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The benefit of running maintenance habituation before learning of machining process begins

Thomas Sukardi [1] *, **Bayu Rahmat Setiadi** [1], **Afri Yudantoko** [2]

[1] Universitas Negeri Yogyakarta, Indonesia.
[2] Technische Universität Dresden, Germany.
* Corresponding Author. Email: thomas_sukardi@uny.ac.id

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ABSTRACT

The study was aimed at investigating the advantages of the habituation of running maintenance and supervision over the practice learning process and the learning achievement of the students of Mechanical Engineering Study Program, Faculty of Engineering, Universitas Negeri Yogyakarta. It was participatory classroom action research. The subjects were 80 third-semester students grouped into the group C class. The data on the habituation of running maintenance were collected using a questionnaire; those on the students' learning achievement were collected through documentation and analyzed using a descriptive technique; those on the supervision intensity and machine feasibility were gathered through observations and analyzed using the descriptive qualitative technique. The findings showed that: 1.) The implementation of running maintenance used the systems of coaching, mentoring, and supervision with an optimal intensity of lecturers in teaching-learning machining practices; 2.) The habituation of running maintenance was done through standard procedures, and the implemented action took three cycles; 3.) The achievement of the habituation of running maintenance on students during the implementation of teaching-learning practices was characterized by the rapid job sheet completion that must be taken in one semester; and 4.) With the habituation of running maintenance, the feasibility of the existing machines in the workshop could be maintained.

INTRODUCTION

Educational institutions, especially those which are related to technology fields, require adequate facilities for practicum teaching and learning. This means the capacity and diversity should be met in accordance with the competence demands that students must master. Thus, educational institutions are always required to prepare practicum facilities that students will use. On the one hand, technological advances are unstoppable to affect the aspects of human life. It is viewed from the technology used around us, ranging from equipment/machinery or industrial goods that are mechanical, electrical to sophisticated or robotics.

Educational institutions always procure practicum facilities in the form of tools or machines. Even they compete to get funded for the procurement of such practicum facilities. These institutions compete to buy the facilities for investment reasons without noticing their quality and origin

(Asiabaka, 2008). However, the aspects of maintenance and repair are ignored so that the practicum facilities cannot function and work optimally.

Maintenance is considered an action that wastes time, energy, and cost (Firdaus et al., 2019). Some even argue that the treatment will be implemented only if the machines or tools are broken and not well-functioned. Those assumptions are incorrect because, as technicians, we have to remember that the investments use enormous amounts of money and can be regarded as an asset to be maintained. Also, we have to remember that saving the asset can be done by implementing programmed and scheduled maintenance (Hardt et al., 2021). According to Goyal and Maheshwari (2012), the function of maintenance in the manufacturing industry is to make its proper contribution to profits, productivity, and quality. It must be recognized as an integral part of the production strategy.

Educational institutions should realize the importance of the existence and role of maintenance in ensuring the continuity, smoothness, and stability of the process of an educational activity (Ekpoh, 2018). Based on a field experience, the abandonment of the maintenance generally resulted from the existing bureaucratic procedures in the institution itself, especially the different opinions from the existing management elements within the institution. Solving maintenance problems needs an approach that takes into account all aspects of the existing functions within the educational institution. A maintenance system should use a systematic approach that includes categories of management techniques, administrative procedures, technological practices, maintenance personnel management, and implementation controls. Of course, in the implementation, all these five elements cannot be applied simultaneously, but at least there is a combination among the five elements or adaptation based on the needs. In the Faculty of Engineering, Universitas Negeri Yogyakarta, especially in the Department of Mechanical Engineering Education, practicum facilities consist of machine tools, cutting tools, and measuring tools. There are 83 machine tools in total, consisting of 13 milling machines, 40 lathe machines, eight snap machines, 12 grinding machines, seven drilling machines, two slot machines, and one electric discharge machine (EDM).

The observation result in the workshop showed that of 83 machine tools, 14 machines or about 17% of the total machines in the machining workshop at the Department of Mechanical Engineering Education had been severely broken. The damages have an impact on the implementation of the practicum. The impact is a disruption of the students' achievement in mastering the machining competence. From the analysis of the observation results, it is found that the ineffective implementation of maintenance causes the damages of the machine tools. The maintenance that should run on a regular basis cannot be done properly because there is no maintenance schedule, fund, or culture in the students.

Most students do not fully understand the role of maintenance because they do not know the benefits of maintenance. The results of preliminary observations showed that 85% of students never did an inspection, initial setup, running maintenance lubrication, and repair of the machine to be used. Such conditions may affect the work performance of the students. For instance, the resulting workpiece of the product deviates from a predetermined standard. The condition is also worsened by ineffective supervision conducted by the lecturers/instructors who are responsible for the practice learning process. In addition, preliminary observation results showed that 90% of lecturers or instructors were not well-managed in conducting guidance, mentoring, and supervision to the students related to the maintenance.

Due to some problems such as the condition and the limited number of the machines, the broken machines, and the insufficient funds for maintenance, the readiness of practicum facilities is not well-achieved. As a result, the ratio of the machine and the students is too high, so that two or three students can use one machine. In other words, the available machines or tools cannot serve the learning process optimally. Sukardi's et al. (2013) research showed that the preventive maintenance culture had a good impact on the students' achievement in their learning practicum, as shown by the job sheet completion that can be achieved two times faster. In addition, the preventive maintenance done in the machining workshop positively impacted the feasibility of machine tools used by the students. The results of this study indicated that preventive maintenance needed to be planned, scheduled, and conducted by every student who would carry out machining practices in the workshop.

To improve the students' understanding of the maintenance function, it is necessary to train those who will carry out machining practices. Therefore, this study applied the culture or habit of

running maintenance in the machining practices to the students in the Mechanical Engineering Study Program, Faculty of Engineering, Universitas Negeri Yogyakarta. Running maintenance is one of the preventive maintenance activities. If this activity is done regularly, the machine is expected to be durable and always ready to use. In implementing it, lecturers are required to be active in assisting, monitoring, supervising, and guiding the students to do it.

The practice learning process at the Mechanical Engineering Education Department, Faculty of Engineering, Universitas Negeri Yogyakarta requires sufficient, well-planned, and structured facilities and procedures. Its implementation requires seriousness and commitment either at the managerial or operational levels. In the implementation, many obstacles are found, such as 1.) The lack of practicum facilities; 2.) Many broken facilities since there is no maintenance; 3.) The undone running maintenance program; 4.) The lack of funds for the practice learning process; 5.) The low competence of lecturers or instructors; 6.) The lack of commitment of existing human resources (lecturers, instructors, technicians, and managers); 7.) The ineffective management and process of practicum learning in the workshop; 8.) The uneven early provisions of the students; and 9.) The students' sincerity and work ethic do not support during the practice learning process.

The focused problem of this research is limited to the aspects of the practice learning process concerning the issue of the habituation of running maintenance in the students and the supervision intensity by the lecturer or instructor (lecturer's commitment and competence in teaching). The research problems can be formulated as follows: 1.) What is the implementation of running maintenance and supervision intensity in the practice learning process like?; 2.) What is the result of the habituation of running maintenance in the students during the implementation of the teaching and learning process of machining practices?; 3.) What is the result of the habituation of running maintenance in the students' learning outcomes during the practicum?; and 4.) What is the achievement of the habituation of running maintenance on the feasibility of machine tools in the workshop?.

Therefore, the objective of this research is to reveal the implementation of running maintenance and supervision intensity in practicum teaching and learning, the achievement of the habituation of running maintenance in the students, the result of the habituation of running maintenance in the students' learning outcomes in the practicum, and the result of the habituation of running maintenance on the feasibility of machine tools in the workshop. The results of this study are expected to provide an overview and input in the implementation of the maintenance running culture and the supervision on the practice learning process at the Mechanical Engineering Education Department, Faculty of Engineering, Universitas Negeri Yogyakarta.

Literature Review

Maintenance often used in factories, workshops, or laboratories has two basic meanings: preservation and repair. Maintenance is defined as an activity to maintain and fix all facilities used to keep them durable and ready to use at any time, while the repair is a refreshment activity of all processes that have been broken or disrupted so that the facilities are able to function properly as the prior condition (Hantoro & Sukardi, 1990). According to the dictionary, the term maintenance has the meaning of preservation or repair. However, in the factory or industry, maintenance is defined as a combination of all actions or activities performed in order to maintain the machine performance in normal conditions.

Maintenance is defined as an act of keeping machines or tools to make them stay in a normal condition and able to function properly (Gackowiec, 2019). According to ISO 14224:2016, maintenance has been defined as the combination of technical and associated administrative actions intended to retain an item or system or restore it to a state where it can perform its required function. According to Gandhare and Akarte (2012), the key objective of maintenance is to ensure system function (availability, efficiency, and product quality), system life (asset management), and system safety with low energy consumption. Related to this, the operational activities to be performed are conducting a routine inspection, setting the function of machines/tools routinely, performing daily lubrication, and cleaning tools. Whereas "repair" is defined as an activity to fix all machine components or equipment that has been broken due to certain uses (e.g., it is used for production). Under operational conditions, these repair activities may include minor repair, major repair, and even overhaul. Thus, in general, the main activity of maintenance is to maintain the continuity of the

production process by conducting a regular inspection, repair, and overhaul. Figure 1 shows an overview related to crucial maintenance.
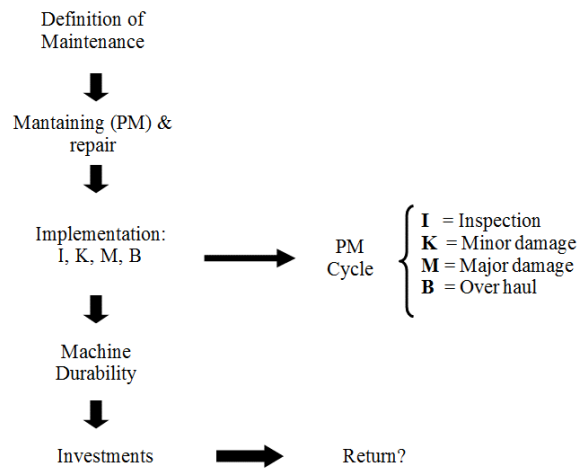
Figure 1. An Overview of the Crucial Maintenance

Maintenance is actually a combination of various activities aimed at keeping the machines or tools in good condition and serviceable to the users. Thus, the main objectives of maintenance activities according to Prokopenko and North (1996) are 1.) To optimize the reliability of equipment and infrastructure; 2.) To ensure that equipment and infrastructure are always in good condition; 3.) To carry out prompt emergency repair of equipment and infrastructure so as to secure the best possible availability for production; 4.) To enhance, through modifications, extensions, or new low-cost items, the productivity of existing equipment or production capacity; 5.) To ensure the operation of equipment for production and for the distribution of energy and fluids; 6.) To improve operational safety; 7.) To train personnel in specific maintenance skills; 8.) To advise on the acquisition, installation and operation of machinery; 9.) To contribute to finished product quality; and 10.) To ensure environmental protection. In order to support the production activities, machine operators need to understand the philosophy of maintenance.

Thus, what should be done in the implementation of maintenance should be in accordance with the expectations. On the other side, the quality of the final product is affected by both the production process and the quality of maintenance (Pophaley & Vyas, 2010). There are several things to consider in implementing and controlling the maintenance of machines or tools. Those things are 1.) The implementation and habituation of routine maintenance such as heating machine or tool (running maintenance); 2.) The regular inspection of machinery or tools; 3.) The implementation of preventive maintenance, including periodic inspections, periodic inspection reports, periodic replacement of components, periodic settings, and testing; 4.) The participation of workers or operators in maintenance activities; 5.) The administration of maintenance and repair of machines or tools; and 6.) The planning and approval of the maintenance by institutions, factory managers, and supervisors (Dhillon, 2002).

People working in the maintenance section have to think about what they can give to other sections or about the determinants of the success of a maintenance section. The key to success is something that can support the maintenance in serving or providing other sections with appropriate. The key to success is the factors that should be owned by the maintenance people, which include: 1) Competent and skillful personnel; 2) Availability of machine/tool data; 3) Efficient flows of information; 4) Clear operational instructions; 5) Availability of a standard operating procedure; 6) Ability and willingness to make maintenance plans; 7) Self-discipline of personnel/workers/operators; 8) Awareness of maintenance personnel; 9) Safety and security at work; 10) Accuracy at work; 11) Adequate facilities at work; 12) Compatibility of work systems and procedures; and 13) Availability of funds and spare parts (Subiyono, 1993).

Shanmugam and Robert (2015) said that the concept of human factors is used for the manage-ment of maintenance resources because human factors determine the success of maintenance. The concept is applied to shape the behavior and culture of safety in the workplace. Human factors in maintenance are a pressing problem. The framework fields important insights regarding the influence of human factors in maintenance decision-making. By incorporating various approaches, a strong framework for analyzing human factors is very important in maintenance, a culture of maintenance will be created well (Sheikhalishahi et al., 2016).

Operationally, maintenance activities are divided into two main activities, namely planned maintenance and unplanned maintenance. The planned maintenance consists of preventive maintenance and corrective maintenance. There are two types of activities in preventive maintenance, namely maintenance in the form of heating machines or tools (running maintenance) (Gackowiec, 2019) and maintenance that must stop the activities of all machines in a moment related to the addition of components or shutdown maintenance (Garg & Gupta, 1987). Furthermore, corrective maintenance is an activity that can be divided into two. They are reparation because of damages and overhaul (breakdown maintenance). In addition, unplanned maintenance is usually done because of damages to the part of the machines or tools, which are very important in the factory (emergency maintenance). For more details, see the following flow chart as shown in Figure 2.
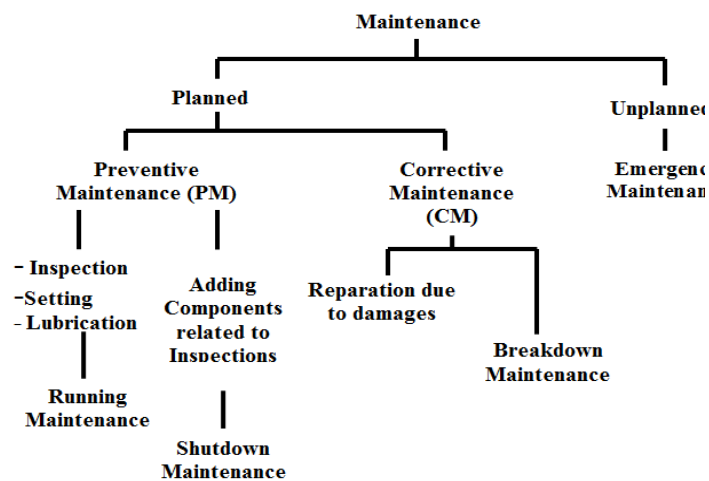
Figure 2. A Flow Chart of the Maintenance Type of Machines

RESEARCH METHOD

This study examines the implementation of the habituation of running maintenance and the supervision conducted by the lecturer in the practicum class. This study is classroom action research with direct participants (participatory action research). It is conducted by providing a direct involvement of researchers from the beginning to the end of the process as a form of class problem-solving actions. The main concept of action research, according to Lewin, consists of four stages, namely: 1.) Planning; 2.) Acting; 3.) Observing, and 4.) Reflecting.

The research was conducted in the workshop of the Mechanical Engineering Education Department for four months. The population consisted of the students of the Mechanical Engineering Department, Faculty of Engineering, Universitas Negeri Yogyakarta, and the sample consisted of 80 students in their third semester. The data on the culture of running maintenance were collected using a questionnaire. The data on the supervision intensity and machine feasibility were gathered through observations, while the data on the practice learning process achievement were collected from the lecturer's documentation, and the other data were collected through direct observation on the practicum.

The data from the questionnaire and those on the students' learning achievement in the practicum were analyzed by employing a descriptive technique, while those from the interviews and observations were analyzed by using a qualitative descriptive technique to explain in detail all

phenomena obtained from the field. The action undertaken in this study refers to a model of an activity developed by Lewin. The cycles are: planning, implementation, observation, and analysis and reflection. Planning phase identified the materials of the habituation of running maintenance through various literature studies, relevant journals, and websites. The setting of the running maintenance materials was done to select and sort the materials used according to the time and topic of the practice learning process. The tryout of the habituation of running maintenance to the students was conducted at Implementation stage. The students were observed during the learning process, including how they performed the habituation of running maintenance.

At the observation stage, lecturers conducted the observation of the supervision intensity in order to implement the habituation of running maintenance. The lecturers supervised, controlled, and monitored the students' activities in order to implement the habituation of running maintenance. This observation was conducted to ensure that there was no misconduct during the implementation. The last stage is analysis and reflection which is done by evaluating, revising, and correcting if there is a discrepancy in the material, time, and teacher. The lecturers did the observations on the supervision to ensure that the students had performed the habituation of running maintenance.

RESULT AND DISCUSSION

The observation prior to the implementation of the model resulted in the data on the machine damage. The data were related to the frequency and location of the damage. The data on the damage frequency showed machine damage during its use every day. The location of the damage was the location of the component, which frequently experienced damages every day. Table 1 shows the damage of components of various types of machines commonly used by students for practicum. Before the running maintenance program was implemented, the damage frequency was irregular, starting from once to four times a day. After the running maintenance program was implemented, the damage could be reduced to once a day, especially for shaping, lathe, and milling machines. In addition, the damages were mainly found only on the components that were often used. The implementation of a running maintenance program had a positive impact, i.e., machine damages could be minimized. The culture of running maintenance could be well achieved through three cycles. However, this process still could not deliver optimal results; some aspects had not been instilled in the students. For more details, see Table 2.

Table 2 explains that the implementation of running maintenance can be completed in 3 cycles. In the first cycle, ± 62.5% of the aspects had not been well implemented, especially in alignment, adjustment, lubrication, and some inspection aspects (± 12.5%). This means that the students had not understood and could not interpret the importance of running maintenance. For further actions, the teachers should provide guidance and assistance intensively to the students by sharpening the meaning and benefits of running maintenance.

In Cycle 2, the success rate reached 62.5%, meaning that there was a very significant improvement compared to that reached in Cycle 1. The most notable aspect that was not implemented was the alignment aspect (18.75%), 12.5% in the adjustment aspect, 6.5% in the lubrication aspect. Thus, in Cycle 2 there was ± 37.5% of the aspects that were not implemented. This means that in this cycle, the students started to play a role in the implementation of running maintenance.

In Cycle 3, the implementation of running maintenance could be done well; the students could already feel the benefits of this activity. All aspects, namely inspection, alignment, adjustment, and lubrication, ran well. One aspect of lubrication had not run yet, i.e., giving grease (± 6.25% out of 12.5% of lubrication aspect), and there were aspects that were not yet implemented optimally in the adjustment aspect. These aspects did not run well because the facilities used for lubrication and adjustment were inadequate; thus, they were not implemented.

In addition to the decreasing frequency of damage to the machine, implementing the habituation of running maintenance also affects the students' speed in completing the job. As shown in Table 3, treatment groups 1 and 2 can complete five jobs in 8 weeks of practicum. While the control groups: class B1.1 & B1.2 can complete only 2 - 4 jobs in 8 weeks, classes C1.1 & C 1.2 can complete 2 - 3 jobs in 8 weeks, so can classes B2 .1 & B2.2, 2 - 3 jobs in 8 weeks. The differences

in the number of jobs done are because the treatment group always performs running maintenance first before carrying out the practice.

