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The Effectiveness of the Application of the Teaching Factory Monitoring Information System (SIMO-TEFA) on Improving Learning Achievement and Entrepreneurial Character of Students in Vocational High Schools (VHS)

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ABSTRACT
This study aims to analyze the effectiveness of implementing a SIMO-TEFA monitoring information system in implementing the learning process of creative and entrepreneurial products in order to realize learning outcomes, namely increasing learning outcomes and instilling entrepreneurial character in students. This research was conducted by adapting the stages of several development models, namely the ADDIE, 4D PPE and Borg and Gall models, into 8 syntaxes namely: problem identification, problem analysis, planning, design, early implementation, testing, final implementation, and dissemination. The research was conducted on students of SMK 8 and SMK 6 Makassar in the culinary department of creative products and entrepreneurship subjects. The results of the study showed that the application of SIMO-TEFA in Vocational Schools was effective in increasing learning achievement with an N-Gain score from the pre-test and post-test results of 0.78 in the high category. In addition to increased learning achievement, the entrepreneurial character of students is cultivated, including being creative, independent, socially concerned, curious, teamwork, and disciplined.

***Keywords**: Effectiveness, Information Systems, Monitoring, Teaching Factory.*

1. INTRODUCTION

Vocational education has a strategic role in producing Indonesian people who are skilled and skilled in fields according to their needs. The reorientation of the revitalization of vocational high schools is very important in several aspects, with the aim that vocational high schools can provide a skilled workforce that is ready to work in various economic sectors such as agriculture, industry, tourism, even the creative economy. It is hoped that the successful revitalization of this Vocational High School can also increase the productivity of the Indonesian workforce and reduce the problem of productive age unemployment. one of the steps of the SMK revitalization strategy is the implementation of industry-based learning (Teaching Factory).

The realization of the synergy of vocational education is carried out by preparing students to have work competencies according to the demands of the industrial world, by equipping and providing various kinds of skills so that they become entrepreneurs [1].

The application of teaching factory in Vocational High Schools (VHS) will encourage the establishment of mutually beneficial cooperation mechanisms between Vocational Schools and the world of industry and work (IDUKA), so that Vocational High Schools will always follow industrial/service developments automatically in technology transfer, managerial, curriculum development, internships and others [2]. The application of the Teaching Factory learning pattern is a synchronization of the world of vocational education with the industrial world, so that checks and balances occur in the educational process at SMK to maintain and maintain harmony (link and match) with the needs of the labour market.

Some research results state that teaching factory is a learning model at the vocational high school level based on production or services, which is guided by industry standards and procedures and carried out in an atmosphere similar to that in industry [3]. The use of the teaching factory model has an influence on improving the entrepreneurial character of vocational high school students [4] and teaching factory learning is effective in increasing the productive competence of students [5]. However, based on the results of the evaluation of the implementation of TEFA in vocational high schools, the impact of the teaching factory program in vocational schools is quite effective, although it has not run optimally for students, teachers, schools, and the community [6].

Based on data from preliminary observations that have been carried out in several vocational schools in south Sulawesi, the teaching factory implementation in vocational schools has not run optimally. The results of interviews regarding the existing conditions and potential by grouping external and internal aspects, namely (curriculum, product quality, promotion, financing, infrastructure, and external aspects, namely vocational partners, identified several obstacles in related aspects, namely: a). Aspects of the curriculum: curriculum synchronization with IDUKA is still lacking, application is still difficult, learning practices are still lacking; b) aspects of product quality/quality are still lacking; c) promotion aspect: lack of creativity in promoting products, there is no measurement of promotion implementation; d) marketing aspect: too many product competitors, lack of marketing allocation; e) financing aspect: still need sufficient financial support to develop the product; f) partner aspect; cooperation with partners has not been well established, it is still limited to an MOU.

These are some of the obstacles that are the reason why most of the products produced by students cannot be widely commercialized to industry and the world of work (IDUKA) or the wider community, because the products produced by students do not meet the standard needs of IDUKA and society. The difficulty of this cooperative relationship with partners can greatly affect the process of implementing learning because partner participation in curriculum development is the first step in aligning the competencies needed by partners [1], as well as work standards and product quality produced must be able to meet the quality standards required by partners [7].

To systematically organize the Teaching Factory learning process, a monitoring information system is needed that can provide space for teachers to directly monitor all TEFA learning processes and teachers can integrate TEFA learning tools into the monitoring system according to the needs of IDUKA and the community. The TEFA monitoring information system model is called the SIMO-TEFA Model.

SIMO-TEFA is integrated with all TEFA learning needs and students can access all learning tools and learning needs according to the standards and types of products to be produced, according to the needs of IDUKA and society. The resulting product can also be marketed through this system. Industry partners can also monitor students' work products. through SIMO-TEFA, teachers can directly monitor the work of students, the presence and activity of students in working on products based on predetermined quality and standards. The implementation of teaching factories in vocational schools can bridge the competency gap needed in industry with the competencies produced in schools [8].

