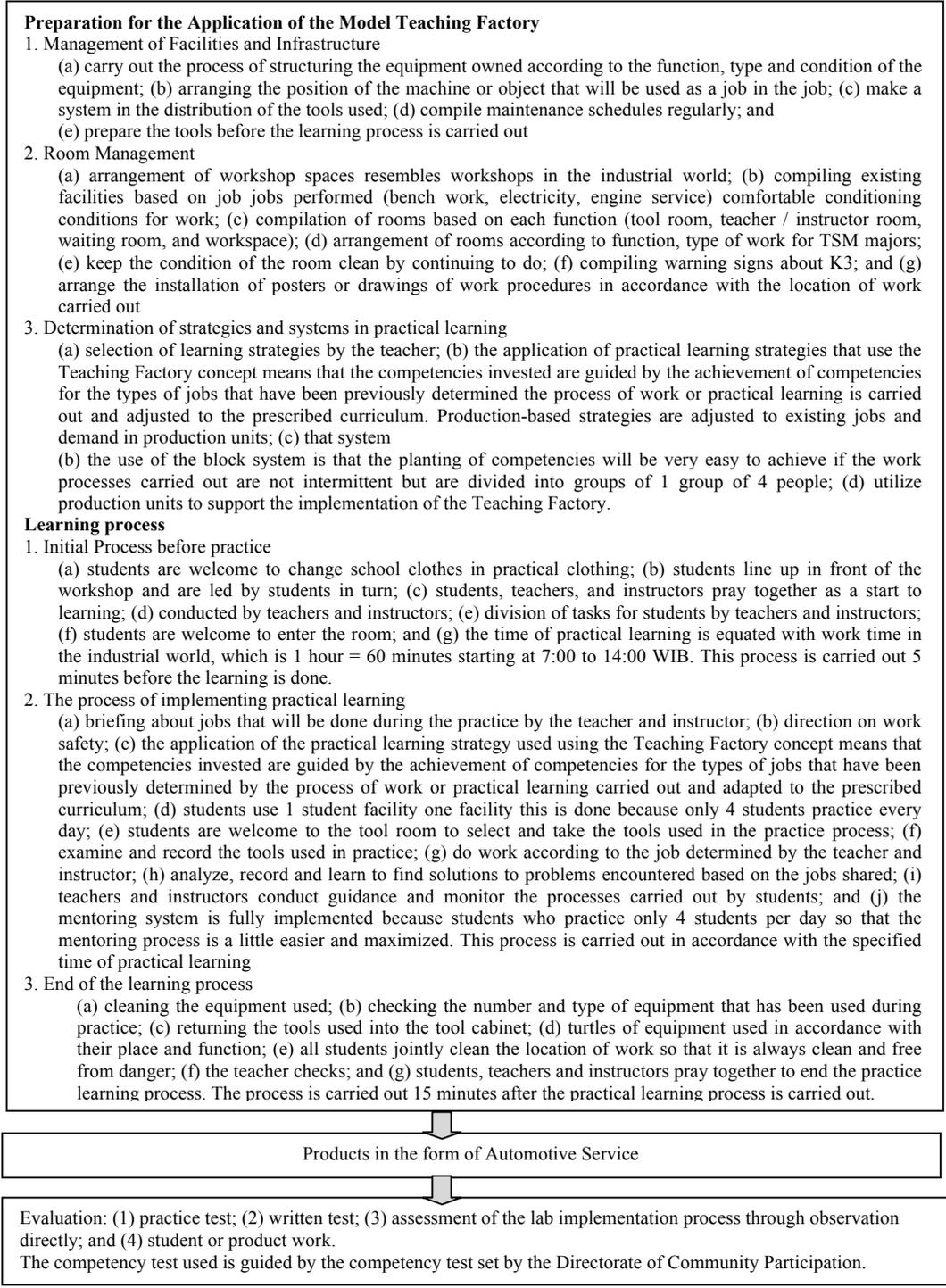


Fig. 2. Development of a Model Teaching Factory

#### IV. CONCLUSION

Conclusion that can be drawn based on data analysis and studies on the results of development in general indicate that the teaching factory model developed is in accordance with the required criteria, namely: (1) the availability of space as a place of practice; (2) There is a production unit as the place to carry out the process; (3) available support and supporting infrastructure such as tools, key locks, and machines; (4) have utilized local environmental conditions in the process of practical learning; (5) human resources involved in the implementation of the teacher / instructor and students; (6) cooperation between the industry and the school; (7) practical subject teachers, instructors are committed to implementing and applying the concept of teaching factory teaching model practice; and (8) students are fully involved in the process. The effectiveness of the process of developing the teaching factory model that is carried out is shown by the ability of students to complete work quickly, well and correctly and the results of competency tests on the learning process that has been implemented during practice by applying the Teaching factory model.

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