Table 1. The Damage Frequency on Machines

Num.	Machine Type	Component Unit	Damage Classification *)			Damages	
			A	M	D	Before SRM	After RM
1.	Lathe Machine	Tail Stock	V			4 times/day	1 time/day
		Head Stock					
		Cross Slide	V				
		Longitudinal Carriage					
		Gear Box	V				
		Machine Electricity	V				
		Machine Cooler					
		Machine Lubricants					
		Chuck					
		Engine Drive					
		Machine Frame					
2.	Vertical Milling Machine	Arbor				3 times/ day	1 time/ day
		Engine					
		Cross Slide					
		Longitudinal Carriage					
		Head Attachment	V				
		Gear Bpx	V				
		Machine Electricity					
		Machine Cooler					
		Machine Lubricants					
		Chuck	V				
		Engine Drive					
		Machine Frame					
3.	Horizontal Milling Machine	Arbor	V			2 times/ day	Null
		Arbor Buffer					
		Engine Drive					
		Cross Slide					
		Longitudinal Carriage					
		Gear Box					
		Machine Electricity	V				
		Machine Cooler					
		Machine Lubricants					
		Chuck	V				
		Machine Frame					
4.	Shaping Machine	Engine Drive	V			4 times/ day	1 time/ day
		Long Stroke Regulator	V				
		Automatic Mechanic Unit	V				
		Chisel Holder	V				
		Machine Cooler					
		Machine Lubricants					
		Chuck					
		Engine Drive					
		Machine Frame					
5.	Grinding Machine	Machine Electricity				1 time/ day	Null
		Chuck	V				
		Machine Frame					
		Gear Box					
		Engine Drive	V				
		Machine Table					
		Spindle Machine					
		Radial Machine					
		Head Attachment					
6.	Pedestal Grinding Machine	Engine Drive				1 time/day	Null
		Machine Electricity					
		Spindle Machine					
		Stone Grinding	V				

*) Clarification of Damages: K = minor damage; M = major damage; B = over haul

Table 2. The Habituation of Running Maintenance of the Treatment Group

Num.	Running Maintenance Aspects	Reflection on Cycle 1	Refelection on Cycle 2	Reflection on Cycle 3
	Inspection			
	• Checking the machine's electrical system	Implemented	Implemented	Implemented
	• Checking and trying the handle function	Implemented	Implemented	Implemented
1.	• Checking the machine's indicator system	Implemented	Implemented	Implemented
	• Checking the machine's work functions	Not implemented	Implemented	Implemented
	• Checking the fragile parts	Not implemented	Implemented	Implemented
	• Checking the binding system	Implemented	Implemented	Implemented
	Alignment			
	• Setting the motion's conformity	Not implemented	Not implemented	Not yet optimally implemented
	• Setting the motion's equality	Not implemented	Implemented	Not yet optimally implemented
2.	• Setting the motion's uprightness	Not implemented	Not implemented	Implemented
	• Setting the moving component's joint and alignment	Not implemented	Not implemented	Implemented
	• Setting the joint, alignment and moving components	Not implemented	Implemented	Implemented
	Adjustment			
	• Checking the component's position	Not implemented	Not implemented	Implemented
3.	• Adjusting the sliding motion	Not implemented	Not implemented	Implemented
	• Checking and adjusting clamps	Implemented	Implemented	Implemented
	• Checking and adjusting aids	Implemented	Implemented	Implemented
	Lubrication			
4.	• Checking and adding lubricants	Not implemented	Implemented	Implemented
	• Applying grease on some parts in need	Not implemented	Not implemented	Not implemented

Table 3. Students' Task Accomplishment

No.	Group	1	2	3	4	5	6	7	8	Note
1	Treatment Group 1	v	v	v	v	v				Accomplished in Week 8 71.42%
2	Treatment Group 2	v	v	v	v	v				Accomplished in Week 8 71.42%
3	B1.1 & B1.2 Group	v	v	v	v					Accomplished in Week 8 50 %%
4	B2.1 & B2.2 Group	v	v							Accomplished in Week 8 20 %
5	C2.1 & C2.2 Group	v	v	v						Accomplished in Week 8 37.5 %

The inspection of machines enables the lecturers to know the function of components and the positions among components so that the students can replace or adjust the machine components to function perfectly. For example, whether the machine is suitable for use can be determined by checking the machine's electrical system, handle function, indicator system, work function, fragile parts, and binding system. The treatment group always performs running maintenance so that the machine is always in proper condition and works according to the machine's geometric quality, resulting in a higher quantity of jobs than that of the control group.

CONCLUSION

The following conclusions can be drawn from the results of this classroom action research in the implementation of running maintenance. The implementation pattern of running maintenance employs guidance, mentoring, and supervision systems with optimal intensity by lecturers in machining practices' teaching and learning process. The habituation of running maintenance can be done well in three cycles. All running maintenance aspects such as inspection, alignment, adjustment, and lubrication are running well. Some parts of lubrication aspects have not been implemented, i.e., applying grease (6.25% out of 12.5% of the total lubrication aspect), and some adjustment aspects are not optimally implemented to the lack of facilities for lubrication and adjustment. Other results also reveal that the student's achievement on the habituation of running maintenance during the implementation of the practical teaching and learning process is marked by the fast completion of the job sheets they take in 1 semester. With the habituation of running maintenance, the feasibility of machining tools in the workshop can be maintained well, marked by the lack of damage to the machine during the practicum activities.

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Analysis of needs for the development of trainer sensor and transducer learning media based on Internet of Things (IoT)

Purnamawati Purnamawati (iD)**, Muhammad Akil * ** (iD)**, Nuridayanti Nuridayanti**
Universitas Negeri Makassar, Indonesia.
* Corresponding Author. Email: muhammadakil@unm.ac.id

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ABSTRACT

The purpose of this study was to analyze the needs of students and teachers in developing a learning media in the form of a trainer to support the sensor and transducer practicum process during the Covid-19 Pandemic. This type of research is quantitative research with descriptive statistical analysis techniques. Data were collected through questionnaires distributed online to 75 respondents, including productive electronic engineering and electrical engineering teachers at SMK Negeri 2 and SMK Negeri 10 Makassar and their students. In addition, there were also respondents from electronic engineering students at the two schools. This study indicates that facilities and infrastructure in schools are in the high category with a percentage of 64%. Learning conditions during the Covid-19 Pandemic based on data from respondents are in the medium category with a percentage of 67%. The level of need for IoT-based sensor trainer learning media to support distance learning at SMK Negeri 2 Makassar and SMK Negeri 10 Makassar is in the high category with a percentage of 72%. Based on this value, it can be concluded that practicum facilities are needed in the form of IoT-based sensors and transducer trainers that can be used as alternative learning during the Covid-19 Pandemic. It is hoped that the teachers can adjust learning tools according to pandemic conditions so that the implementation of the learning process can run smoothly.

INTRODUCTION

The need for media in learning is very important to ensure the achievement of learning objectives for students (Nurrita, 2018). Media is a tool used to assist the learning process and is generally mentioned in the learning design, so educators must have the ability to design and implement quality learning as a factor in improving the quality of learning quality (Yaumi, 2018). In addition, educators are expected to have sensitivity to all conditions experienced by students so that they do not quickly cause an unpleasant atmosphere for students. An educational paradigm that is recommended in learning is to use Student-Centered Learning (SCL) methods. The use of the SCL method in learning has proven to have a very good impact on students. This can be seen in various studies using SCL with very effective results in increasing student understanding (Marpaung & Azzajjad, 2020), giving students confidence in carrying out the learning process (Mariana, 2020), and can improve students' skills from the results of their learning activities (Zaus et al., 2019).

In addition to student-centered learning, blended learning is becoming popular amid the current development of information technology. Mixed learning is an innovative concept that combines face-to-face meetings or traditional learning with online learning (with the help of ICT) (Lalima & Dangwal, 2017). Mixed learning is very suitable for use in learning activities during the pandemic, although online meetings are mostly conducted to prevent the transmission of Covid-19. According to Allen et al. (2007), online learning can be carried out with a proportion of 30-79% in mixed learning, where the substance of delivering material and giving assignments is mostly carried out online.

Unlike the case for practical learning, during the current pandemic, government regulation requires all work to be carried out at home, including schools. This is, of course, to prevent the spread of Covid-19. Based on these conditions, practicum subjects become a big problem for some teachers because they have to make various efforts to find ways to achieve practicum objectives, including using several learning methods. Of course, the use of a good method cannot be separated from the media or learning tools used. In general, in practical learning, media trainers are very suitable and needed in several schools and vocational colleges in Indonesia. The learning outcomes of students who use trainer media in several practicum subjects in vocational high schools have been shown to increase, as was done by Rahmadiyah and Sumbawati (2014) with the results of the cognitive assessment of students getting a very good category after using the trainer as a media on basic electronics engineering subjects at SMK Kartika 2 Surabaya. Arifin and Zuhrie (2015) did the same thing and Hariyadi and Kholis (2015), which got a positive response or very good category from students after using a microcontroller trainer media.

In the example of the sensor and transducer practicum case, the appropriate practicum media used is the sensor and transducer trainer (Purnamawati et al., 2021). The use of sensor and transducer trainers is effective and feasible to use based on the research results obtained, namely student responses to the use of sensor and transducer trainers in practicum reaching a very good category. However, this research has not been equipped with Internet of Things (IoT) technology so that its application is carried out face-to-face.

The use of IoT technology strongly supports the online learning process, especially in practicum during the pandemic. The utilization of the internet network makes data communication possible without the limitations of distance and time. Thus, the process of reading sensor values can be carried out at a long distance (in this case, at the student's house) either through the android application or web browser. So that practical activities can be carried out remotely in terms of monitoring and controlling sensor and transducer equipment.

The availability of IoT kits or modules that can be used for the learning process is currently on sale. Not even a few of the student's final projects are implementing IoT. However, there are several problems: the lack of students' understanding of making hardware like a minimum microcontroller system and any other input-output equipment that connects to it. The added lacks are the students didn't understand how to connect the microcontroller with communication media and how to create a network as cloud IoT, even to create an interface platform to the web or Android application that makes it easier for users to access the equipment (Hariyanto et al., 2020). Based on these problems, Rahayu et al. (2020) tried to make an IoT-based trainer to increase teachers' understanding of IoT and to be able to apply the trainer to the learning process for students. Hasanah et al. (2018) has also done the same thing, who made an IoT trainer support IoT practical learning. Online system learning in practicum has also been carried out by Jarillo et al. (2019) by developing a virtual laboratory that can be controlled remotely by offering an online laboratory.

This study aims to obtain important information and analyze data related to the needs of teachers and students in developing IoT trainer learning media products on sensors and transducer subjects at vocational schools in Makassar. Through this research, it is hoped that teachers can make the right decisions in compiling the learning process according to user requests.

RESEARCH METHOD

This research is a quantitative descriptive study that will describe the learning conditions in partner schools and analyze the needs of learning media in supporting distance learning. The samples in this study were productive teachers of electronics engineering and several students from SMK Negeri 2 and SMK Negeri 10 Makassar. The sample selection was made randomly, especially for students. The data collection was carried out by distributing online questionnaires through the Google Forms application on a number of samples.
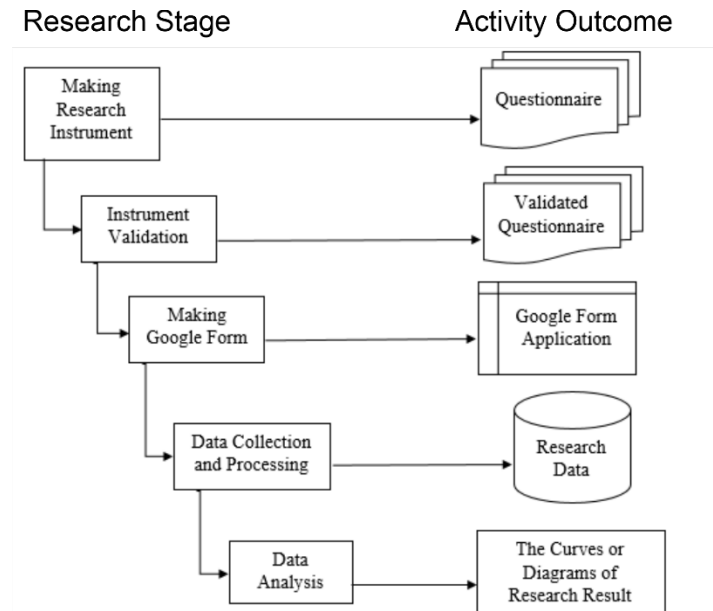
Figure 1. Research Stages

Based on the information shown in Figure 1, the first stage is making research instruments. The research instrument is made in the form of a statement that explores the necessary research information and what products need to be developed in overcoming problems at school. The research instrument consisted of 3 main indicators, namely the condition of facilities and infrastructure, learning conditions, and media needs. The instrument was then validated by a media expert validator consisting of four people with study backgrounds from electrical and electronic engineering education. The validation results are then processed using Aiken V to see the results per item using Formula 1 (Aiken, 1985; Azwar, 2016).

$$V = \frac{\sum s}{n\,(c-1)} \tag{1}$$

Descriptions:
S   = r – lo
Lo = The lowest score of validity assessment
c   = The highest score of validity assessment
r   = Score given by validator
n   = Sum of experts & practitioners who do an assessment

Aiken proposes the concept of content validity in more detail, especially detailed on standard validity, which is influenced by the number of raters and the rating scale used (Aiken, 1985). The next stage is making a google form application. This research activity was carried out still in a pandemic atmosphere so that the implementation process was carried out online and offline. The research questionnaires were distributed through the Google Form application to 75 respondents consisting of 24 teachers and 51 students. The next stage is the collection and processing of data from respondents. The data collected contains information from respondents directly and is processed

for data analysis purposes. The items of the instruments used can be seen in Table 1, Table 2, and Table 3. The data that has been obtained are categorized according to Azwar (2010) as can be seen in Table 4.

Table 1. Instruments for the Condition of Facilities and Infrastructure

No.	Statement Items
1.	Distance Learning Activities, which are government policies in the new normal period of covid 19, present their own challenges for teachers in the implementation of learning .
2.	Availability of laboratory facilities in schools as a place for students to practice .
3.	Availability of practicum facilities in the form of trainers that support distance learning
4.	The use of trainer learning media can increase students' interest and motivation to learn.
5.	There is an internet network at school and at home that supports distance learning activities
6.	There are supporting equipment for the implementation of distance learning such as mobile phones and laptops

Table 2. Instrument of Learning Conditions

No.	Statement Items
1.	During the implementation of distance learning, students are actively involved in learning activities
2.	Teachers and students have no difficulty in implementing distance learning
3.	Traditional learning by only focusing on teacher explanations can be easily understood by students
4.	One method of distance learning in practical subjects can be carried out by means of simulation
5.	Simulation-based practicum activities are sufficient to increase understanding of the material provided
6.	Student learning outcomes for practical subjects during the distance learning period have decreased
7.	Student learning outcomes for practical subjects during the distance learning period have increased

Table 3. Instruments for Learning Media Needs to Support Distance Learning

No.	Statement Items
1.	Practical activities carried out with only simulations have not been effective without trainer learning media
2.	Practicum activities using a media trainer are needed
3.	One of the trainer learning media that supports distance learning is an IoT-based trainer
4.	IoT-based practicum activities can be carried out at students' homes during the practical learning process
5.	IoT-based home practicum activities can increase students' learning motivation, especially in remote control material for components used in media trainers.
6.	Understanding and analyzing the characteristics of sensor and transducer components through practice from home can increase learning motivation
7.	The use of IoT technology in remote practice can be done to read sensor values on trainer learning media

Table 4. Interval Category

Interval	Category
$X < (\mu - 1{,}0\,\sigma)$	Low
$(\mu - 1{,}0\,\sigma) \leq X < (\mu + 1{,}0\,\sigma)$	Medium
$(\mu + 1{,}0\,\sigma) \leq X$	High

Descriptions:
X = Score
μ = Mean ideal = ½ (highest score + lowest score)
σ = Ideal Standard Deviation
σ = 1/6 (highest score - lowest score)

RESULT AND DISCUSSION

Result

This research was conducted to determine the need for trainer learning media on sensor and transducer material at SMK Negeri 2 Makassar and SMK Negeri 10 Makassar in order to support the implementation of distance learning. Three indicators will be explored in the questionnaire that has been distributed to teachers and students. The scores obtained from the results of the expert validity test on the instrument items were analyzed using the Aiken V validity analysis. The analysis results were valid or invalid categories based on the Aiken V coefficient. Based on the Table 4, the value of the coefficient of validity (V) on a rating scale of 5 with four raters is 0.88 (Aiken, 1985). Therefore, all types of instruments in the three indicators are declared valid with an average score of 0.90. The average score of V Aiken can be seen in Figure 2.
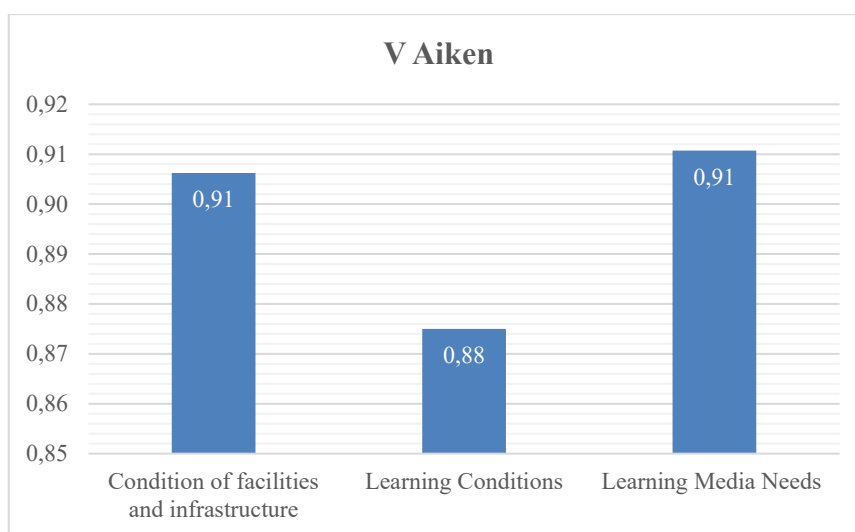
Figure 2. V Aiken's Average Score

Condition of facilities and infrastructure

The condition of facilities and infrastructure indicator consists of 6 question items: 1.) The challenges of distance learning; 2.) The availability of laboratory facilities; 3.) The availability of practical facilities in the form of trainers; 4.) The use of trainers in learning; 5.) The availability of internet networks in schools; and 6.) The availability of distance learning support equipment such as laptops and smartphones. The learning media requirement interval is determined by first determining the maximum data, minimum data, range, standard deviation, and theoretical mean. The data from the descriptive analysis can be seen in Table 5. Based on the data in Table 5, the interval category can be determined by substituting it into the predetermined criteria.

Table 5. The Results of the Descriptive Analysis of the Condition of Learning Facilities and Infrastructure

Number of Respondents	Mean (μ)	Std. deviation (σ)	Range	Minimum	Maximum
75	15	3	18	6	24

The data in Table 6 shows that respondents who have a questionnaire score of less than 12 state that the condition of facilities and infrastructure to support the implementation of distance learning is in a low category. Respondents who had a questionnaire score ranging from 12 to less than 18 stated that the condition of the facilities' implementation of distance learning was in the medium category. Meanwhile, respondents who have a questionnaire score equal to or greater than

18 state the condition of the facilities and infrastructure to support their implementation of distance learning is in the high category.

Table 6. Frequency Distribution of Facilities and Infrastructure Conditions

Formula	Interval	Category	Frequency	Percentage
$X < \{15 - 1,0(3)\}$	$X < 12$	Low	2	2,67%
$\{15 - 1,0(3)\} \leq X < \{15 + 1,0(3)\}$	$12 \leq X < 18$	Medium	25	33,33%
$\{15 + 1,0(3)\} \leq X$	$18 \leq X$	High	48	64%
	Total			100%
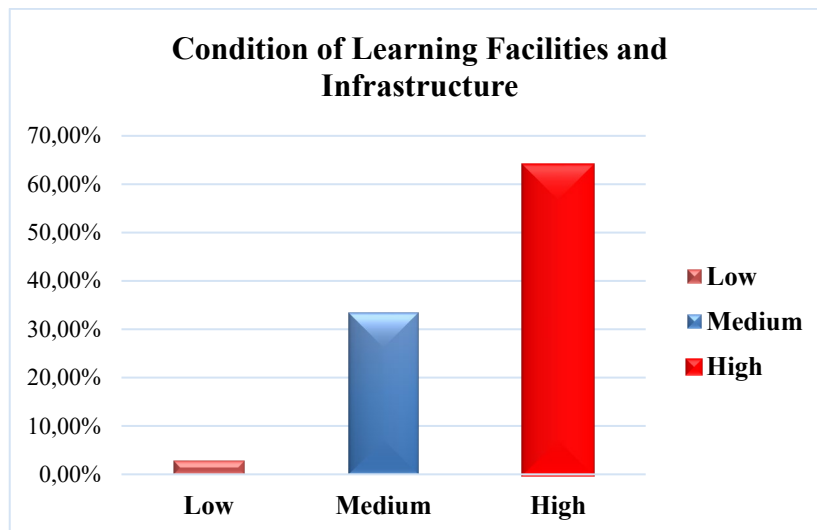
Figure 3. Graph of Frequency Distribution of Learning Facilities and Infrastructure Conditions

Based on the results of the analysis of the condition of facilities and infrastructure, it is known that as many as two respondents stated that the condition of the facilities and infrastructure used in the distance learning process was in the low category with a percentage of 2.67%. 25 respondents gave answers in the medium category with a percentage of 33.33%. A total of 48 respondents stated that facilities and infrastructure in schools were in the high category with a percentage of 64%. These results indicate that the condition of existing facilities and infrastructure in SMK Negeri 2 Makassar and SMK Negeri 10 Makassar is in the high category in supporting the implementation of distance learning.

Learning Conditions

The data obtained were processed using descriptive analysis. The results of descriptive analysis for the conditions of learning in SMK Negeri 2 Makassar and SMK Negeri 10 Makassar during the distance learning period can be seen in Table 7. The data from the descriptive analysis were then substituted into intervals to determine the criteria and frequency distribution of the respondent's answers. The results can be seen in Table 8.

Based on Table 8, it is known that two respondents from SMK Negeri 2 Makassar and SMK Negeri 10 Makassar or as much as 2% stated that the condition of learning during the new normal Covid-19 is in a low category. A total of 50 respondents, or 67%, stated that the learning conditions were in the medium category, and as many as 23 respondents or 31% were in the high category. These results indicate that the learning conditions at SMK Negeri 2 Makassar and SMK Negeri 10 Makassar are in the medium category with a percentage of 67%.

Table 7. The Results of the Descriptive Analysis of Learning Conditions

Number of Respondents	Mean (μ)	Std. deviation (σ)	Range	Minimum	Maksimum
75	17,5	3,5	17	11	28

Figure 4 shows that the learning conditions during a Pandemic Covid-19 at SMK Negeri 2 and SMK Negeri 10 Makassar Makassar based on data from respondents in the middle category that is equal to 67%.