This SIMO-TEFA can make students focused and disciplined in learning and working because students feel that they are always being monitored and monitored by the teacher so that in the end they can improve productive competence and students' entrepreneurial character. The SIMO-TEFA model can effectively improve the productive competence and entrepreneurial character of students at VHS.

Based on the background that has been explained, the formulation of the research problem is: How can the Teaching Factory Monitoring Information System (SIMO-TEFA Model) improve productive work competence and entrepreneurial character of students in SMK?

Vocational education is a unique type of education because it aims to develop understanding, attitudes and work habits that are useful for individuals so that they can meet social, political and economic needs according to their characteristics [9]. The teaching factory is a production or service-based learning model at the Vocational High School level, which is guided by standards and procedures that apply in the industry and is carried out in an atmosphere similar to that in the industry [3]. Teaching Factory learning is effective in increasing the productive competence of students [5], another opinion states that the Teaching Factory model has an influence on improving the entrepreneurial character of Vocational High School students [4].

Entrepreneurship is a scientific discipline that studies the values, abilities and behavior of a person in facing life's challenges to obtain opportunities with various risks that may be faced [10]. Entrepreneurship is a creative, innovative ability that is used as a basis, tips and resources to seek opportunities for success [10]). Furthermore, that entrepreneurship is the result of a disciplined and systematic process in implementing creativity and innovation [11]. Characteristics of people with entrepreneurial spirit, among others: (a) Having vision, (b) Creative and innovative, (c) Being able to see opportunities, (d) Orientation on customer satisfaction, profit and growth, (e) Dare to take risks and have a competitive spirit, (f) Quick response and fast action, and (g) Have a social spirit by being generous [12].

Entrepreneur is basically the soul of a person which is expressed through creative and innovative attitudes and behavior to carry out certain activities [13]. The benefits felt by the existence of a teaching factory can make a positive contribution to improving the quality of graduates, which can develop an entrepreneurial spirit and entrepreneurial character for students. The products/services that have been produced from teaching factories have largely contributed to the operational costs of schools or campuses [14].

The value of an information (Value of information) is determined by two things, namely: (a). An information is said to be valuable if the benefits are more effective than the cost of getting it; (b). An information is said to be valuable if the information is not valued in money but is estimated by its effective value [15]. An information system is a regulated way to collect, enter and process and store data, and a regulated way to report, control, manage and even store information so that organizations can achieve goals [16].

Utilization of information systems can also be used as a means of monitoring or observing various conditions, behavior of activities in various fields of life. Utilization of monitoring information systems can produce information that can be used to regulate and identify trends in development [17].

Utilization of the monitoring system in monitoring the plan so that it can be implemented on time and carried out in real time so that it can be carried out according to the target [18]. Utilization of monitoring information systems can also be used for education-based service audits so as to ensure a rational allocation of resources for the implementation of education [19]. The results of the information system can be used as a basis for making decisions and controlling and managing accordingly for future improvements [19].

2. METHODS

This type of research is Research and Development (R&D). The Research and Development method is a research method used to produce products and test the validity, practicality, and effectiveness of the products produced. Research and development to testing the effectiveness of the Teaching Factory Monitoring Information System (SIMO-TEFA) in Vocational High Schools (VHS).

This research was conducted by adapting the stages of the Plomp model for model development, and for the development of monitoring information systems using the SDLC methodology with the waterfall model method. At the Implementation stage, a product performance test was carried out until it met the required quality, namely: The SIMO-TEFA model was valid, practical and effective in increasing the Productive competence and entrepreneurial character of students in Vocational High Schools (VHS).

The SIMO-TEFA model is said to be effective if it fulfills four indicators of effectiveness, namely: (1) The results of students' productive work ability/competence meet industry standards and an entrepreneurial character is formed; (2) active activities of students in TEFA learning; (3) teacher's ability to manage TEFA learning through SIMO-TEFA; and (4) Student responses to the SIMO-TEFA model for monitoring the implementation of applied TEFA learning. Therefore, the effectiveness of the SIMO-TEFA model is related to the level of implementation of the model well and the results can increase productive competence and foster the entrepreneurial character of students in VHS.

3. RESULTS AND DISCUSSION

This study aims to determine the effectiveness of the model (SIMO-TEFA) which can be seen from the achievement of the learning objectives, namely increasing competence and cultivating the entrepreneurial character of students. The measurement of competency improvement is seen from the increase in student learning outcomes and the measurement of the formation of entrepreneurial character is seen from the results of observations and observations during theoretical and practical learning by teachers using SIMO-TEFA.