Table 8. Frequency Distribution of Learning Conditions

Formula	Interval	Category	Frequency	Percentage
X < {17,5 − 1,0(3,5)}	X < 14	Low	2	2%
{17,5 − 1,0(3.5)} ≤ X < {17,5 + 1,0(3,5)}	14 ≤ X < 21	Medium	50	67%
{17,5 + 1,0(3,5)} ≤ X	21 ≤ X	High	23	31%
Total				100%
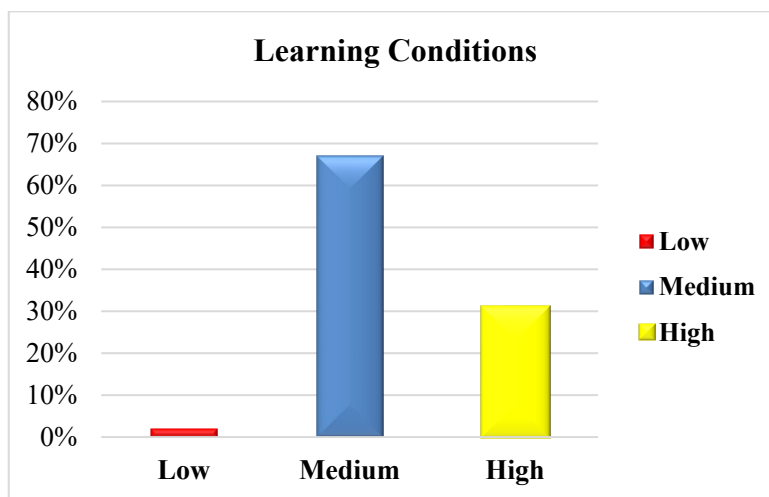
Figure 4. Graph of Frequency Distribution of Learning Conditions

Learning Media Needs to Support Distance Learning

The indicator for learning media needs in the form of an IoT-based sensor trainer consists of 7 question items related to the need for a media that is able to overcome obstacles in practical learning during the Covid-19 Pandemic, especially on sensor material. It is expected that students in distance learning, understanding, and knowledge of the characteristics of sensor components remain able to keep up with developments in the industrial world. Analysis of the needs of the media needs of 75 respondents consisting of teachers and students obtained the questionnaire data as shown in Table 9.

The descriptive data in Table 9 is then substituted into the interval table to determine each respondent's answer category. The frequency distribution results on the needs of learning media can be seen in Table 10. Based on the frequency distribution table for learning media needs, it can be seen that 21 respondents, or 28% of the total respondents, stated that the learning media needs were in the medium category, and 54 respondents, or 72%, stated that the need for IoT-based learning media on sensor practice materials to support distance learning far in the high category. This shows that both teachers and students need the level of media needed in practical learning during the Covid-19 pandemic.

Table 9. The Results of the Descriptive Analysis of Learning Media Needs

Number of Respondents	Mean (μ)	Std. deviation (σ)	Range	Minimum	Maksimum
75	17,5	3,5	14	14	28

Table 10. Frequency Distribution of Learning Media Needs

Formula	Interval	Category	Frequency	Percentage
$X < \{17{,}5 - 1{,}0(3{,}5)\}$	$X < 14$	Low	0	0%
$\{17{,}5 - 1{,}0(3.5)\} \leq X < \{17{,}5 + 1{,}0(3{,}5)\}$	$14 \leq X < 21$	Medium	21	28%
$\{17{,}5 + 1{,}0(3{,}5)\} \leq X$	$21 \leq X$	High	54	72%
Total				100%
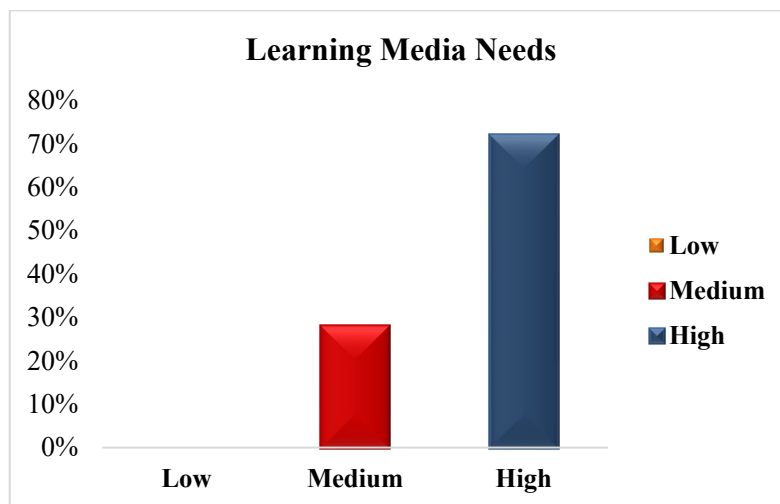
Figure 5. Graph of Frequency Distribution of Learning Media Needs

Discussion

The need for learning media during the Covid-19 Pandemic, which requires learning activities to be carried out at home, is very important. IoT technology is very helpful in the development of learning, especially in remote practicums that can be carried out boldly by utilizing the internet network. The same thing has been done by Kalashnikov et al. (2017) with the addition of cameras and communication devices by telemetry and IoT so that the implementation of remote practicum in the laboratory can be carried out. Another benefit of using IoT in remote practicum is that it can trigger students to actively participate in the process of creating their own IoT projects, increase student motivation and encourage them to learn and solve problems from the outside world (Guerra et al., 2017). The experiment conducted by Idhar et al. (2021) with the IoT trainer can also be carried out in the laboratory by implementing an application interface to give commands to devices connected to the internet in the trainer. Previous research examples will increase the importance of using IoT technology in laboratory practicums, especially during the Covid-19 Pandemic.

Based on the study results, it was found that the percentage of facilities and infrastructure supporting IoT-based distance learning was in the high category. One of the main facilities needed in distance learning is the availability of adequate internet and electronic or devices that support online learning (Rahayu & Haq, 2020). Online learning is the main solution for education in dealing with the Covid-19 Pandemic. Still, several conditions must be improved to carry out distance learning effectively, including networks, competencies, and student abilities (Alperi et al., 2021). Hermawan (2021) added the need for improvements in terms of comfort, infrastructure, and absorption of knowledge that can provide a holistic experience to make it easier for students to learn and gain knowledge.

In addition to the availability of facilities for distance learning, teachers and students must have competence in the use of technology. Based on the research results, Darabi et al. (2006) found significant characteristics of distance teaching, namely interaction with learners and the need for technology and logistics. At the same time, Thach and Murphy (1995) revealed several competencies that describe the importance of technical and communication skills in distance learning, such as interpersonal communication, teamwork, and basic knowledge of technology.

The main requirement for developing IoT-based media is mastery of technology. Based on the IoT architecture, a physical layer is a number of sensors that detect and collect the surrounding

information environment Sethi and Sarangi (2017), so it is important to know the characteristics of each sensor. IoT supports a number of sensors connected to each other via the internet. The development of the media trainer in this study adopted several types of sensors connected to a microcontroller that supports the internet network via a wifi connection. So that the monitoring process of reading sensor values can be done through applications on Android or web browsers, IoT technology will turn real objects into intelligent virtual objects (Saini et al., 2020).

CONCLUSION

Based on preliminary research results on the need for IoT-based learning media in censorship practices at SMK Negeri 2 Makassar and SMK Negeri 10 Makassar to support the implementation of distance learning during the Covid-19 Pandemic, it can be concluded as follows: 1.) The results of the analysis of the availability of facilities and infrastructure for media development IoT-based learning to support distance learning during the Covid-19 Pandemic at SMK Negeri 2 Makassar and SMK Negeri 10 Makassar is in the high category with a percentage of 64%; 2.) Learning conditions, especially in practicum subjects during the Covid-19 Pandemic, based on the score of the questionnaire results were in the low category with a percentage level of 67%; and 3.) The results of the analysis of the need for IoT-based sensor trainer learning media to support distance learning are very much needed in learning. This is shown from the results of the analysis of respondents' answers who are in the high category, with a percentage reaching 72% of the total respondents' answers. Based on the results obtained, the potential for developing IoT-based sensor trainer learning media is very large, especially in sensor practicum subjects. This is supported by an adequate level of facilities and infrastructure from each school that supports the use of Internet of Things (IoT) technology. The results of this study can also be used as a basis for teachers in developing media trainers in other IoT-based practical subjects.

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Implementation of the learning process: Efforts to improve the quality of vocational education graduates

Ernawati Ernawati
Universitas Negeri Padang, Indonesia.
* Corresponding Author. Email: ernawati@fpp.unp.ac.id

ARTICLE INFO

ABSTRACT

The quality of education is determined by a good management process, including the evaluation process of vocational education graduates. Furthermore, the purpose of this study is to evaluate the implementation of the learning process in vocational education programs, which includes an implementation of the teaching and learning process, the implementation of industrial training, lecturer skills in industrial supervision training, and encouraging entrepreneurship by lecturers to students. This study used a mixed-method design, and data were collected by questionnaires and depth-interview questions. The sample size is 218 graduates successfully collected using the total sampling technique. Data analysis used quantitative descriptive statistics (SPSS 23.0) and qualitative descriptive. Qualitative data support the quantitative results through interviews with five research informants. The results showed that graduates agreed that the teaching and learning process, the implementation of industrial training, lecturer skills in industrial supervision training, encouraging entrepreneurship by lecturers to students had gone well. In conclusion, the implementation of the vocational education program has been following the program's objectives. However, the results of the study showed that there are still weaknesses in the guidance from lecturers to students in the practice of opening a business and updating developments in related industries. Based on the results of this study, recommendations are made to focus on improving the process of implementing vocational education programs.

INTRODUCTION

Vocational education aims to generate graduates who are professional, broad-minded, skilled, and have entrepreneurial abilities. The education also aims to prepare graduates to become professionals in certain fields, have the ability to practice, develop knowledge and skills, and be able to improve people's living standards by providing employment opportunities (Eryanto et al., 2019; Imansari, 2017). Previous studies stated that the problems that arise in vocational education graduates are that the skills and competencies of graduates are still not satisfying the need of the industry and the number of graduates who become entrepreneurs after graduating from the diploma program still tends to be low (Dahalan et al., 2020; Ernawati et al., 2019; Eryanto et al., 2019; Imansari, 2017; Purwana et al., 2015; Zhao et al., 2018).

Ernawati et al., (2019), Eryanto et al. (2019), and Zhao et al. (2018) argued that motivation and desire for entrepreneurship were not the main factors causing the small number of graduates to

become entrepreneurs. Research that has been carried out on entrepreneurial perceptions and motivations proves that student motivation was categorized as high in entrepreneurship, but the problem was the low number of diploma program graduates who become entrepreneurs. This indicates that the purpose of vocational education to create graduates who have entrepreneurial careers has not been achieved optimally. The problem of achieving educational goals is certainly rooted in the poor implementation of the education system (Areli et al., 2020; Okolie & Ogbaekirigwe, 2014; Yuan et al., 2020; Zhao et al., 2018).

One of the efforts in finding solutions to these problems is through evaluating the implementation of vocational education programs to find out the problems and inequalities that occur in each component of the program that is a sub-system of this study program. Evaluation can provide recommendations and decisions on programs implemented to achieve program objectives (Haron et al., 2019). Efforts that policymakers can make to determine the skills of vocational education graduates require detailed and systematic research to ensure that program implementation continues to be guaranteed and the reliability of vocational education remains as an institution that is in line with the needs of the community and policymakers. However, there has been no systematic and observational study to evaluate this diploma program. Meanwhile, improving an educational program requires detailed and systematic research to ascertain the strengths and weaknesses of the program as well as the quality of vocational education.

Many studies are conducted to evaluate curriculum (Areli et al., 2020; Okolie & Ogbaekirigwe, 2014; Sandroto et al., 2018). However, it has not explored in more detail the process aspects regarding the implementation of vocational education programs such as the Context, Input, Process, Product (CIPP) Evaluation Model by Stufflebeam (1971). In fact, many studies also prove that the Process aspect of CIPP is very important in growing and developing graduate competencies (Atmacasoy et al., 2018; Umam & Saripah, 2018). Based on these problems, this study aims to evaluate the implementation of vocational education programs, especially the learning process aspect, which consists of the teaching and learning process, the implementation of industrial training, lecturer skills in industrial supervision training, and encouraging entrepreneurship by lecturers to students.

RESEARCH METHOD

This study used a mixed-method design, and data were collected by questionnaires and depth-interview questions. This design was very suitable to be used by researchers to explain research findings that agree or disagree even research findings that are significant or not significant (Creswell & Clark, 2011). The population of the study was 241 graduates of D3 Fashion Design Department of Family Welfare, Faculty of Tourism and Hospitality, Universitas Negeri Padang. The sampling technique used is total sampling. However, only 218 respondents successfully filled out the questionnaire (response rate = 90.46%). For the purposes of administering qualitative data, the researcher conducted individual interviews, and 5 participants agreed to be interviewed. In the interview method, researchers selected individuals who can help researchers understand key phenomena (Creswell, 2013). Interviews were recorded to facilitate interview transcripts provided. The quantitative data analysis technique used was descriptive analysis with a categorization method based on the average score assessment. The qualitative data analysis technique was carried out by reducing data, presenting data, and drawing conclusions.

RESULT AND DISCUSSION

Result

The descriptive statistic on the quantitative analysis was undertaken looking at the central tendency or the mean score and standard deviation on every item in each variable. The main purpose of this analysis is to understand the view of the respondents toward each item used. In other words, descriptive statistics enables the researcher to present the data in a more meaningful way, which allows a simpler interpretation of the data. It should be reaffirmed that this research focuses on the

learning process to examine the variables of the implementation of the teaching and learning process, the implementation of industrial training, lecturer skills in industrial supervision training, and encouraging entrepreneurship by lecturers to students. Evaluation of the implementation of this aspect in education is carried out to improve the quality of vocational education graduates. The results and discussion of these four variables can be explained as follows.

Teaching and Learning Process

Table 1 reports the mean score rated by the respondent on items dealing with the teaching and learning process. The magnitude of the mean scores ranging from 3.61 to 4.07 out of five points on the Likert scale indicates that respondents agree on the items in this section.

Table 1. Results of Mean Score and Standard Deviation of the Implementation of the Teaching and Learning Process

No.	Items	M	SD
1.	The entrepreneurial learning offered prepares you to become an entrepreneur	3.92	.742
2.	The implementation of learning follows the course synopsis	3.61	.819
3.	Entrepreneurial learning has clear rules	3.76	.866
4.	Computers are provided to make it easier for lecturers to carry out entrepreneurial learning	3.88	.725
5.	Lecturers present appropriate material and can open students' horizons to become entrepreneurs	3.84	.727
6.	Teaching and learning often use pictorial media	3.99	.643
7.	Lecturers use teaching and learning materials obtained from various sources	4.00	.629
8.	Lecturers often associate learning with current or recent entrepreneurial issues	4.07	.657
9.	Learning activities are guided by the curriculum provided by the faculty	3.99	.727
10.	Lecturers guide students while conducting the entrepreneurial practice in the field of fashion studies	3.77	.831
11.	Lecturers always arouse students' interest in opening a business in the field of fashion/clothing studies	3.87	.826
	Overall	3.88	.494

Note:
SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SDs = Strogly Disagree; SD = Standard Deviation
N = 218

Respondents ever felt that lecturers often associate learning with current or recent entrepreneurial issues (M=4.07, Item 8), lecturers use teaching and learning materials obtained from various sources (M=4.00, Item 7), teaching and learning often use pictorial media (M=3.99, Item 6), and learning activities are guided by the curriculum provided by the faculty (M=3.99, Item 9). Similarly, respondents agreed that the entrepreneurial learning offered prepares you to become an entrepreneur (M=3.92, Item 1), computers are provided to make it easier for lecturers to carry out entrepreneurial learning (M=3.88, Item 4), lecturers always arouse students' interest in opening a business in the field of fashion/clothing studies (M=3.87, Item 11) and lecturers present appropriate material and can open students' horizons to become entrepreneurs (M=3.84, Item 5).

Further agreements were given to the three items whereby lecturers guide students while conducting the entrepreneurial practice in the field of fashion studies (M=3.77, Item 10), entrepreneurial learning has clear rules (M=3.76, Item 3), and the implementation of learning follows the course synopsis (M=3.61, Item 2). Overall, the average value of the process aspects of the teaching and learning process variables obtained an average score of 3.88, which explained that overall, respondents agreed on the items in the process of implementing the teaching and learning process. What could be said from the overall result is that aspects of the learning process for the implementation of the teaching and learning process have been going well.

Based on data reduction and display data, the results obtained from qualitative data through interviews concluded that all interviewed graduates admitted that the graduates agreed with the implementation of the teaching and learning process taken during the D3 fashion design program at Family Welfare, Faculty of Tourism and Hospitality, Universitas Negeri Padang. According to A1,

A2, A3, A4, and A5, the implementation of the teaching and learning process can increase students' interest in entrepreneurship. They also suggested that the implementation of the teaching and learning process needs to be improved both the material and the learning media. What is no less important is that during the practice of entrepreneurship, it is still necessary to improve the quality of learning so that it really opens students' horizons to become entrepreneurs in the fashion field.

Implementation of Industrial Training

This section analysis looks at the perception of respondents toward the implementation of industrial training. The overall mean scores ranging from 3.72 to 4.05 in Table 2 show that the graduates D3 Fashion Design program at the Faculty of Tourism and Hospitality, Universitas Negeri Padang agreed with all items probed in this section.

Table 2. Results of Mean Score and Standard Deviation of the Implementation of the Industrial Training

No.	Items	M	SD
1.	Industrial training improved my mastery of entrepreneurial knowledge	3.72	.597
2.	Gain a lot of knowledge related to the production process easily	3.94	.722
3.	Able to learn effective ways to handle customer complaints	3.91	.787
4.	Industrial training is a learning method that helps me in real situations	4.05	.780
5.	The implementation of industrial training made me proficient on how to be an entrepreneur	3.95	.726
6.	Able to learn to identify business opportunities during industrial training	3.90	.740
7.	Get a lot of information needed by the field of study	3.95	.720
8.	Get a lot of information about the type of machine/technology that is appropriate to produce clothing products	3.90	.715
9.	Get a lot of information about entrepreneurial opportunities in various fields of business	3.72	.771
10.	Able to learn new techniques that can complement existing skills	3.73	.821
11.	Able to apply the knowledge possessed to the types of training implemented in the industry	3.73	.826
12.	Industrial training adds to the consolidation of knowledge and skills	3.74	.889
13.	Industry training is useful for synchronizing knowledge with skills	3.90	.737
14.	More confident to work alone after undergoing industrial training	3.80	.737
15.	Able to improve skills learned during the implementation of industrial training	3.90	.727
16.	Activities during industrial training provide many new experiences	3.94	.696
17.	Industrial training provides many new experiences	4.01	.773
18.	Industrial training has eliminated the negative nature of the self	3.99	.788
	Overall	3.88	.412

Note:
SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SDs = Strogly Disagree; SD = Standard Deviation N = 218

Respondents agreed that industrial training is a learning method that helps me in real situations (M=4.05, Item 4), industrial training provides many new experiences (M=4.01, Item 17), industrial training has eliminated the negative nature in the self (M=3.99, Item 18), the implementation of industrial training made me proficient on how to be an entrepreneur (M=3.95, Item 5) and get a lot of information needed by the field of study (M=3.95, Item 7). With such perceptions, they admitted that gain a lot of knowledge related to the production process easily (M=3.94, Item 2), activities during industrial training provide many new experiences (M=3.94, Item 16), able to learn effective ways to handle customer complaints (M=3.91, Item 3), able to learn to identify business opportunities during industrial training (M=3.90, Item 6) and get a lot of information about the type of machine or technology that is appropriate to produce clothing products (M=3.90, Item 8).

Respondents seemed to agree that industry training is useful for synchronizing knowledge with skills (M=3.90, Item 13), able to improve skills learned during the implementation of industrial training (M=3.90, Item 15), more confident to work alone after undergoing industrial training (M=3.80, Item 14), industrial training adds to the consolidation of knowledge and skills (M=3.74, Item 12) and able to learn new techniques that can complement existing skills (M=3.73, Item 10). Further agreements were given to the three items whereby they agreed that able to apply the knowledge possessed to the types of training implemented in the industry (M=3.73, Item 11), industrial training improved my mastery of entrepreneurial knowledge (M=3.72, Item 1), and get a lot of information about entrepreneurial opportunities in various fields of business (M=3.72, Item 9). Overall, the average value of the process aspects of the implementation of the industrial training variables obtained an average score of 3.88, which explained that overall, respondents agreed on the items in the process of implementing the industrial training. What could be said from the overall result is that aspects of the learning process for the implementation of industrial training have also been going well.

Based on data reduction and display data, the results obtained from qualitative data through interviews concluded that all the interviewed graduates admitted that they agreed with the implementation of industrial training during the D3 Fashion Design Department of Family Welfare, Faculty of Tourism and Hospitality, Universitas Negeri Padang. A1, A2, A3, A4, and A5 conveyed that industrial training can increase students' interest in entrepreneurship. They also suggested that the implementation of industrial training needs to be maintained because, in the implementation of industrial training, a lot of information is needed to become an entrepreneur.

Lecturer Skills in Supervision Industrial Training

Table 3 displays the overall mean score rated by the respondents dealing with lecturer skills in industrial supervision training. The overall mean scores in Table 3 show that the graduates D3 Fashion Design program at JKK FPP UNP agreed with all items probed in this section. This is evident through the magnitude of the mean score, which ranges from 3.70 to 4.05 out of the five points of the Likert scale. Obviously, the majority of the respondents in this study agreed that lecturers could encourage industry leaders to provide motivation to carry out industrial training (M=4.05, Item 13), lecturers experience with industry helps identify entrepreneurial opportunities that are relevant to the knowledge being studied (M=3.82, Item 9), lecturers always find solutions to problems faced in carrying out industrial training (M=3.78, Item 6), lecturers always discuss the procedures for industrial training activities (M=3.78, Item 7) and lecturers always provide support in identifying activities that can be carried out in the industrial field (M=3.77, Item 8).

Similarly, they agreed that lecturers could identify the problems encountered while carrying out industrial training (M=3.75, Item 2), lecturers show positive thoughts while carrying out industrial training (M=3.75, Item 4), lecturers and industry leaders always provide examples of types of businesses that are following the field of fashion studies (M=3.75, Item 11), lecturer's guide carrying out industrial training on an ongoing basis (M=3.74, Item 5) and lecturers work well with industry leaders (M=3.73, Item 10). They also agreed that lecturers always provide moral support in carrying out industrial training (M=3.72, Item 3), lecturers collaborate with industry leaders in supervision when carrying out industrial training (M=3.71, Item 12), and lecturers guide cooperatively during industrial training (M=3.70, Item 1).

Overall, the average value of the process aspects of the implementation of the lecturer skills in supervision industrial training variables obtained an average score of 3.77, which explained that overall respondents agreed on the items in the process of implementing the lecturer skills in industrial supervision training. This result manifestly shows that aspects of the learning process for implementing the lecturer skills in industrial supervision training have also been going well.

Table 3. Results of Mean Score and Standard Deviation of the Implementation of the Lecturer Skills in Supervision Industrial Training

No.	Items	M	SD
1.	Lecturers guide cooperatively during industrial training	3.70	.628
2.	Lecturers can identify the problems encountered while carrying out industrial training	3.75	.743
3.	Lecturers always provide moral support in carrying out industrial training	3.72	.766
4.	Lecturers show positive thoughts while carrying out industrial training	3.75	.685
5.	Lecturer's guide carrying out industrial training on an ongoing basis	3.74	.740
6.	Lecturers always find solutions to problems faced in carrying out industrial training	3.78	.788
7.	Lecturers always discuss the procedures for industrial training activities	3.78	.780
8.	Lecturers always provide support in identifying activities that can be carried out in the industrial field	3.77	.692
9.	Lecturers experience with industry helps identify entrepreneurial opportunities that are relevant to the knowledge being studied	3.82	.747
10.	Lecturers work well with industry leaders	3.73	.786
11.	Lecturers and industry leaders always provide examples of types of businesses that are in accordance with the field of fashion studies	3.75	.750
12.	Lecturers collaborate with industry leaders in supervision when carrying out industrial training	3.71	.725
13.	Lecturers can encourage industry leaders to provide motivation to carry out industrial training	4.05	.680
	Overall	3.77	0.496

Note:
SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SDs = Strogly Disagree; SD = Standard Deviation N = 218

Based on data reduction and display data, the results obtained from qualitative data through interviews concluded that some of the graduates interviewed admitted that industrial skills development was carried out by lecturers while attending lectures from the D3 Fashion Design Department of Family Welfare, Faculty of Tourism, and Hospitality, Universitas Negeri Padang. According to A1, A2, A3, A4, and A5 conveyed that the development of industrial supervision skills by lecturers can increase student interest in conducting industrial development. However, some of the graduates interviewed admitted that the industrial supervision skills provided by the lecturers during the D3 Fashion Design education program have not produced good and maximum results. All students need guidance from lecturers because the guidance of lecturers will determine the success of students in carrying out industrial training. In contradiction with the quantitative result, it was found that there are still lecturers who do not provide guidance while students carry out industrial training.

Encouraging Entrepreneurship by Lecturers to Students

Table 4 displays the overall mean score rated by the respondents regarding encouraging entrepreneurship by lecturers to students. Out of eleven items posed, four items were rated as neutral, and seven items received the level of agreement by the respondents. This is evident through the magnitude of the mean score, which ranges from 2.78 to 3.80 out of the five points of the Likert scale. As such, respondents neutral that lecturers always provide feedback regarding achievements in implementing entrepreneurial practices (M=3.50, Item 5), lecturers always inform the latest developments in the fashion business (M=3.10, Item 11), lecturers always lend entrepreneurship books to discuss (M=2.86, Item 1) and lecturers guide students when carrying out teaching and learning activities of business practice (M=2.78, Item 9).

Despite these, the respondents agreed that lecturers always increase interaction when carrying out entrepreneurial practices (M=3.80, Item 6), students are given the opportunity to discuss

ideas and experiences with lecturers (M=3.75, Item 7), lecturers help to identify and find solutions if they find problems in learning (M=3.71, Item 2) and lecturers always talk to the group how to carry out entrepreneurial practices learning (M=3.70, Item 4). The respondents also agreed that together, the lecturers teach how to run an effective business (M=3.69, Item 3), lecturers always give advice related to entrepreneurial work (M=3.66, Item 8), and lecturers are open to criticism in learning (M=3.67, Item 10).

Overall, the average value of the process aspects of the implementation of the encouraging entrepreneurship by lecturers to students' variables obtained an average score of 3.50, which explained that overall respondents were neutral on the items in the process of implementing the encouraging entrepreneurship by lecturers to students. This result manifestly shows that aspects of the learning process for implementing the lecturer skills in industrial supervision training have been slightly going well.

Table 4. Results of Mean Score and Standard Deviation of the Implementation of the Encouraging Entrepreneurship by Lecturers to Students

No.	Items	M	SD
1.	Lecturers always lend entrepreneurship books to discuss	2.86	.836
2.	Lecturers help to identify and find solutions if they find problems in learning	3.71	.763
3.	Together, the lecturers teach how to run an effective business	3.69	.692
4.	Lecturers always talk to the group about how to carry out entrepreneurial practices	3.70	.702
5.	Lecturers always provide feedback regarding achievements in implementing entrepreneurial practices	3.50	.680
6.	Lecturers always increase interaction when carrying out entrepreneurial practices	3.80	.793
7.	Students are given the opportunity to discuss ideas and experiences with lecturers	3.75	.809
8.	Lecturers always give advice related to entrepreneurial work	3.66	.706
9.	Lecturers guide students when carrying out teaching and learning activities of business practice	2.78	.714
10.	Lecturers are open to criticism in learning	3.67	.772
11.	Lecturers always inform the latest developments in the fashion business	3.10	.742
	Overall	3.50	.449

Note:
SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SDs = Strogly Disagree; SD = Standard Deviation N = 218

Based on data reduction and display data, the results obtained from qualitative data through interviews concluded that some of the graduates interviewed agreed that encouragement of entrepreneurship by the lecturers to their students in achieving the program goals carried out during the D3 Fashion Design Department of Family Welfare, Faculty of Tourism, and Hospitality, Universitas Negeri Padang. According to A1, A2, and A5, lecturers always encourage their students to achieve program goals. Lecturers also act as role models for their students.

Discussion

Teaching and Learning Process

Based on the result, respondents agreed on the items in the process of implementing the teaching and learning process. This means that the learning process has been carried out well. This result is strengthened by the results obtained from interviews in which graduates also agreed on the items in the process of implementing the teaching and learning process. From the overall results obtained that the teaching and learning process has been carried out well but needs improvement on material and the learning media teaching and learning process to increase students' interest in entrepreneurship.

A good teaching and learning process will impact students' interest in pursuing a career as an entrepreneur in the fashion business. This result is well corroborated with Lang and Liu (2019) that good entrepreneurial education planning impacts graduates' interest in entrepreneurship. This is supported by Hidayah (2020) that using the latest project-based learning model in the teaching and learning process improves the readiness of graduates in entrepreneurship.

Implementation of Industrial Training

Based on the result, respondents agreed on the items in the process of implementing the industrial training. This means that the industrial training program has been carried out well. This result is strengthened by the results obtained from interviews in which graduates also agreed on the items in implementing the industrial training. From the overall results obtained that the industrial training program has been carried out well. The implementation of industrial training needs to be maintained because a lot of information is needed to become an entrepreneur in the implementation of industrial training. Industrial training has a segment of education and training, between education and training, which are interrelated. The training aims to improve skills and learn to improve and develop attitudes, values, and experiences to be more productive. This study aligns with Mawonedzo et al. (2021) that the experiential learning gained from industrial attachment is necessary for students to become future entrepreneurs in fashion design.

Lecturer Skills in Supervision Industrial Training

Based on the result, respondents agreed on the items in the process of implementing the lecturer skills in industrial supervision training. This means that lecturers have applied their skills in supervision students during the implementation of industrial training well. This result is slightly contradicted by the results obtained from interviews in which graduates suggested that students need guidance from lecturers because the guidance of lecturers will determine the success of students in carrying out industrial training. The result also found that there are still lecturers who do not provide guidance while students carry out industrial training. Even though the existence of good guidance by lecturers in the implementation of industrial training has an impact on the achievement of students' abilities in entrepreneurship. This result is contradicted with Donkor et al. (2009) that lecturer skills in guidance or supervision during practical in the industry is very necessary to ensure the achievement of competencies obtained by students.

Encouraging Entrepreneurship by Lecturers to Students

Based on the result, overall respondents were neutral on the items in the process of implementing the encouraging entrepreneurship by lecturers to students. This result showed that implementing the lecturer skills in industrial supervision training has been slightly going well. Based on the interview result, the graduates agreed that encouragement of entrepreneurship by the lecturers to their students in achieving the program goals which were carried out during the D3 Fashion Design Department of Family Welfare, Faculty of Tourism, and Hospitality, Universitas Negeri Padang.

From the results of this study, graduates have not felt strongly encouraged entrepreneurship by lecturers to students. It is necessary to increase lecturers' understanding in providing entrepreneurial encouragement to students during student education programs. This is in line with the position of lecturers as educators who can transfer knowledge as well as become models in learning. Committed lecturers can provide encouragement and guidance related to entrepreneurship courses and student success. Entrepreneurship education aims to develop the potential of students to be more creative and innovative, educate someone to be ready to identify opportunities and seize opportunities in their environment, translate ideas into reality or economic activities, and be able to survive and be sensitive to changes. The lack of a harmonious relationship between lecturers and students in carrying out specific learning causes problems for students, making students less interested in entrepreneurship. In addition, lecturers must also provide clear explanations regarding the tasks assigned to their students and encourage a harmonious relationship.

CONCLUSION

Based on the results of quantitative analysis that the average graduate agreed that the learning process in D3 Fashion Design Department of Family Welfare, Faculty of Tourism, and Hospitality, Universitas Negeri Padang has been carried out well, this was also confirmed through interviews for qualitative analysis which explained that the informants had experienced a good learning process while being a student in the program. Evaluation of the implementation of the learning process, which is viewed from teaching and learning process, the implementation of industrial training, lecturer skills in industrial supervision training, and encouraging entrepreneurship by lecturers to students it also has been implemented well, but improvements need to be made for each of the variables involved.

The improvements made such as the use of the latest teaching and learning processes, optimizing the use of industrial training, equalizing the perception of lecturers in providing assistance to students during industrial training, and increasing the entrepreneurial encouragement by lecturers to students through programs carried out during education program will have an impact on achievement competence of graduates in entrepreneurship in the fashion sector and also improve the quality of graduates as vocational study programs. This result is in line with Iwu et al. (2021) that the perceived competence of lecturers showed a moderate and positive correlation with the entrepreneurial intentions of students. Encouragement from lecturers in the learning process can kindle the entrepreneurial intention flame in students..

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Transferable skills perception analysis of vocational high school teachers on-in-on-in dual skills program

Purnomo Purnomo * ⓘ**, Marsono Marsono** ⓘ**, Tuwoso Tuwoso** ⓘ
Universias Negeri Malang, Indonesia.
* Corresponding Author. Email: purnomo@um.ac.id

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ABSTRACT

The Ministry of Education and Culture in 2016 made one of the breakthrough programs in an effort to organize and fulfill productive teachers in Vocational High Schools (VHS), namely through the Dual Skills Program (DSK). The DSK is implemented to support the improvement of vocational education as well as education and job skills training. Meanwhile, DSK participating teachers must have new competencies that can be used to teach productive subjects in certain areas of expertise. Increasing the competence of DSK participants needs to take into account the development of transferable skills obtained after conducting training or in the process of implementing DSK. The aims of this study are to 1.) Determine the types of transferable skills that DSK participant teachers need to possess; and 2.) Analyze and describe the transferable skills of teachers of vocational high school on-in-on-in DSK in Malang Regency. This study uses a quantitative approach. The samples used were all vocational high school teachers who took part in the on-in-on-in DSK in Malang Regency, while the respondent's data collection used a question-naire. The results showed that the types of transferable skills consist of communication skills, planning skills, interpersonal skills, work attitude skills, organizational skills, financial management skills, and critical thinking skills. The transferable skills of teachers of vocational high school on-in-on-in DSK in Malang Regency were in a good category.

INTRODUCTION

The Ministry of Education and Culture in 2016 made one of the breakthrough programs in an effort to organize and fulfill productive teachers in Vocational High Schools (VHS) through the Dual Skills Program (DSK). The DSK is implemented to support the improvement of vocational education as well as education and job skills training. Mutiara (2018) stated that Indonesia currently needs approximately 91 thousand vocational teachers. Furthermore, Mutiara (2018) explained that DSK participants had to go through 12 months with four stages of ON (self-study at home school) and IN (study in industry and the Center for Development and Empowerment of Education and Education Personnel/P4TK) to get a certificate of expertise as a productive teacher. So that at the end of the DSK implementation, participants can get a double certificate.

In Presidental Instruction No. 2 of 2015, the Government of Indonesia, through the Directorate General of GTK, organized a skill certification program and educator certification for VHS teachers called the Dual Skills Program (DSK). DSK is a program to increase teaching authority for teachers who teach normative and adaptive subjects to become productive subject teachers in

vocational high schools in certain skill competencies. Normative and adaptive teachers are expected to be able to meet the shortage of productive teachers in vocational schools through training to add adaptive to productive teaching authority. Normative and adaptive teachers are provided with training and education through an on-in-on-in pattern and end with expertise certification and educator certification. The DSK will produce qualified VHS teachers and can meet the required number of teachers.

Meanwhile, DSK participating teachers must have new competencies that can be used to teach productive subjects in certain areas of expertise. Teaching some life skills to students, especially in vocational high schools, is something that is very important, considering the purpose of VHS is to prepare students to become reliable workers. Increasing the competence of DSK participants needs to take into account the development of transferable skills obtained after conducting training or in the process of implementing DSK. Transferable skills play a very important role in a person's ability to adapt to new social conditions, including teachers who take part in DSK. By knowing in advance, the extent of transferable skills possessed by DSK participating teachers, the final outcome of the training can be well predicted. For example, suppose a trainee has a weakness in one type of transferable skill, then in the training process. In that case, this weakness will be improved, and vice versa. If other types of transferable skills are deemed to have been completed well, it must be maintained and improved. This research, it will be very helpful in preparing and predicting the readiness of DSK participants related to several transferable skills that must be developed. It is hoped that after the program is completed, DSK participants will not only be equipped with productive competencies but also become excellent teachers by possessing capable transferable skills to be taught to every vocational student, as well as equipping them to face the demand for workforce skills that are adaptable to the times.

Transferable skills, better known as life skills, are very important for now and in the future. Moreover, in vocational high schools whose aim is to prepare graduates to be ready to enter the world of work, transferable skills are very important for them because companies will prefer graduates who have transferable skills. Pukelis and Pileicikiene (2006), Asiabaka (2008), and Alimah and Marianti (2016) argue that in the 21st century, transferable skills are needed by someone, especially with the rapid development of technology. Furthermore, several important components in transferable skills are: 1.) Self-management; 2.) Planning and organizing; 3.) Communication; 4.) Working with others; 5.) Problem solving; 6.) Initiative; 7.) Enterprise; 8.) Applying numeracy; 9.) Technology skills; and 10.) Learning. These skills are very important, and every student must have them because they are applicable and can be applied in all vocational education and in every social situation in their environment. In line with this, Arensdorf (2009), Inti et al. (2018), and Mitchell (2008) stated that essential skills, when combined with knowledge and a good attitude, will prepare the basis for lifelong learning and readiness to compete in a challenging world of work. Some of these skills include: 1.) Commu-nication skills; 2.) Numeracy skills; 3.) ICT skills; 4.) Thinking and problem-solving skills; 5.) self-management and competitive skills; 6.) Study and work skills; 7.) Social skills; 8.) Physical skills; and 9.) Aesthetic skills.

Meanwhile, Paryono et al. (2014) stated that the concept of categorizing transferable skills had become an issue of vocational education in Indonesia for the past few years. Several concepts of transferable skills have been tested in the formal education system in Indonesia, but the results have not shown any development in the level of skills expected by DUDI as a graduate user. Almost all education systems around the world focus on preparing the younger generation as nation builders who must have skills in life skills or generic skills, necessary skills, competency skills, psychosocial competence, employability skills, and transferable skills (Sharma, 2003; Yassin et al., 2008). Transferable skills are skills that are indispensable in all fields of work where a person can work flexibly and adaptable (Bennett, 2002).

The Ministry of Education and Culture of the Republic of Indonsia (2005) explains that the Dual Skills Program (DSK) transfers the function of teachers from certain types of teachers to other types of teachers, for example, from mathematics teachers to biology teachers Indonesian language to English teachers. Teachers can be transferred to the education unit if the number of teachers is excessive and it is impossible to transfer them. The dual expertise program can be carried out on teachers, both those who already have an educator certificate and those who do not. The dual

expertise program for teachers can be carried out in an educational unit or followed by a transfer of duties/mutations between educational units, between education levels, between types of education, between districts/cities, between provinces, and transfer of functions to/from structural positions. double, the teacher must follow: 1.) Certification in accordance with the new skills/subjects; 2.) Competency improvement training for new skills/subjects; or 3.) Appropriate academic qualification eye new lessons taught.

Furthermore, the types of teachers according to the 2006 Curriculum that is no longer needed in the 2013 Curriculum must be equipped with other skills or converted or given the authority to teach other subjects in the 2013 Curriculum. Study forget S-1/D-IV qualification, while those who have not been certified must follow certification according to provisions. Teachers are interested in converting competence skills to register with the transfer of functions implemented program. After registering, the teacher will participate in IN-ON-IN training to master the competency skills that will be used taught. In the first ON process, the teacher continues to teach adaptively at the original school. However, the teacher must learn independently guided by the competence of productive skills with the national instructor or appointed supervisor. Study time spends 300 hours of lessons and completes three modules. Places of learning will be designed to be in schools that have been standardized to hold these activities (The Ministry of Education and Culture of the Republic of Indonsia, 2005).

Teachers will attend focused and intensive training in theory and practice in the first IN process. Teachers attend training with guided self-learning reflection methods by completing 400 hours of lessons in 4 modules. The learning materials provided are professional, pedagogic, entrepreneurship material, and also practices at DUDI. In the second ON process, the teacher will practice teaching the results of the material in the first IN at the target school. Even though they teach, teachers continue to study independently and are guided by 200 hours of study time and complete two teacher modules.

In the second IN process, the teacher carries out training on sharpening productive material and guided self-learning reflection by completing one learning module with 100 lesson hours. Places of learning can be in P4TK, referral vocational schools, LPMP, agency, and training. In addition, teachers also carry out practice at DUDI. After completion, the teacher will conduct teacher certification through the PLPG pattern (theory and practice of learning for nine days). The place in the tertiary institution that organizes teacher certification is determined by the Minister and has a similar study program. The certified competencies are professional, pedagogical, personality, and social competencies. The appointed instructors are lecturers who the Ministry of Research has appointed, Technology and Higher Education and have an instructor register number. Teachers will also take performance tests and follow UKG (The Ministry of Education and Culture of the Republic of Indonsia, 2005).

The learning methods applied to the first and second IN are: 1.) Applying an adult education approach (andragogy) that is in accordance with the practical needs and self-development of participants, is interactive between participants and facilitators as well as between participants and participants, and learning takes place in a relaxed learning atmosphere, dynamic, and fun; 2.) Learning in education and training uses scientific (scientific) thinking with strategies or learning models used including discovery learning, inquiry learning, problem based learning, project-based learning, and design-based learning; and 3.) Number of participants per group for professional competence between 10 - 20 people or according to the character of each skill package.

RESEARCH METHOD

This research is descriptive research because the data generated is in the form of exposure and percentage, which aims to describe perceptions DSK participant teachers are related to the transferable skills they have so far. While the research approach used in this study uses a quantitative research approach to describe the results of the study, determine the effect of independent variables on the dependent variable, and the tendency of the level of the variables in the study. The population in this study were all teachers who participated in the dual skills program, with a sample of all

vocational high school teachers who participated in the on-in-on-in dual skills program in Malang Regency.