Validation testing was carried out at SMKN 8 Makassar and SMKN 6 Makassar which had already implemented the Teaching Factory. Each school involves 1 class with a total of 42 students. At this stage the measurement of learning outcomes is carried out. The first stage is to measure the increase in understanding based on student learning outcomes, by giving a pre-test to see the initial learning results of students and after learning using SIMO-TEFA a post-test is given. The pre-test and post-test results obtained from 42 students can be seen in table 1.

Table 1. Validating Testing results

No	Aspects/ Assessment	Pre- Test	Post-Test
1	Lowest value	30	50
2	2 Highest rated	75	100
3	3 Average Rating	44.29	87.98
4	4 Total Due Diligence (≥ 70)	3	40
5	5 Total score Not Completed (< 70)	39	2

Based on table 1, it shows that the lowest score in the pretest is 30 and in the posttest is 50. The highest score in the pre-test is 75 and in the post-test is 100. The average value in the pre-test is 44.29 and the average

value in the post-test is 87.98. The number of completed scores in the pre-test was 3 and increased in the post-test to 40. Meanwhile, the number of scores that were not completed in the pre-test was 39 and decreased in the post-test to 2. From these data, the N-Gain value can be calculated as follows:

$$N - Gain = \frac{Posttest\ score - PreTest\ score}{Maksimal\ score - PreTest\ score}$$

$$N - Gain = \frac{87.98-44.29}{100-44.29} = 0{,}78$$

Based on these calculations, the N-Gain value is 0.78 or in the high category, so it can be concluded that the SIMO-TEFA model is effective in improving learning outcomes.

Based on the pre-test and posttest values, it can be divided based on intervals in the frequency distribution as shown in the following table, Table 2.

Table 2. Distribution of Effectiveness Test Frequency

No	Interval	Pre-Test		Post-Test	
		Frequency	Percentage	Frequency	Percentage
1	91-100	0	0	13	65
2	81-90	0	0	5	25
3	71-80	2	10	1	5
4	61-70	0	0	1	5
5	51-60	4	20	0	0
6	≤ 50	14	70	0	0
TOTAL		20	100	20	100

Based on these calculations, the N-Gain value is 0.78 or in the high category, so it can be concluded that the SIMO-TEFA model has been effective in its use.

The method used for software development uses the systems development life cycle (SDLC) with the waterfall model method. The selection of the waterfall model in the development of this system is because this model is simple, easy to understand and apply. But it can work well and give proper results. As stated by [20] who examines the biggest advantage of the waterfall model for SDLC is that it provides a structure for organizing and managing software development projects with the main methodological approach is the accurate identification of user needs.

This research is expected to be able to produce SIMO-TEFA media products that are able to meet the learning needs of TEFA in the Culinary Department.

Based on the results of black box testing, it is known that all system components are functioning properly. As stated by [21] testers can determine a set of input conditions and test the functional specifications of the program with a focus on the functional specifications of the software. After all the units or modules that have been developed and tested in the next implementation stage are integrated into the overall system.

The design of features in the media is designed to facilitate a systematic learning model based on lesson plans, informative, can be monitored properly so that good performance progress can be seen, carried out systematically and formulated in measurable and observable operational work. After all data related to feature requirements has been available, system design is carried out using UML, including user interface design, after the design stage is carried out, it is continued with the implementation stage.

Product trial stages aim to obtain data on the effectiveness of the media product being developed. Data collection was carried out using a multiple choice test given before using the media (pre-test) and after using the media (post-test). In line with the research conducted by [22] also used the results of the pre-test at the beginning of learning and the post-test at the end of learning, the data obtained showed an N-Gain of 0.78 which was in the high category where the average participant score students before using the media was 46.25 and increased to 90.5 after using SIMO-TEFA

It can be concluded that the SIMO-TEFA media has been effective in its use. In line with previous research by [23] which stated that with a monitoring system, the implementation of work plans can be more effective, real time, so that work can be accelerated and on target.

In addition to increasing value, based on the results of teacher observations and observations, students also show the embedded entrepreneurial character which can be seen from the culture of creative, independent, social care, curiosity, discipline, responsiveness to opportunities, cooperation and team work. in line with research by [24] which states that entrepreneurial attitudes, discipline, responsibility can be trained through real practice in TEFA lessons which are expected to develop all the potential students have to be more productive.

4. CONCLUSION

The information system for monitoring the implementation of the teaching factory (SIMO-TEFA) was declared effective as evidenced by the learning outcomes which increased from the average before use (pre-test) of 46.25 and after use it increased to 90.5 with an N-Gain of 0.78 or in the high category. In addition to increased learning achievement, one can also see the culture of entrepreneurial character in students, including being creative, independent, socially concerned, curious, teamwork, disciplined, responsive to opportunities and hard work.

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