The instrument for this research consisted of questions that related to the various transferable skills they have so far. As for indicators used, include 1.) Communication skills, 2.) Research/ planning/investigation; 3.) Human relations/interpersonal; 4.) Work survival/attitude; 5.) Organization/management/leadership/decision making; 6.) Financial management; and 7.) Critical thinking/ problem-solving. This Research using a 4-choice Likert scale, namely VNC = Very Not Confidence; NC = Not Confidence; C = Confidence; and VC = Very Confidence. While the categorization of the achievement of the percentage of each respondent can be seen in the following Table 1.

Table 1. Categorization of Achievement Percentage

Percentage	Category
≥ 80%	Have good transferable skills very good
65% - 79%	Have good transferable skills good
55% - 64%	Have good transferable skills quite good
≤ 54%	Have good transferable skills not good

In data collection techniques, there are two methods used in data collection in this study, namely questionnaires and documentation. While the data analysis used is descriptive statistical analysis techniques. The descriptive statistical analysis technique is an analytical technique that is used to analyze data by describing or describing the collected data as it is without the intention of making conclusions that apply in general or generalizations (Sugiyono, 2016).

RESULT AND DISCUSSION

This study aims to determine the types of transferable skills that need to be possessed by DSK participating teachers and to analyze and describe the transferable skills possessed by teachers of Vocational High School on-in-on-in dual skills program in Malang Regency. The following are the study results in terms of communication skills, research/planning/investigation, human relations / interpersonal, work survival/attitude, organization/management/leadership/decision making, financial management, critical thinking/problem-solving.

Communication Skill

The results of teacher communication skills in the dual skills program can be seen in Table 2. Based on Table 2, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following describes the transferable skills from the aspect of communication skills. 29.3% of teachers have very good communication skills, 65.2% are good, 5.2% are quite good, and 0.3% are not very good.
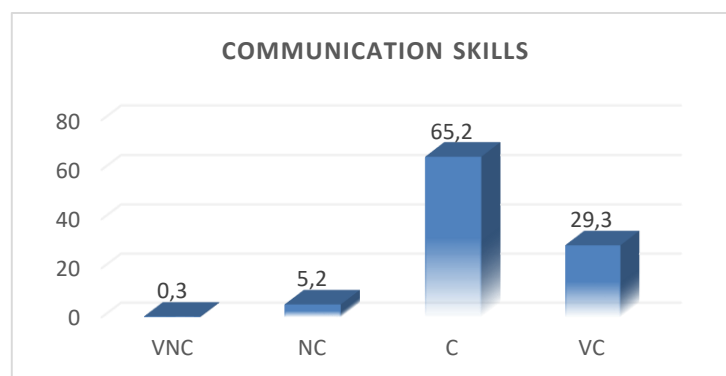
Figure 1. Diagram of DSK Teacher Communication Skills

Table 2. DSK Teacher Communication Skills

No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	0	0	6	3.49	109	63.37	57	33.14
2	0	0	0	0.00	107	62.21	65	37.79
3	0	0	0	0.00	101	58.72	71	41.28
4	0	0	8	4.65	122	70.93	42	24.42
5	0	0	11	6.40	108	62.79	53	30.81
6	0	0	5	3.09	109	67.28	48	29.63
7	0	0	11	6.40	114	66.28	47	27.33
8	0	0	8	4.65	121	70.35	43	25.00
9	0	0	10	5.81	106	61.63	56	32.56
10	1	0.58	12	6.98	119	69.19	40	23.26
11	6	3.49	26	15.12	107	62.21	33	19.19
12	0	0	6	3.49	118	68.60	48	27.91
13	0	0	9	5.23	111	64.53	52	30.23
14	0	0	10	5.81	105	61.05	57	33.14
15	1	0.58	11	6.40	119	69.19	41	23.84
16	1	0.58	9	5.23	111	64.53	51	29.65
		0,3		5,2		65,2		29,3

Planning Skills

The results of the planning skills of teachers participating in the dual skills program can be seen in Table 3. Based on Table 3, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following describes the transferable skills from the planning skills aspect. 23.87% of teachers have very good planning skills, 71.09% good, 4.81% quite good, and 0.23% less good.

Table 3. Planning Skills for DSK Teachers

No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	2	1.16	24	13.95	120	69.77	26	15.12
2	0	0.00	18	10.47	111	64.53	43	25.00
3	2	1.16	7	4.07	115	66.86	48	27.91
4	0	0.00	10	5.81	125	72.67	37	21.51
5	1	0.58	8	4.65	124	72.09	39	22.67
6	1	0.58	4	2.33	114	66.28	53	30.81
7	0	0.00	12	6.98	115	66.86	45	26.16
8	0	0.00	4	2.33	123	71.51	45	26.16
9	0	0.00	5	2.91	129	75.00	38	22.09
10	0	0.00	6	3.49	126	73.26	40	23.26
11	0	0.00	7	4.07	129	75.00	36	20.93
12	0	0.00	7	4.07	133	77.33	32	18.60
13	1	0.58	16	9.30	124	72.09	31	18.02
14	0	0.00	5	2.91	126	73.26	41	23.84
15	0	0.00	2	1.16	123	71.51	47	27.33
16	0	0.00	5	2.91	123	71.51	44	25.58
17	0	0.00	7	4.07	117	68.02	48	27.91
18	0	0.00	2	1.16	124	72.09	46	26.74
		0,23		4,81		71,09		23,87
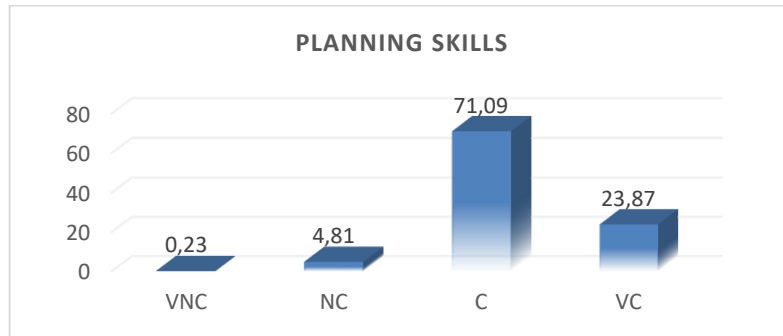
Figure 2. DSK teacher's Planning Skills Ability Diagram

Interpersonal Skills

The results of the interpersonal skills of teachers participating in the dual skills program can be seen in Table 4. Based on Table 4, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following is a description of the transferable skills from the interpersonal skills aspect. 44.59% of teachers fall into the category of having very good interpersonal skills, 53.09% good, 2.25% quite good, and 0.07% less good.

Table 4. Interpersonal Skills for DSK Teachers

| No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	1	1.16	1	13.95	76	69.77	94	15.12
2	0	0.00	2	10.47	76	64.53	94	25.00
3	0	1.16	1	4.07	74	66.86	97	27.91
4	0	0.00	4	5.81	75	72.67	93	21.51
5	0	0.58	0	4.65	80	72.09	92	22.67
6	0	0.58	7	2.33	96	66.28	69	30.81
7	0	0.00	1	6.98	64	66.86	107	26.16
8	0	0.00	3	2.33	89	71.51	80	26.16
9	1	0.00	3	2.91	81	75.00	87	22.09
10	0	0.00	15	3.49	108	73.26	49	23.26
11	0	0.00	10	4.07	108	75.00	54	20.93
12	0	0.00	2	4.07	103	77.33	67	18.60
13	0	0.58	2	9.30	110	72.09	60	18.02
14	0	0.00	3	2.91	115	73.26	54	23.84
15	0	0.00	5	1.16	104	71.51	63	27.33
16	0	0.00	3	2.91	102	71.51	67	25.58
		0.07		2.25		53.09		44.59
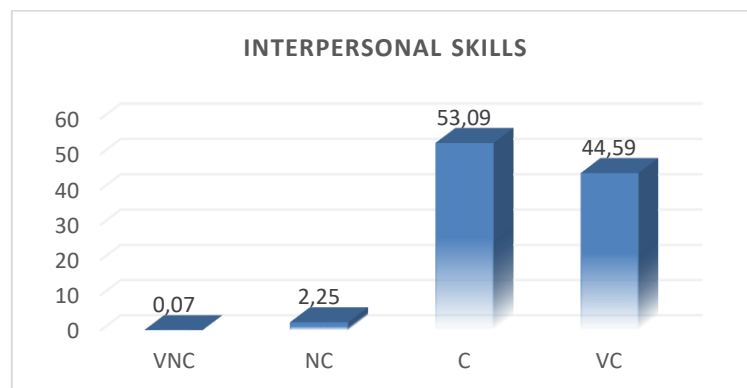
Figure 3. Interpersonal Skills Diagram of DSK Teachers

Work Attitude Skills

The results of the interpersonal skills of teachers participating in the dual skills program can be seen in Table 5. Based on Table 5, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following is a description of the transferable skills from the aspect of work attitude skills. 32.05% of teachers have very good work attitude skills, 63.01% good, 4.47% quite good, and 0.47% less good.

Table 5. Work Attitude Skills for DSK Teachers

No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	0	0.00	7	4.07	110	63.95	55	31.98
2	0	0.00	2	1.16	74	43.02	96	55.81
3	0	0.00	6	3.49	98	56.98	68	39.53
4	0	0.00	7	4.07	99	57.56	66	38.37
5	2	1.16	19	11.05	114	66.28	37	21.51
6	0	0.00	8	4.65	115	66.86	49	28.49
7	8	4.65	18	10.47	106	61.63	40	23.26
8	0	0.00	4	2.33	120	69.77	48	27.91
9	0	0.00	1	0.58	115	66.86	56	32.56
10	2	1.16	12	6.98	105	61.05	53	30.81
11	0	0.00	2	1.16	107	62.21	63	36.63
12	0	0.00	6	3.49	123	71.51	43	25.00
13	0	0.00	8	4.65	121	70.35	43	25.00
14	0	0.00	6	3.49	110	63.95	56	32.56
15	0	0.00	9	5.23	103	59.88	60	34.88
16	1	0.58	8	4.65	114	66.28	49	28.49
		0.47		4.47		63.01		32.05
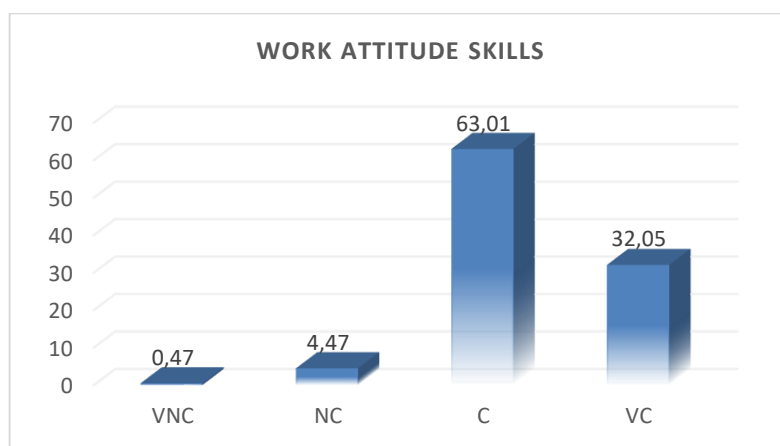
Figure 4. DSK teacher's Work Attitude Skills Diagram

Organization Skills

The results of the organizational skills of teachers participating in the dual skills program can be seen in Table 6. Based on Table 6, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following is a description of the transferable skills from the organizational skills aspect. 26.81% of teachers have very good organization skills, 66.65% good, 6.13% quite good, and 0.42% less good.

Tabel 6. Organization Skills of DSK Teachers

No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	0	0.00	16	9.30	119	69.19	37	21.51
2	2	1.16	12	6.98	121	70.35	37	21.51
3	0	0.00	5	2.91	116	67.44	51	29.65
4	0	0.00	8	4.65	111	64.53	53	30.81
5	0	0.00	9	5.23	112	65.12	51	29.65
6	0	0.00	20	11.63	109	63.37	43	25.00
7	1	0.58	15	8.72	105	61.05	51	29.65
8	0	0.00	11	6.40	115	66.86	46	26.74
9	0	0.00	6	3.49	115	66.86	51	29.65
10	0	0.00	6	3.49	121	70.35	45	26.16
11	0	0.00	3	1.74	93	54.07	76	44.19
12	0	0.00	4	2.33	123	71.51	45	26.16
13	1	0.58	20	11.63	113	65.70	38	22.09
14	0	0.00	5	2.91	127	73.84	40	23.26
15	0	0.00	5	2.91	123	71.51	44	25.58
16	0	0.00	9	5.23	120	69.77	43	25.00
17	1	0.58	3	1.74	111	64.53	57	33.14
18	0	0.00	8	4.65	122	70.93	42	24.42
19	12	6.98	33	19.19	90	52.33	37	21.51
20	2	1.16	14	8.14	109	63.37	47	27.33
21	0	0.00	7	4.07	122	70.93	43	25.00
22	0	0.00	16	9.30	125	72.67	31	18.02
23	1	0.58	24	13.95	115	66.86	32	18.60
24	0	0.00	13	7.56	121	70.35	38	22.09
25	0	0.00	3	1.74	120	69.77	49	28.49
26	0	0.00	5	2.91	114	66.28	53	30.81
27	0	0.00	11	6.40	114	66.28	47	27.33
28	0	0.00	4	2.33	104	60.47	64	37.21
		0.42		6.13		66.65		26.81
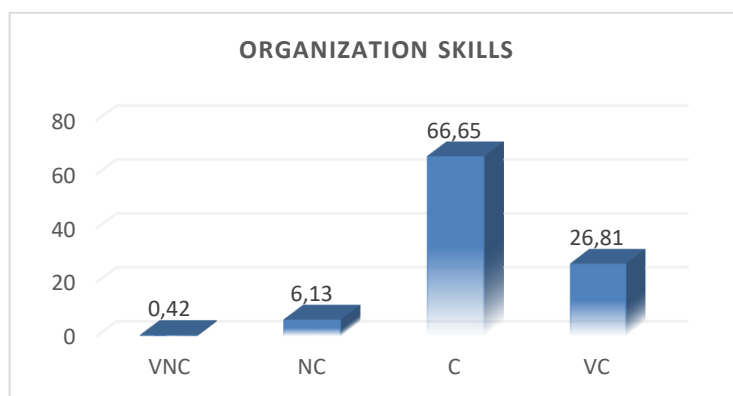
Figure 5. DSK teacher Organization Skills Ability Diagram

Financial Management Skills

The results of the financial management skills of teachers participating in the dual skills program can be seen in Table 7. Based on Table 7, the results obtained from each selected statement item can be described by looking at the frequency of each statement's answer and presented based on the transferable ability level of the DSK participating teachers. The following is a description of the transferable skills from the aspect of financial management skills. 23.39% of teachers have very good financial management skills, 63.11% are good, 12.79% are quite good, and 0.71% are not very good.

Table 7. Financial Management Skills for DSK

No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	0	0.00	16	9.30	113	65.70	43	25.00
2	1	0.58	30	17.44	100	58.14	41	23.84
3	2	1.16	38	22.09	98	56.98	34	19.77
4	1	0.58	11	6.40	117	68.02	43	25.00
5	1	0.58	25	14.53	105	61.05	41	23.84
6	0	0.00	16	9.30	109	63.37	47	27.33
7	5	2.91	28	16.28	109	63.37	30	17.44
8	0	0.00	11	6.40	119	69.19	42	24.42
9	1	0.58	23	13.37	107	62.21	41	23.84
		0.71		12.79		63.11		23.39

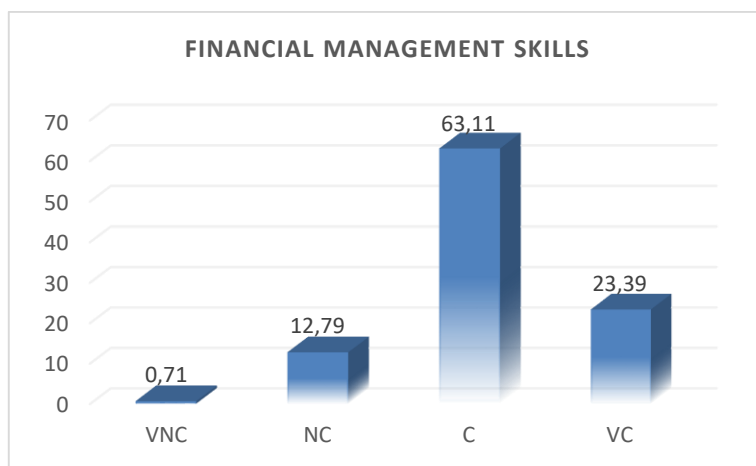

Figure 6. DSK teacher's Financial Management Skills Chart

Critical Thinking Skills

The results of the critical thinking skills of teachers participating in the dual skills program can be seen in Table 8. Based on Table 8, the results obtained from each selected statement item can be described by looking at the frequency of each statement answer and presented based on the transferable ability level of the DSK participating teachers. The following is a description of the transferable skills from the critical thinking skills aspect. 24.75% of teachers have very good critical thinking skills, 69.52% good, 5.73% quite good, and 0% less good.

Tabel 8. Critical Thinking Skills for DSK Teachers

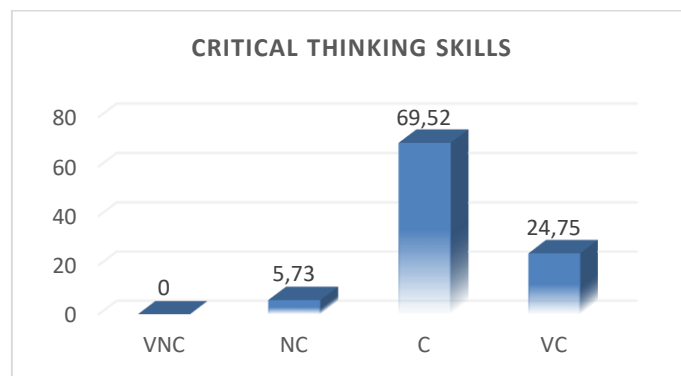| No	STPD		TPD		PD		SPD	
	F	%	F	%	F	%	F	%
1	0	0.00	16	9.30	121	70.35	35	20.35
2	0	0.00	8	4.65	123	71.51	41	23.84
3	0	0.00	6	3.49	113	65.70	53	30.81
4	0	0.00	9	5.23	117	68.02	46	26.74
5	0	0.00	8	4.65	126	73.26	38	22.09
6	0	0.00	13	7.56	118	68.60	41	23.84
7	0	0.00	9	5.23	119	69.19	44	25.58
		0.00		5.73		69.52		24.75

Figure 7. Diagram of DSK Teacher's Critical Thinking Skills

Based on these results, it can be seen that there are types of transferable skills possessed by vocational high school teachers, especially in facing the the industrial revolution. In line with the intense competition for labor. The types of transferable skills consist of: 1.) Communication skills; 2.) Research/Planning/Investigation skills; 3.) Human relations/interpersonal skills; 4.) Work survival/attitude; 5.) Organization/Management/leadership/ Decision making; 6.) Financial management; and 7.) Critical thinking/Problem solving.

In general, the DSK participant teachers have good transferable skills, with almost over 70% of the respondents. About 6% fall into the sufficient category, and less than 1% are not good at mastering transferable skills. Finding interesting is in the type of work survival/attitude teacher. When viewed from the category between very good and good, both almost close to the same amount. This is possible because the teacher in work already used to use attitude good in their work environment. As for more clearly each type of transferable skills can be described as follows: 1.) Communication skills teacher for DSK participants is good; 2.) Planning skills of DSK participant teachers is good; 3.) Interpersonal skills of DSK participant teachers is good; 4.) Work, attitude DSK participants, is good; 5.) Organization skill teachers participating in DSK is good; 6.) Financial skill of DSK participant teachers is good; and 7.) Critical thinking skill of DSK participant teachers is good.

CONCLUSION

Based on the description of the transferable skills perception analysis of vocational high school teachers on-in-on-in dual skills program, the following conclusions were: 1.) DSK participant teachers need to possess transferable skills: communication skills, planning skills, interpersonal skills, work attitude skills, organization skills, financial management skills, and critical thinking skills; 2.) The transferable skills of teachers of Vocational High School on-in-on-in dual skills program in Malang Regency are included in the good category.

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Readiness of fashion education and training institutions management in facing the industrial revolution 4.0 and society 5.0

Miftahul Annisah Nurfitria (ID) ***, Widihastuti Widihastuti** (ID)**, Nur Kholifah** (ID)**,
Sayidatul Maslaha** (ID)

Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: miftaannisah@gmail.com

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ABSTRACT

This study aims to determine how the management of education and fashion training institutions is prepared to face the industrial revolution 4.0 and society 5.0. This research is a case study research by examining field conditions. The data collection method is triangulation with observation, interviews, and documentation. The data of this study were obtained from the head of the institution, instructors, and course students. Technique triangulation and source triangulation were carried out to check the validity of the data. The research was conducted at the Yogyakarta Career Busana course and training institute. The research results based on the principles of POAC (planning, organizing, actuating, controlling) include the condition of the institution's management such as the institution's program curriculum, institutional management, strategy, program implementation, and control strategies and techniques in management. The results show that a strategy is needed to increase the readiness of educational institutions and fashion training for industrial revolution 4.0 and society 5.0. The development strategy can be seen from several aspects of the management function, namely planning, organizing, activating, and controlling. Institutions that have good readiness for the industrial revolution 4.0 and society 5.0 have aspects of management functions that are by the development, needs, and conditions of the industrial revolution 4.0 and society 5.0.

INTRODUCTION

The sophistication of technology provides changes in all areas of life. Changes need to be made according to the times and needs. Increasing challenges and opportunities result in the development of management that must be carried out in stages, planned, and sustainable so that it can produce a quality and according to the concept of objectives, especially in the industrial world, which has significant dynamics of change from time to time. Revolution 4.0 and society 5.0 are a form of human change experienced in the 21st century (Hermann et al., 2016). Various kinds of new technologies are present to simplify the system of life. Digitalization is becoming a megatrend and a force that is very influential on changes in human life around the world. On the other hand, digitalization is also a new problem for humans in the scope of competence, where humans must learn more to align their competencies according to this era. Technological innovations that are influential and highly developed in this era are autonomous vehicles, 3D printing, advanced robotics, and new materials (Schwab, 2016). Technology seems to be a necessity that humans cannot separate.

The dependence will be increasingly felt because of the conveniences offered, and especially information will be very easy and cheap to access with the internet. The existence of technology that provides convenience and will slowly form an intelligent society, or an intelligent 5.0 era society in developing social and community problems by utilizing technology by adjusting the potential of the existing local community (Salgues, 2018). Not only for human individuals, problems due to digitalization occur, but also for educational and training providers. For educational and training institutions, digitalization is a big and complex problem because it has to make its graduates have standards in accordance with digital-based industries.

Industry requires competent and globally competitive human resources. For humans to be able to compete, programs organized by educational and training institutions must be truly adapted to conditions and needs. In addition, the demand for mastery of several skills on everyone must be met because of uncertainty, and changes in types of work in the industrial world will occur quickly. New jobs will appear replacing old jobs that are no longer relevant. This type of work in the 21st century will have a lot to do with digitization, the internet, smartphones, and laptops that can be done anywhere, anytime, and by anyone. Quick decision-making skills, communication skills, critical thinking skills, technology skills, and the ability to innovate will always be needed by industry in the 21st century (Bell, 2010). In the end, vocational education and training are the keys to economic sustainability because they can produce competent human resources.

Educational and training institutions are a bridge between the world of education and the industrial world wherein these institutions there will be a vocational learning process. Education and training institutions are vocational education institutions that aim to increase the relevance of the world of education and vocational training by labor developments. The processes and systems in this vocational institution must be arranged in an actual and contextual manner based on the current conditions (Sudira, 2018). These vocational education institutions can be organized through formal education such as vocational schools or non-formal education such as job training centers or course and training institutions.

Increasing competence through the learning process must be considered and carried out. Humans have to learn a lot and practice anywhere, anytime, and with anyone to improve competence. The process and experience of learning and training can be obtained in formal and non-formal institutions. Skills are the key to productivity and modern economic growth, both macro and micro. These skills are also a reference and measure of the competency level of human resources (Mcgrath & Mulder, 2019). Lessons and training are an inseparable part of education. The success rate of an education and training program is supported by several things, including materials that are prepared according to needs objectives and can increase knowledge, methods used according to the type of program, the instructor's ability to deliver materials, facilities, and principles of learning, training participants and evaluation of training (Zainal et al., 2014). To realize the success of education and training programs, methods that are by the programs offered include the on-the-job training method and the off-the-job training method.

Vocational education is one of the educations that prepare students to become workers (Terry, 1977). One of the institutions that can provide vocational education is non-formal education. The provision of education can serve based on the objectives of the economic system, namely welfare, and the contemporary dynamics of society, such as based on the needs and problems that occur in society. The learning process is carried out in the form of social movements and learning environments through informal apprenticeships, while the institutional process is not too structured and is oriented towards the formal labor market and the non-formal labor market (Singh, 2005).

The number of training institutions in Indonesia in 2020 is 5,020 registered institutions of the Ministry of Manpower. However, the number of accredited training institutions is still very small, namely 1,622 institutions. The number of accredited institutions is almost half (Kementerian Ketenagakerjaan Republik Indonesia, 2019). Therefore, this research needs to be done to find out how far the management process is carried out and how the level of readiness of educational and training institutions to face the industrial revolution 4.0 and society 5.0. This is because of the importance of management for the development of an educational and training institution. Institutional managers can use this research as a reference in making decisions on the development of institutional programs. Many studies on institutional management have been carried out, but the

research that shows the level of readiness of educational institutions and fashion training for the industrial revolution 4.0 and Society 5.0 has not been found.

RESEARCH METHOD

This study aims to determine the level of readiness of educational institutions and fashion training for the era of the industrial revolution 4.0 and Society 5.0. This research is descriptive qualitative research with a triangulation data collection method. The triangulation technique is a data collection technique with participatory observation, in-depth interviews, and documentation as the data source (Sugiyono, 2013). The data collection process is carried out at the career *busana* course and training institution. This institution was chosen because it provides a fashion training program. This institution has also been accredited by National Accreditation Board for Higher Education, Ministry of Education and Culture of the Republic of Indonesia and has several achievements, both from the achievements of managers or instructors and the achievements of the course students.

The analytical technique used in this research is the descriptive analysis technique. Data analysis in the study was carried out during data collection and after (Miles & Huberman, 2009). This study's data analysis was based on data from interviews, observations, and documentation at the career *busana* course and training institution. The subjects who were the sources of data in the interviews in the research were the heads of institutions, instructors, and course students. Besides that, documents related to learning in the course and training institutions are also analyzed to strengthen research data.

RESULT AND DISCUSSION

Management of an institution is a process in regulating the institution to achieve specific targets. The cooperation process is an important factor that determines the level of achievement in an educational institution. Humans are the main element that influences how management occurs in addition to materials, markets, money, and methods. Management is defined into three things, namely management as a process, management as a collectivity, and management as a science or art. Management as a process is managed as an implementer in achieving certain goals. Management is a collection of people who work and gather to achieve a target is management as a collectivity. At the same time, management as a science or art is always related to the principles of management itself.

Achieving an organizational goal effectively and efficiently cannot be separated from the existence of management. In terms of management, effective is the goal that is achieved according to plan, while efficient means that the tasks given in the organization are carried out properly, well, organized, and completed according to the specified schedule (Terry, 1977). Management is a process consisting of action, planning, organizing, mobilizing, and controlling. The management process in an organization is carried out aiming to facilitate the organization so that it will be easy to achieve goals effectively and efficiently. In addition, management will also create harmony in work and a dynamic organization.

The management functions that are widely used consist of planning (planning), organizing (organizing), actuating, coordinating, and controlling (Wijaya & Rifa'i, 2016). Another opinion suggests that the basic functions of management are planning, organizing, actuating, and controlling, which is abbreviated as POAC (Terry, 1977). Planning is carried out in the management process to get an overview of strategic steps to realize the most important organizational goals. The principle of planning or planning is carried out not only focusing on the vision and mission of the organization or institution but also planning to manage and use the resources owned by taking into account the limitations. Planning in an organization or institution must be made specific, measurable, achievable, realistic, and has a time limit so that it is easy to evaluate the program of the organization or institution.

The organizing principle is a specific and clear division of assignments to members of the organization or institution by the fields and abilities of the members. The division in this way is done so that the plans are made run systematically. Organizing activities can be divided by dividing work

fields or commonly called departments or divisions. The division of tasks according to these competencies will determine the level of success of an organization or institution. The third principle is the actuating principle, which is the principle that underlies directive activities in the management of institutions or organizations. This briefing activity must be synergized with planning and organizing. The institutional management ability of a head or chairperson is needed in this process to instill a culture of discipline, totality, work smart, work together, and work hard. The last principle is that controlling this activity is usually carried out by evaluating, inspecting, auditing, supervising, and supervising the implementation of the work program that has been agreed upon. The benefit of this activity is that it can find out problems that occur early on so that it can be a guide in determining decisions on the institution or organization in carrying out development. In addition, it can also find out the extent of performance achievements.

Planning Strategy for Fashion Education and Training Institutions to Produce Graduates Who Have Competence According to the Era of the Industrial Revolution 4.0 and Society 5.0 (Planning)

Planning is the process of formulating a strategy to determine the goals to be achieved in an educational institution and fashion training. An organization requires cooperation between individuals involved in it to achieve common goals (Thach & Murphy, 1995). Planning in an organization can include vision, mission, and ways to achieve goals. Careful planning will produce optimal output. Planning is seen as an effort to maximize the potential of an organization's resources, including human resources, finance, production tools, raw materials, technology, markets, and information. Therefore planning is fundamental to carrying out various activities to achieve a goal (Wijaya & Rifa'i, 2016). The planning process must make adjustments to what is needed and will be carried out based on the involvement of the process of determining the desired future state compared to the current conditions so that the gap will be seen, and details of alternative selection in closing the gap of the situation which includes effectiveness and efficiency.

The planning process is carried out by compiling program planning through a curriculum that is adapted to the conditions of need in the era of industrial revolution 4.0 and society 5.0. The curriculum is an action plan on a written document that includes strategies for achieving goals. This curriculum also describes the form of learning experiences that students will get in the classroom and outside the classroom as long as it is written in the curriculum. Aspects that are loaded in this stage of curriculum preparation include objectives, the content of teaching materials, learning strategies, media used in learning, and evaluation of learning used.

Key skills in vocational learning in education and training institutions include the ability to solve problems creatively using critical thinking, the ability to build relationships with others, the ability to work together, the ability to use language, symbols, and text interactively and effectively in communicating both oral and written, the ability to access and analyze information into new knowledge, the ability to use internet-based communication and information technology, the ability to innovate, the ability to lead, assess, and make decisions, the ability to negotiate, the ability to provide satisfying customer service and the ability to continuously develop self must be mastered as a determinant of competence capability.

For learning to produce human resources who have these competencies, reforms in the management of educational and training institutions must be carried out. Curriculum planning must pay attention to the character of a good curriculum, namely by applying the principles of curriculum development. The curriculum of educational institutions is made relevant to the needs and learning conditions of the industrial revolution era 4.0 and society 5.0, such as applying appropriate learning methods and strategies so that work skills, work knowledge, work attitudes, and work morals are competitive and of high quality (Sudira, 2018).

The curriculum is developed based on the needs of students, developments in science and technology, community needs, and industrial needs. From the existence of these needs, the objectives of the curriculum are determined, determine the learning experience be obtained, organize appropriate learning experiences, and evaluate the learning process. The career *busana* course and training institution implement a curriculum based on Indonesian National Work Competency Standards Customade No. 90/MEN/V/2010 in collaboration with Indonesian National Work Competency Standards Customade garment 2020 No. 177 with digital learning methods. The

Indonesian National Work Competency Standards Customade collaboration is applied to produce a curriculum that is by the conditions of the need for competence in the industrial revolution, competence according to the needs of the community, and competence according to the needs of the fashion industry in this era. Indonesian National Work Competency Standards Customade Customade No. 90/MEN/v/2010 has the advantage of many competencies provided and complex materials according to the needs of fashion in society. Indonesian National Work Competency Standards Customade Garment 2020 No. 177 is applied because it has the advantage of being able to meet competencies and skills according to the standards of the fashion industry in this era.

In addition to program planning, planning for all aspects of needs that also support processes in institutional performance is also carried out such as the number of human resource needs, the need for infrastructure that supports the learning process, program budget planning, to long-term planning in the form of strategies for developing educational and training institutions. The planning must be calculated carefully and based on the priority scale. It is also important to do in planning, namely a SWOT (Strength, Weakness, Opportunities, Threats) analysis so that the weaknesses of the work program that will be carried out will be known. Knowing these weaknesses can provide direction or instructions for managers to make decisions.

The career *busana* training educational institution carries out a careful planning process from the beginning to the end. The number of institutional resource needs, including the head of the institution, instructors, and admins, is six people consisting of one permanent instructor, three contract instructors, one permanent admin, and one contract admin. This amount of human resources is planned and adjusted to the needs of the fashion training and course institutions. Likewise, the facilities and infrastructure and the program budget are also adjusted to the number of course students in each study group.

The development strategy in the long-term plan also needs to be carried out. The development strategy in the long-term plan of the career *busana* course institution is by the vision and mission of the institution. Becoming a strong, environmentally friendly and character-based course and training institution is a long-term plan for this institution. While the institutional development strategy in the long-term plan is to produce graduates who believe and are devoted to God Almighty and have a noble character, are capable and ready to face global challenges, are entrepreneurial, creative, innovative so that they can create jobs, competent according to the needs of the market share. The workforce is knowledgeable and concerned about the environment and can actualize the capabilities possessed.

The Strategy of the Process of Managing Educational Institutions and Fashion Training in Regulating Work Mechanisms so that Goals can be Achieved Optimally (Organizing)

Organizing or the mechanism for the division of tasks within an institution or organization is very important to do so that program goals and organizational or institutional goals are easily and quickly achieved. Organizing is part of meeting various interests and utilizing the potential of human resources in the institution in a certain direction and purpose. Organizing is part of determining, grouping, and compiling various kinds of activities needed to achieve organizational goals. In organizing, the leader or head of the institution must place human resources or staff in positions that are by their competencies. Organizing must be done based on an understanding of organizational goals that must be understood by all staff, clear division of work, procedures for determining how to work, clear evaluation and punishment, a delegation of authority according to the duties and functions of each position and clarity of coordination lines in the institution (Terry, 1977).

The skills of the head of the institution in managing programs and work systems are very much needed to achieve common goals. A new strategy to manage a working system that is by the conditions of the industrial revolution 4.0 and society 5.0 is needed to support this process (Winanti et al., 2019). Especially in this era, digitalization is present and has an important influence on the changes that occur in all aspects of life. The communication process, coordination between institutional members, learning, and various other processes must transform and adapt to digital conditions.

The strategy in regulating the working mechanism at the career *busana* course and training institution has been carried out, for example, the division of work assignments for instructors and admins. The work reporting process is carried out periodically together with evaluation activities. The process of reporting activities and documenting the evaluation of institutional activities is also carried out using a system that utilizes digital technology, such as websites and utilizing Google Drive. For staff who have good performance will get a reward.

During the evaluation process, a discussion of the next program development strategy for the institution was also carried out. Not only that, the coordination process related to the time or schedule of learning to the learning process is also carried out so that it is known how far the competencies absorbed by students are. There is also a collection of alumni data from graduates of course and training institutions to know to what extent output is absorbed in the industrial world.

Strategy for Implementing Program Plans for Fashion Education and Training Institutions (Actuating)

The program is a part of a plan that is systematically arranged. The program is a formulation that contains a description of the work to be carried out along with instructions on how to implement it (Syamsi et al., 1982). Work programs in institutions or organizations are made to realize the ideals contained in the vision and mission. The preparation process is carried out in a directed manner based on mutual agreement between the management or agency managers and considering various aspects such as community needs. The work program compiled will help make it easier to work so that its implementation is more regular. In addition, the work program can also function to answer the needs of the institution's organization as well as external demands.

The program is the first element for the creation of an activity that has aspects, namely the objectives of the activities to be achieved, the activities taken in achieving the goals, the rules that must be adhered to and the procedures to be followed, the estimated budget needed and the implementation strategy. It can be concluded that the program of action is based on a clear theory that determines the social problems that occur and want to be overcome. Before determining it, intervention and serious thinking can be carried out on the problem until the best solution is found. Therefore, it can be concluded that the determination of the program must be adjusted to the needs to achieve the objectives of the program implementer.

A program structure and plan for education and training institutions need to be a key in paving the way for its vision and mission. There are three activities in operating the program: the organization of a clear organizational structure, the interpretation of the implementers, must be able to run the program by technical instructions and implementing instructions. So that the expected goals can be achieved, the application needs to make clear work procedures so that the program can run according to the plan, including the schedule of activities, so that it does not clash with other programs (Meriza, 2018). Action is something to turn decisions into operational patterns in achieving big or small changes. At the same time, implementation refers to a person's actions in achieving the goals set based on a decision.

One of the implementation models is a model using a learning process approach called the program implementation suitability model. The implementation model has three elements: the program, program implementation, and program target groups. A program will be said to be successful if the three elements match. These elements are the suitability between the programs needed by the community and the programs offered by the institution or organization, the suitability between the program and the organization or institution, which includes the suitability of tasks with organizational capabilities, and the suitability between the beneficiary group and the program implementing organization which includes the conformity between the requirements decided by the organization to be able to obtain program output (Rizani, 2019).

Educational institutions and fashion training implement work programs, including course packages that have been adapted to the needs of the community. Problem analysis is also carried out in the process of determining the type of training course, as is the case in making a buffet system course package program that provides learning services according to the knowledge needs of students. Students can choose and decide what they want to learn to sew in this case.

Internal Communication in Education and Training Institutions

Communication is one of the determinants of the quality of relationships within an institution or organization. The effectiveness of communication depends on the ability to understand one another (communication depends on our ability to understand one another). Along with the sophistication of technology, communication in institutions in era 4.0 and society 5.0 is mostly done online through Whatsapp groups. Communication in this way has the advantage of being easy to do anywhere, anytime (O'Hair et al., 2009). But on the other hand, there is also a weakness that online communication is considered less effective because in some cases, there is a lack of response from certain people, and in some cases, students underestimate passive learning in the learning process.

Career Fashion courses and training institutions utilize developing technology to carry out internal communication processes. WhatsApp is the most frequently used social media in addition to direct communication. The choice of this technology is considered more effective because it can be discussed in groups. In addition, internal communication that is carried out during discussions in discussing a matter is also often used in Zoom Meetings or Google Meet. Although this technology still does not provide an optimal communication process, it has greatly shaped the long-distance communication process.

Learning Models and Learning Methods According to the Industrial Revolution 4.0 and Society 5.0

The learning model is a systematic procedure or pattern that is used as a guide to achieving learning objectives in which there are strategies, techniques, methods, materials, media, and learning assessment tools. At the same time, the learning method is the method or stages used in the interaction between students and educators to achieve the learning objectives that have been set by the material and mechanism of the learning method (Afandi et al., 2013). The learning model is a method, method, or strategy in teaching and learning activities with four elements: syntax, the social system, the principle of reaction, and a support system.

The demands of digitalization in the world of education are increasingly changing traditions and ways of learning for everyone. This learning model, due to digitization, has different characteristics from the traditional learning of the past. The characteristics of the learning include a learner-centered learning approach, collaborative learning, contextual learning, and learning that involves social conditions. Learning is also more flexible, not bound by space and time, because access to information and knowledge is getting easier and cheaper.

The career busana course and training institution indirectly applies the project-based learning model. The learning process is carried out such as by exploring sewing techniques, designs, and fashion decoration through the internet. This exploration is carried out in the learning process to make various types of fashion. The project-based learning model is a learning model based on projects as the core of learning. In this learning model, students are required to explore, assess, interpret, and synthesize information to obtain various learning outcomes (knowledge, skills, and attitudes).

Strategy Controlling the Management of Educational Institutions and Fashion Training in Learning and Organizational Performance (Controlling)

Controlling is one of the management functions that the principal must carry out as a leader in the school. Supervision is the process of observing or monitoring the implementation of organizational activities to ensure that all work being carried out goes according to a predetermined plan. Thus, supervision is the last process of a series of other management functions (Meriza, 2018). Supervision in an organization or institution is intended to prevent errors from occurring. The supervisory function is closely related to the directing or commanding function in the organization of institutional activities. As one of the management functions, supervision is the last action taken by managers in an organization.

Directing also functions to evaluate the successful implementation of employees' duties and improve the efficiency and performance of educational institutions' activities. At the same time, directing develops a better work situation through coaching and professional improvement of

employees and providing direct guidance to correct errors, shortcomings, and mistakes, as well as helping to solve problems faced by employees to prevent more serious mistakes (Hikmat, 2014). Controlling is the process of observing or monitoring the organization's implementation so that all work being carried out goes according to a predetermined plan.

The supervisory function is also defined as an assessment that is the task of every manager. For educational institutions, assessment is an important element in management activities. Because the assessment is related to efforts to improve the effectiveness and efficiency of the organization in achieving its goals. Assessing an activity, whether it was carried out well or failed, is the target of assessment or supervision. In the assessment, the value of a program, product, project, process, goal, or curriculum (Syafaruddin, 2005). In line with this, it can be emphasized that the assessment of education in a school or institution must be comprehensive and directed towards measuring the main goal of improving/enhancing students' learning experience.

Supervision is a basic process that is essentially still needed no matter how complex and broad an organization is (Fattah, 2001). The steps that can be taken in control are as follows: 1.) Determining the standard or standard size that will be the benchmark; 2.) Measurement or assessment of the activities that are actually carried out (or the results of those activities); 3.) Comparison between the implementation of the activities or their results with predetermined benchmarks to find out deviations or differences that occur; 4.) Correction of deviations or differences that occur so that all activities or results are in accordance with what has been determined (Gie, 1992). Control is defined as the process of monitoring, evaluating, and reporting the plans that have been set for corrective actions for further improvement. While the supervisor is only limited to giving advice, the controller will conduct the follow-up.

Supervision in educational organizations is directed at implementing the overall course and training institution program, the end of which is to improve the quality of learning. In this regard, the Career Busana course institution supervises the reporting of course program activities using a system that utilizes technology, such as monitoring student activities and learning outcomes through the WhatsApp group.

CONCLUSION

Management is an important thing in an organization or institution. Goals will be more easily achieved if management in an institution or organization can be carried out properly. Management also makes a program implementation process more structured and directed in the organization. Humans are the main element that greatly influences the process of management. The industrial revolution and society 5.0 is an unavoidable condition. The term arises due to sophisticated technology and continues to grow. The influence and consequences of this condition caused a revolution in all aspects of life, including education and training. Therefore, to determine the level of readiness of a course and training institution, it is necessary to develop a strategy in management.

POAC is a management function based on planning, organizing, actuating, and controlling. These four main functions of management are often used to determine the extent to which the management process is carried out so that through these four aspects it can be seen the level of readiness for the industrial revolution 4.0 and society 5.0. Based on the management function, the fashion training and course institution at Career Fashion are considered ready to face the industrial revolution 4.0 and society 5.0. This is based on the curriculum, which has been adapted to the needs of industry 4.0 and society 5.0, and the management and implementation of the learning process to the supervision or evaluation held that have integrated and utilized technology and information systems.

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Developing an e-module of making Edmodo-based Hosanna Moda system bustier to improve learning independence and learning achievement

Lestari Rochmatun Choirunnisya' *, Putu Sudira (iD)

Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: choirunnisyasafaa139@gmail.com

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ABSTRACT

This study aims to: 1.) Develop an Edmodo-based e-module for making Hosanna Moda system bustier to increase independence and achievement in learning custom made clothing; 2.) Describe the feasibility of the developed e-module; and 3.) Reveal the effectiveness of the developed e-module in increasing student learning independence and learning achievement. This research is development research, which was carried out on grade XII students of Fashion, State Vocational High School 3 Magelang. The product trial consisted of a validity test by three experts, a small-scale trial involving 12 students, a large-scale trial involving 24 students, and an effectiveness test involving one control and one experimental groups each consisting of 36 students. The data were collected using questionnaires and tests as well as through interviews. The data analysis used is quantitative description and the effectiveness testing used the t-test. The results of the study are as follows: 1.) The developed e-module contains learning materials about making Hosanna Moda system bustier illustrated with relevant pictures to make it easier for students to understand it when studying independently; 2.) The product has been declared feasible by a material expert, media expert, and linguist. In the operational trial, teacher responses are with an average score of 5.00 (very good category and suitable for use), and student responses are with an average score of 4.59 (very good category and suitable for use); and 3.) The results of the effectiveness testing on student learning independence is at the significance level of 0.000 (<0.050) indicating that the learning independence of experimental group students was higher than that of the control group, while the results of the effectiveness test on student learning achievement is at the significance level of 0.001 (<0.050) indicating an average value. The posttest average score of the experimental group was much higher than that of the control group. Thus, it can be concluded that the developed e-module is effective in increasing student learning independence and learning achievement.

INTRODUCTION

Based on Instructions of the President of the Republic of Indonesia No. 9 of 2016 the revitalization of Vocational High Schools (VHS) is carried out in order to improve the quality and competitiveness of Indonesian human resources for the revival of vocational schools. In order to facilitate the achievement of the objectives of implementing education in VHS, the media component must be able to become an intermediary in delivering messages from teachers to students. Learning media refers to the tools used to assist teachers in delivering and displaying learning materials (Yaumi, 2018). The use of media needs to pay attention to the needs of students and the environment

so that the learning process runs according to its objectives. Teachers and students can utilize the wifi provided by the school as a means of supporting digital technology-based learning media with online learning through the Internet.

The application of the use of the Internet will provide learning media innovations to implement an electronic learning called e-learning. E-learning can make students more active in the teaching-learning process (Wani, 2013). Teaching is no longer centered on the teacher, but students are also actively involved in finding materials and studying them independently. Students can choose their own study time which makes it easy and comfortable for them to understand the materials. There are many types of e-learning that can be used by students, including: Edmodo, Rumah Belajar, Moodle, Fedena, Schooltool, Dokeos, and OpenEMIS. Edmodo is a social learning platform that can be used by teachers, lecturers, students, and parents (Ekayati, 2017). Edmodo is also a type of information technology in the form of a website and it can be used by students, educators, and guardians of students (Nasrullah et al., 2017).

State Vocational High School (SMKN) 3 Magelang is a tourism vocational school that has implemented online learning using Edmodo. However, it is still limited to simulation and digital communication subjects. The use of Edmodo media in teaching is still strange to teachers, especially the teachers of the Department of Clothing. Whereas teacher training related to the management of Edmodo has been carried out since 2015. Online media is only used by teachers to give students browsing tasks. The use of media in custom made clothing is also still minimal. Making custom made clothing is one of the productive subjects of years XI and XI students of Fashion Design, SMKN 3 Magelang. One of the basic competencies in Custom Made Clothing course is implementing bustier making. The Hosanna Moda system bustier is still applied today for several advantages, including: 1.) Pattern making is faster than other patterns; 2.) Product results can be enlarged and reduced by the wide back seam; 3.) The chest shape fits the body curve shape; and 4.) Fitting the zipper is not limited to using bustier zipper, but can use jacket zipper to make it stronger. The goal of this subject is that students are skilled in making custom made clothing products. At the end of teaching-learning process, students are expected to be able to make bustier.

Each learning competency has many indicators that must be achieved, but there are several problems in learning to make bustier. Based on the data on student daily test scores in 2018, out of 36 students, 56% had not mastered the knowledge and 14% had not mastered the skill. The specified minimum mastery criterion (MMC = KKM) was 80. The low MMC score of the students was due to the fact that they did not understand the process of making bustier correctly, so the results obtained were not maximal. The lack of student understanding was caused by the absence of appropriate and clear learning media in conveying the correct bustier making process, so that the main source of student learning was only the teacher. However, the large number of bustier-making learning materials that had to be delivered, made the teacher rush in delivering the material using the lecture method, thus making it difficult for students to understand it.

Teachers not only organize learning activities with the lecture method, but also use learning media to help them deliver the materials, namely the PowerPoint. However, in practice, the use of PowerPoint media has not been able to stimulate students to participate in learning activities better. In addition, to support the delivery of learning materials through PowerPoint media, the teacher also prints the materials into handouts and distributes them to students. However, the materials given to the students are not accompanied with a clear jobsheet guide because the content was the same as the PowerPoint presentation. This causes the knowledge conveyed cannot be perfectly absorbed by students, and also shows that students' learning independence has not been seen. Independence refers to the ability to be responsible for the learning process for oneself (Wicaksono & Roza, 2016). Independence needs to be instilled in children from an early age so that they are accustomed to learning independently. Independence can make students do everything they are facing according to their abilities (Fitriana et al., 2015). Therefore, the delivery of learning materials using the PowerPoint is less effective, so students need the right media in order that learning runs smoothly.

The module is one of the printed media and is designed systematically with the aim of helping learning processes (Tang et al., 2018). The module is self-instructional, so it can be used as a learning resource without face-to-face teacher assistance or guidance. This is because the module contains the material on the steps to make bustier equipped with clear images, so that it can make it

easier for students to understand the learning materials. However, modules in physical form are certainly less efficient for teachers, considering the number of class XII students of SMKN 3 Magelang, which reaches 108 students. Therefore, to be more efficient for teachers and effective for students in learning the process of making bustier, the development carried out is in the form of electronic modules (e-modules). The e-module in question is a module in the form of a soft file which is uploaded into an application, which can then be accessed and downloaded by students. This type of e-module includes cloud form media, namely modules in softfile format that are stored on a website or share point, and in order to access them the Internet connection is required (Yusuf et al., 2020). This form of e-module is considered more flexible because it is stored on the website so that students can access and download it easily, anywhere, and anytime. The application that is considered appropriate as the media for uploading the e-module is Edmodo.

Edmodo is a free-of-charge social learning application for online practice that can be used via mobile devices or computers that can be used by teachers, students, and guardians of students (Ekici, 2017). Teachers can upload learning materials in the form of e-modules, practice questions, and assignments in the Edmodo application, and students can download them anytime and anywhere. Edmodo is also considered easy to use because it looks like a social media Facebook. In addition, student guardians can also monitor student learning achievement through Edmodo, because in addition to accessible learning materials and practice questions, student learning achievement will also be listed in the application, and they can also be accessed by student guardians. Fauzi (2017) and Khodary (2017) in their research report show that Edmodo is effective in learning and it improves students' skills and maximizes the use of ICT.

Based on the condition of SMKN 3 Magelang, which is well equipped with the supporting wifi facilities, the development of this Edmodo-based e-module can be carried out. All of the students are able to operate mobile phones and 94% have Android phones. Therefore, they can download the Edmodo application and e-module materials within the school environment, and can study them at school or at home. Learning using the Edmodo-based e-module, besides being able to save learning time at school, can also develop students' abilities to study independently at home. Therefore, the development of this e-module is considered not only able to improve student competence to make bustier in the subject of custom made clothing, but also able to increase their learning independence.

RESEARCH METHOD

Developmental Model

This research is research and development. According to Gall et al. (2003) research and development is a form of development based on research results that are used to design new products and procedures, which are then tested, evaluated, and systematically refined to obtain specific criteria that are effective and of the same quality or standard. This study aims to: develop an Edmodo-based e-modul for making Hosanna Moda system bustier, describe the feasibility of the developed e-module, and reveal the effectiveness of the developed e-module in increasing student learning independence and learning achievement. The data were gathered by using questionnaires containing instruments about learning media and e-module materials to experts and year XII students of the Fashion Design Department, State Vocational High School 3 Magelang, who are the subjects of this research.

Research and Development Procedure

This study refers to Borg and Gall (1983) in Putra (2012) whose procedure is decreased into six stages, namely: 1.) Gathering data and information; 2.) Planning; 3.) Product development; 4.) Feasibility testing; 5.) Effectiveness testing; and 6.) Final product. In brief, the description of the six steps of e-module development is presented in Figure 1.
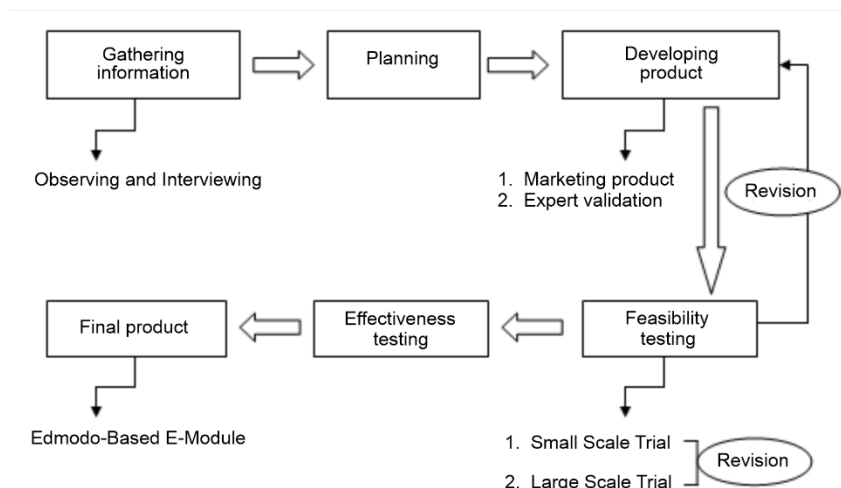
Figure 1. The Steps of Developing Edmondo-Based E-Module

Product Trial Design

The product trials in this study were carried out in three stages, namely: validity testing by experts, small and large scale trials, and effectiveness testing. The effectiveness testing was carried out using the experimental model of pretest-and-posttest-control-group design (Sekaran & Bougie, 2016). The model uses one experimental group and one control group, which is given a pretest and posttest.

Table 1. Pretest-Posttest-Control-Group Model

Group	Pretest	Treatment	Posttest
Experimental	O1	X	O2
Control	O3		O4

Notes:
X   : Instruction applying the e-module
O1 : Experimental Group Pretest
O2 : Experimental Group Posttest
O3 : Control Group Pretest
O4 : Control Group Posttest

Research Subjects

The subjects in this study are grade XII students of the Fashion Design expertise program, SMK Negeri 3 Magelang. The test subjects in this study were divided into three groups, namely 12 students (four high achievers, four moderate achievers, and four low achievers) for small-scale trials, 24 students (eight high achievers, eight moderate achievers, and eight low achievers) for a large-scale trial, and 72 students (36 students in the experimental group, and 36 students in the control group) for the effectiveness testing.

Data Collection Techniques and Instruments

The data collection in this study used questionnaires, tests, and interviews. The questionnaires were used to collect data related to learning independence and student and teacher responses to the developed e-module. The learning achievement test was used to collect data about student learning achievement. Interviews were held to determine the state of the learning process and the needs for developing a learning e-module.

Technique of Data Analysis

Research Instrument Testing

The research instrument testing was conducted on 12 students (a small-scale trial). The instrument testing included the validity and reliability tests. The instruments tested are a questionnaire for independent learning, and a test for learning achievement. The validity test for the questionnaire is the product moment test (Pearson Correlation) with five score variations (Arikunto, 2001). Based on the results of the validity testing, it is known that 23 items of learning independence have a calculated r-value greater than r-table, at the significance level of lower than 0.05. These results indicate that all items in the learning independence variable instrument are valid. While the reliability test used for the learning independence questionnaire is the Cronbach's Alpha test. Based on the results of the analysis, the alpha coefficient value is 0.941. This value is greater than 0.700 (Hair et al., 2014). This indicates that the learning independence questionnaire is reliable, so it can be used for data collection in the research.

The validation of the test was carried out using biserial correlation (Arikunto, 2001) because there were two variations in the scores used in the instrument, namely the score of one (1) for the students who answered correctly, and the score of zero (0) for the students who answered incorrectly. The value of r-table for 12 data with an error rate of 5% is 0.575 and it is greater than r-table. This shows that all items in the learning achievement test are valid. While the instrument reliability testing of the instrument used for the test is the KR-20 test (Arikunto, 2001). Based on the calculation results, it is known that the coefficient value of KR-20 is 0.971. This value is high and greater than 0.700. This indicates that the instrument for assessing learning achievement is reliable and can be used for collecting the research data.

Quantitative Descriptive Analysis

The description analysis was conducted to describe the data obtained using the questionnaires and tests. The feasibility of the developed e-module can be categorized as can be seen in Table 2 (Widoyoko, 2012).

Table 2. Category of E-Module Media Validation

Score Range	Category
3.01 – 5.00	Feasible
1.00 – 3.00	Not feasible

The learning independence data obtained were calculated for the average score, and grouped into five categories as can be seen in Table 3 (Widoyoko, 2012).

Table 3. Categories of Learning Independence Average Score

Score Range	Category
1.00 – 1.80	Very Poor
1.81 – 2.60	Poor
2.61 – 3.40	Sufficient
3.41 – 4.20	Good
4.21 – 5.00	Excellent

The test in this study was used to collect the data about student learning achievement. The scores obtained were calculated using the Formula 1 (Arikunto, 2001).

$$V = \frac{\text{Score obtained}}{\text{Maximum Score}} \times 100 \qquad (1)$$

Based on the scores obtained, students are said to achieve the mastery if the scores obtained are able to reach or exceed the minimum mastery criterion (MMC). Furthermore, based on the values obtained, the students' mastery scores can be calculated classically.

$$P = \frac{\Sigma ni}{\Sigma n} \times 100\%$$

Notes:
P   : Classical learning mastery
Σni   : Total number of students achieving individual mastery (score $\geq$ 80)
Σn   : Total number of students

The assessment of the quality of learning achievement was done by conforming to the percentage of classical mastery. Students are declared to have achieved classical mastery if a minimum of 85% of the students get a score of 80 or are able to achieve the MMC score (Abdullah, 2017).

Effectiveness Testing

The t-test was used to test the effectiveness of the developed media in increasing student learning independence and learning achievement. If the results of the normality test showed that the data were normally distributed, and the results of the homogeneity test showed that the data were homogeneous, then the tests used were paired t-test and independent t-test. However, if the results of the normality test used showed that the data were not normally distributed and the results of the homogeneity test showed that the data were not homogeneous, then the tests used were the Wilcoxon test and Mann Whitney (Sekaran & Bougie, 2016).

RESULT AND DISCUSSION

The product developed in this research is an Internet-based learning media. The product development was carried out through several stages of product development such as: 1.) Collecting the data and information related to product development; 2.) Product trial; and 3.) Effectiveness test.

Collecting the Data and Information Related to Product Development

Prior to product development, several analyses were carried out to find out the problems faced and the purpose of developing learning products. The analyses carried out included field studies, needs analysis, objective analysis, and capability analysis.

Planning

The planning stage of the e-module development was carried out by determining the preparation and content of the materials to be used in the e-module, starting from determining the indicators of achievement of basic competencies, formulating the objectives of the preparation of the e-module, and arranging the sequence of learning activities carried out using the e-module. In addition, it was also necessary to collect various sources related to the materials for making bustier to determine the distribution of learning activities. Then the researcher determined several experts who knew about the development of learning resources and experts who understood the materials of custom made clothing, especially in the manufacture of bustier. The researcher also determined the size of the sample used in the e-module small scale and large scale trials as well as operational testing or effectiveness testing. The testing was carried out to determine the parts that needed improvement.

Edmodo-Based Product Development

At the first stage, the researcher compiled the e-module according to the plan. The e-module contained the materials for custom made clothing, especially the Hosanna Moda system bustier. However, preceding the learning materials, the initial pages of the e-module contain the introduction cover page, preface, map of the position of the e-module, table of contents, and glossary. The introduction aims to provide the identity of the e-module, to mention the usefulness of the e-module, and to make it easier for students to understand the contents of the e-module.

The main part of the e-module contains four chapters and a bibliography, which is briefly described as follows.

Chapter I: contains basic competencies and indicators of competency achievement, a brief description of the learning materials, learning time, requirements for participating in learning, and instructions for using the e-module.

Chapter II: contains the objectives of learning activities, material descriptions, material summaries, assignments, skill worksheets, exercises, and self-assessments.

Chapter III: contains evaluation activities after learning is carried out, in the form of knowledge competency tests, skill competency tests, attitude assessments, products/workpieces, and scoring guidelines.

Chapter IV: contains conclusions from all the contents of the e-module

Bibliography: contains the sources used by researchers in compiling the e-module.

After the e-module was compiled, the second stage was to develop the e-module into the Edmodo application. The e-module was uploaded via Edmodo in Pdf format. Assignments, skill worksheets, and exercises were tailored to the learning activities that would be carried out through Edmodo. Meanwhile, polls were also included at the end of each learning activity.

Product Validity Testing

The validation in this study was carried out by experts whose fields are in line with the module. They are a material expert, linguist, and media expert. The material expert is a lecturer of clothing engineering education, Faculty of Engineering, UNY, who is an expert in the field of custom made clothing. The media expert is a lecturer who is an expert in the module field. And the linguist is a lecturer who is very good at grammar. The validation by these experts was carried out in order to get a valid and quality product so that the e-module is suitable for use in learning activities. The result of the validation in this study is presented in Table 4.

Table 4. Result of Validation by Material Expert

No.	Indicator	Average	Category
1.	Content and Objectives	5.00	Feasible
2.	Instruction	4.88	Feasible
	Average	4.93	Feasible

The result of the linguist validation test is presented in Table 5. The result of the validation by the media expert is presented in Table 6.

Table 5. Result of Validation by Linguist

No.	Indicator	Average
1.	The language rules used are good	4
2.	The terms used are in accordance with the concept of material	5
3.	The terms used are consistent	5
4.	The language used is easy to understand	4
5.	The language used is communicative	4
6.	The choice of words is appropriate in analysing the materials	5
7.	The sentences constructed represents the materials to be presented	5
8.	The spelling used is appropriate	5
9.	The symbols used are consistent	5
	Average	4.67
	Category	Feasible

Based on the results of the validation of the three validators, it is known that the developed e-module is attractive and easy to use by students in learning. In addition, the e-module has also been declared feasible, so it can be tried out in the field.

Table 6. Result of Validation by Linguist

No.	Indikator	Average	Kategori
1.	Content and objectives	5.00	Feasible
2.	Instruction	4.43	Feasible
3.	Technique	4.29	Feasible
	Average	4.44	Feasible

Product Trial

Small-Scale Trial

The result of small-scale trials based on the assessment by 12 students shows that the average score obtained is 4.20, which is in the good category. The majority of the students considered that the material presented was in accordance with the topic they were studying. In addition, the material had also been arranged systematically, the type of font used was also easy to read, and the images used were also very clear so that students could easily understand it, and it was considered to have a positive impact on students' learning. The material presented was also considered adequate and presented in an attractive manner, and used large enough letters with good color choices, so that it could motivate students to learn. The grammar used was also good so it was easy for students to understand.

The result of small-scale trials based on the assessment by three teachers shows that the average score obtained is 4.92, which is in the very good category. The teacher judged that the material presented was adequate. It was arranged according to competency standards and basic competencies in bustier making, presented in an interesting and systematic way, so that it was easy for students to understand and it could motivate students to learn better. The e-module was also considered to have very good interaction quality and it contained very good test and assessment tools, so that the e-module could have a positive impact on students. In addition, the e-module also made it easy for teachers to deliver learning materials because the images presented were very good and had very good program management quality and were easy to use. When viewed from the technical point of view, the e-module was presented with the right typeface, right font size, very good grammar, and choice of colors, so it was considered to be able to assist teachers in delivering the learning materials better.

Large Scale Try out

Based on the results of large-scale trials from the 24 students' responses, it is known that the average score obtained is 4.48, which is in the very good category. The majority of the students considered that the learning material was in accordance with the theme of their learning material. The material was also presented in a concise, interesting, and systematic manner so that it was easy to understand and could have a positive impact such as increasing student learning motivation. The presentation of the material was also carried out using easy-to-read letters with fairly large font size, using easy-to-understand grammar and excellent color choices. The material was also illustrated with clear and appropriate pictures showing the process of making bustier so that students could learn it more easily.

Based on the results of the assessment by three teachers, it is known that the average score obtained is 4.98, which is in a very good category. This shows that the e-module has been prepared very well and can be used to assist teachers in delivering learning materials, in terms of the material presented, grammar, use of letters and colors, and the selection of appropriate and clear images. In addition, the management of the e-module program is also very good.

Based on this assessment, suggestions were also obtained. The first teacher gave suggestions to further complement the other bustier examples, so that students could get a view of the various bustier shapes and colors that they could make by learning through the e-module. Meanwhile, the second and third teachers gave their judgement that the e-module was good, had been improved according to the suggestions given, and could be used as learning media. Based on the suggestions given, the researcher then made improvements to the e-module. After repairs were made, an operational test was administered to determine the e-module effectiveness in learning.

Operational Try out

The result of the assessment by 36 students shows that the average score obtained is 4.59, which is in a very good category. The e-module is equipped not only with subject matter that is presented in an attractive manner, but also with images that match the material. This shows that all students considered that the developed e-module was very good because it was easy to read, easy to understand, and interesting and it could increase their learning motivation. The results of the assessment by three teachers show that the average score obtained is 5.00, which is in a very good category. The score obtained shows that the e-module has been prepared very well, in terms of the materials, the way of writing, the language used, and the use of pictures to help students understand the process of making bustier referred to in the e-module. In addition, the e-module is also equipped with test and evaluation tools which are considered to be able to measure and assess students' knowledge and skills after participating in learning using the e-module. Thus, it can be concluded that the developed e-module is good.

Effectiveness Test

The effectiveness testing in this study began with the statistical descriptive analysis to describe the data on learning achievement and learning independence. The result of the pretest of student knowledge shows that the number of students who score 80 or above 80 in the control group is six students (16.67%), while 30 students (83.33%) have not yet achieved minimal mastery criterion. In the experimental group, the students who have achieved mastery level are nine students (25.00%), while the 27 students (75.00%) have not achieved mastery level. The score in the knowledge competence in the pretest is shown in the graph as shown in Figure 2.
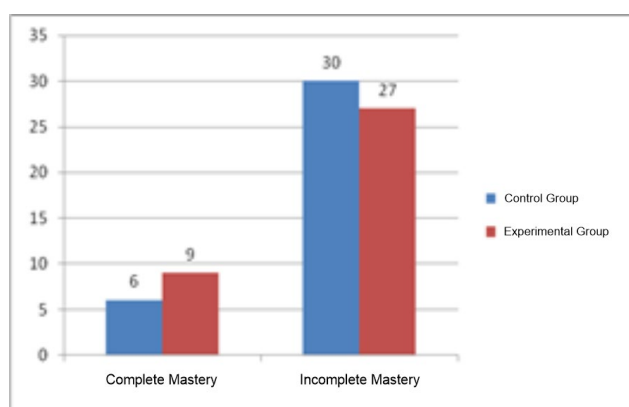

Figure 2. Mastery of Knowledge Competence in Pretest of the Control and Experimental Groups

The posttest result shows that 28 students in the control group (77.78%) have achieved the mastery level, while eight students (22.22%) have not. In the experimental group, 32 students (88.89%) have achieved the mastery level, while four students (11.11%) have not. The students' posttest scores in the knowledge competence are depicted in Figure 3.

Based on the mean score obtained, it is known that in the pretest, the mean score of the control group is 68.889 and that of the experimental group is 69.861, which shows that they are not very different. However, in the posttest, the average score obtained by the experimental group is 87.847, which is much higher than the control group average score, which is 82.222. The average scores are presented in the form of a bar graph in Figure 4.
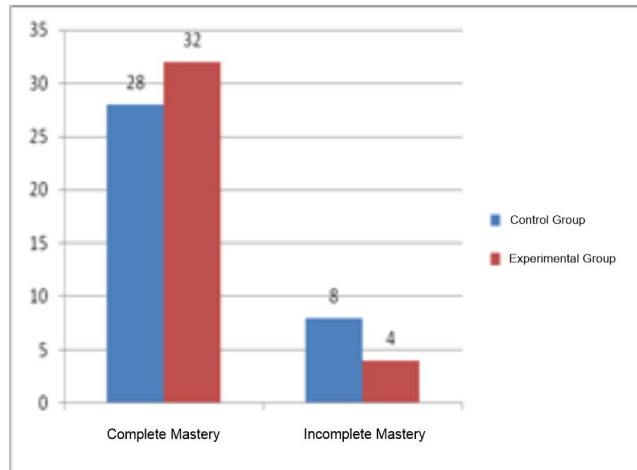
Figure 3. Mastery of Knowledge Competence in Posttest of the Control and Experimental Groups
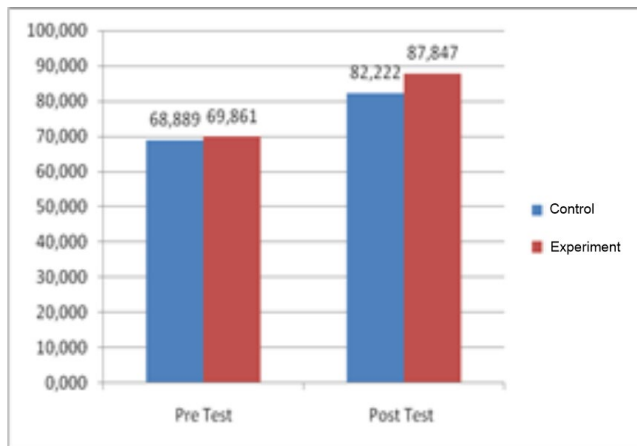

Figure 4. Average Score in the Pretest and Posttest of Knowledge Competence of the Control and Experimental Groups

Based on the mastery of the skills obtained, it is known that only 10 students (27.78%) in the control group have achieved the mastery level, while 26 students (72.22%) have not. On the other hand, in the experimental group, the majority of students or as many as 34 students (94.44%) have achieved the mastery level, while two students (5.56%) have not. The statistic of the mastery level of the students in the control and experimental groups is presented in Figure 5.
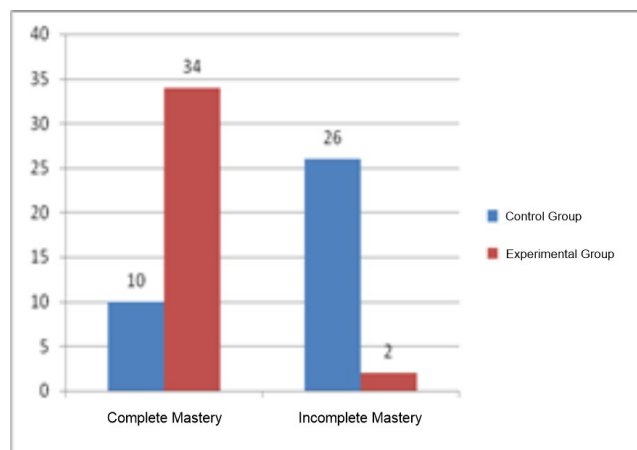

Figure 5. Practicum Mastery Score of the Control and Experimental Groups

Apart from the number of students who have achieved the mastery level, the differences in the ability to make bustier of the students in the control and experimental groups can be seen from the average score obtained. Based on the results of the practice of making bustier, it is known that the classical average score in the control group is 75.382, which is lower than the experimental group average score of 89.630. This shows that classically the students' average score of the ability to make bustier after they learned activities is much higher when they used the e-module. The average score is presented in the form of a bar graph in Figure 6.
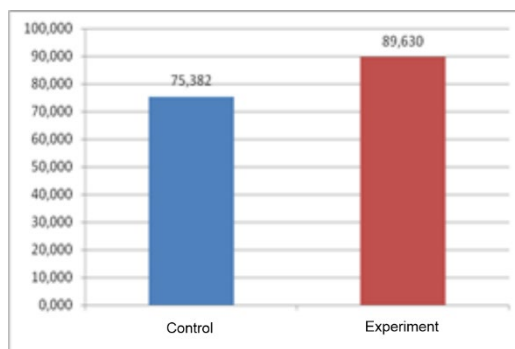

Figure 6. Practicum Average Score of the Control and Experimental Groups

The result of the attitude competency test in the control group, after learning activities, shows that 21 students (58.33%) have achieved the mastery level, while 15 students (41.67%) have not. In the experimental group, which used the e-module in learning, more students have achieved the mastery level, namely 28 students (77.78%), while eight students or 22.22% have not achieved the mastery level. These results are shown in the form of a bar graph in Figure 7.
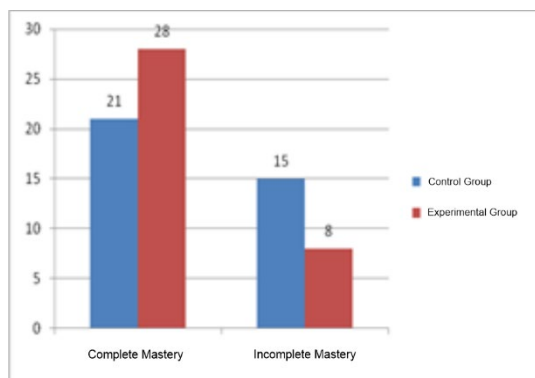

Figure 7. Mastery of Attitude Competence of the Control and Experimental Groups

In addition, the comparison of the control group and the experimental group in terms of attitude competence can also be seen from the average scores obtained classically. The average score obtained by students in the control group is 78.889. This score is lower than that obtained by the students in the experimental group, which is 84.653. This shows that the average score in the attitude competence of the students in the experimental group is higher than the average score of the students in the control group. The comparison of the average score in the attitude competence of students in the control and experimental groups can be seen in Figure 8.

The result of the pretest of student learning independence show that in the control group the majority of the students (31 students or 86.11%) have learning independence in the good category. Furthermore, four students (11.11%) have excellent learning independence and one student (2.78%) is with fairly good learning independence. In the experimental group, the majority of students (27 students or 75.00%) also have initial learning independence in the good category. Furthermore, seven students (19.44%) have very good learning independence and two students (5.56%) have fairly good

learning independence. The result of the student learning independence pretest is presented in the form of a bar graph in Figure 9.
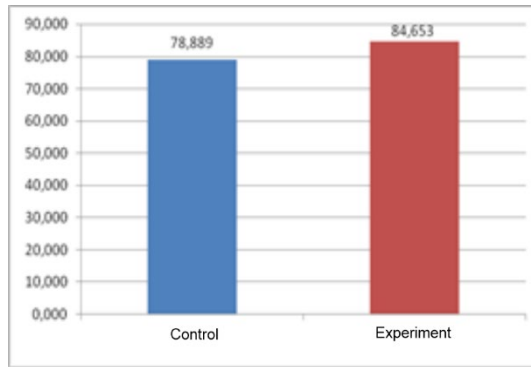
Figure 8. Average Score in Attitude Competence of the Control and Experimental Groups
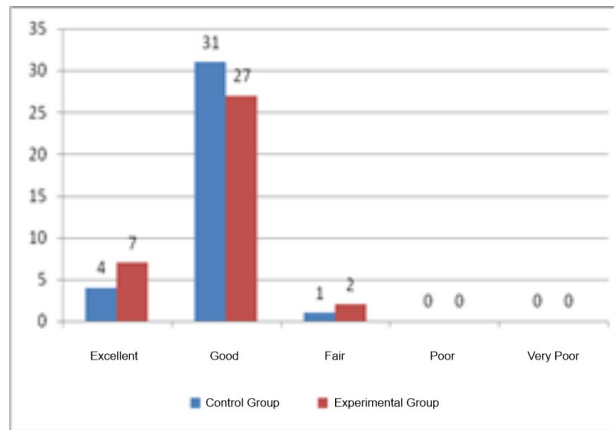
Figure 9. Pretest of Learning Independence of the Control and Experimental Groups

The posttest scores that have been obtained show that the students in the control group experienced an increase in learning independence. The number of the students who have learning independence in the good category decreases to 24 students (66.67%), while the number of those with very good learning independence increases to 12 students (33.33%). In the experimental group, there is an increase in the number of the students with excellent learning independence to 35 students (97.22%), while one student has learning independence in the good category. The result of the posttest of learning independence of the students in the control and experimental groups is presented in Figure 10.
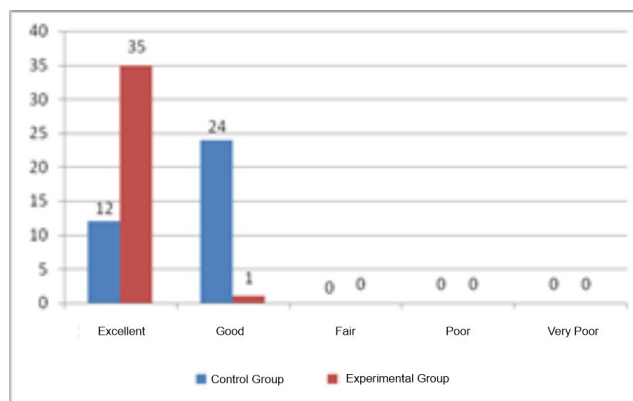

Figure 10. Posttest of Learning Independence of the Control and Experimental Groups

Based on the average score obtained, it is known that the average score of the control group in the pretest is 3.850 and that of the experimental group is 3.891. The two scores are not much different. The average score of the experimental group is 4.684. It is much higher than the average score of the control group, which is 4.107. The average scores can be seen in Figure 11.
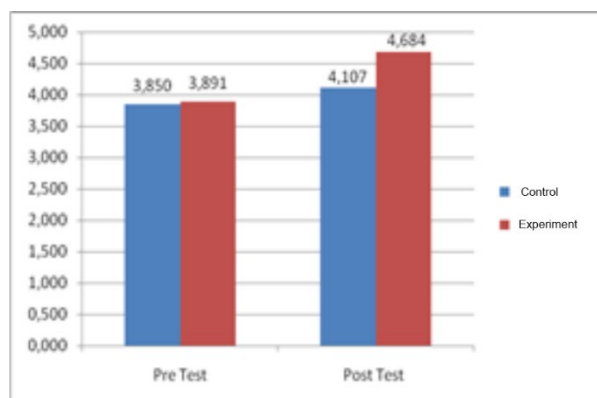

Figure 11. Average Score of Learning Independence Pretest and Posttest of the Control and Experimental Groups

The e-module effectiveness testing was carried out with a non-parametric test, thus using the Wilcoxon test. The results of the Wilcoxon test for the learning achievement of the control and experimental groups are presented in Table 7 and Table 8.

Table 7. Result of Wilcoxon Test of Learning Achievement of Control Group

	Average	Z-Score	Significance
Pretest	68.889	-5.243	0.000
Posttest	82.222		

Table 8. Result of Wilcoxon Test on Learning Achievement of the Experimental Group

	Average	Z-score	Significance
Pretest	69.861	-5.240	0.000
Posttest	87.847		

Based on the result of the t-test that has been carried out in the control group, it is known that the significance level is 0.000 (< 0.05), meaning that the average scores in the pretest and posttest of learning to make bustier in this study are significantly different. This shows that the learning activities carried out by the teacher by conveying the material directly to the students in the control group can improve students' knowledge related to making bustier. Based on the result of the t-test that has been carried out in the experimental group, it is known that the significance level is 0.000 (<0.05), meaning that the average pretest and posttest scores in bustier-making learning achievement in this study are significantly different. This shows that the learning activities carried out using the e-module in the experimental group can improve students' knowledge regarding bustier making.

In addition, the posttest of learning achievement was also tested to determine whether the use of the e-module in teaching the experimental group was more effective than ordinary teaching in the control group. This testing was carried out using the Mann-Whitney test. The teaching was said to be effective if the significance value obtained is < 0.05. The test result are briefly presented in Table 9.

Table 9. Result of Mann-Whitney Posttest of Student Learning Achievement

	Average	Mann-Whitney U	Sig
Control group	82.222	342.000	0.001
Experimental group	87.847		

The effectiveness test for independent learning in this study was carried out using a parametric test, thus using a paired t-test. The result of the paired t-test analysis for learning independence is presented in Table 10 and Table 11.

Table 10. Result of Paired t-test on Learning Independence of the Control Group

	Average	t-count	Sig
Pretest	3.851	7,727	0.000
Posttest	4.107		

Table 11. Result of Paired t-test of Learning Independence of the Experimental Group

	Average	t-count	Sig
Pretest	3.892	14.439	0.000
Posttest	4.684		

Based on the result of the analysis that has been carried out in the control group, it is known that the significance value obtained is 0.000 (<0.05), which means that the difference in the average scores in the pretest and posttest of student learning independence is significant. This shows that learning activities carried out by delivering materials directly to the control group can increase student learning independence.

Based on the result of the analysis that has been carried out in the experimental group, it is known that the significance value obtained is 0.000 (<0.05), meaning that the difference in the average pretest and posttest scores of learning independence is significant. This shows that the learning activities carried out using the e-module in the experimental group can improve students' knowledge regarding bustier making.

In addition, testing was also conducted on the posttest of learning independence in the control and experimental groups to reveal whether or not teaching by using the e-module was more effective than ordinary teaching. Based on the normality test, it is known that the posttest scores obtained are normally distributed and homogeneous, so the test is carried out using the independent t-test. The test result is presented in Table 12.

Table 12. Result of Independent T-Test Posttest on Learning Independence of the Control and Experimental Groups

	Average	t-count	Sig
Control group	4.107	11.026	0.000
Experimental group	4.684		

Based on the result of the analysis, it is known that the significance value obtained is 0.000 (<0.05), meaning that the average score of learning independence of the control group is significantly different from that of the experimental group. This shows that the e-module used in the teaching of the experimental group is effective in increasing students' learning independence compared to ordinary learning activities carried out in the control group.

Final Product Review

The e-module for making the Hosanna Moda system bustier was developed based on the needs of students and teachers, and it was declared feasible by experts and thus it was declared feasible in small and large scale trials, and then the effectiveness testing was carried out. The effectiveness testing was conducted to obtain empirical evidence that the developed Edmodo-based e-module was suitable for use in learning and it also showed its effectiveness in increasing student learning independence and learning achievement in the Hosanna Moda system bustier making materials.

The Effectiveness of Edmodo-Based E-Module for Making Hosanna Moda System Bustier in an Effort to Improve Student Learning Independence

Learning independence refers to students who try to carry out learning activities on their own consciousness. They will try to understand the material being studied based on their abilities, and they can also ask other students or the teacher for the explanation of the things that they do not understand in independent study. The independence of students in learning can take place well if it is supported by the right sources and learning media. This study develops an Edmodo-based e-module for the construction of the Hosanna Moda system bustier.

Edmodo is one type of information technology in the form of a website and it can be used by students, teachers, and guardians of students (Nasrullah et al., 2017). Edmodo can be accessed anytime and anywhere as long as there is a device that is connected to the Internet. Teachers can upload learning materials, practice questions, and assignments through the application. The students can download it and work it out according to instructions, even their learning results can also be known through Edmodo, and student guardians can monitor the student learning process and learning achievement directly through the application.

In addition, the developed e-module contains not only learning materials, but also instructions for using it, such as an explanation of the steps for using the e-module and equipment that needs to be provided and prepared in order to be able to take part in learning activities. Students can ask the teacher through the message feature provided in Edmodo or face to face regarding the material that is not yet clear. They can do the assignments and exercises provided in each learning activity. They are also asked to prepare the tools and materials that are used to practice making bustier.

The instructions for using the e-module are important to be included and explained in the e-module, which are intended to train students' independent learning, so that they can also study on their own at home properly according to the specified flow of learning activities. Although the developed e-module is intended to train students' independence in learning, the students can still ask the teacher online or directly when learning is in the classroom if there are things that are not understood.

The Edmodo-based e-module that was developed was then tested for its effectiveness in improving student learning independence. The testing was conducted by comparing the students who studied by using the Edmodo-based e-module with those who studied without the help of the e-module. The results of the analysis show that the learning independence of the students who studied by using the Edmodo-based e-module is higher than that of those who studied without using the e-module. The differences shown are statistically significant. This means that the effectiveness of the developed Edmodo-based e-module is proven to be able to make students' learning independence better.

The high students' learning independence is shown by their not depending on others, which means that the e-module is able to help students understand the material more easily without the need for detailed explanations from the teacher. Students can also make patterns to sew bustier to completion without asking the teacher much and they can work together with their friends. It also shows that students have high confidence in their own work, either following the bustier example given, or creating their own bustier model in accordance with the teacher's instruction.

Students' increasing learning independence proves that the developed e-module can provide functions and benefits as expected. The material is described in detail, starting from the definition of bustier, the steps for making patterns, and sewing bustier until it is ready to use, and it is illustrated with relevant pictures to help students learn independently each stage that must be passed in order to produce bustiers. Students can also ask Edmodo or the teacher directly during learning activities in the classroom the material that has not been understood.

The results of this study are in line with the research conducted by Sujadi et al. (2017) and Purnawarman et al. (2016). Both studies also used Edmodo media in learning activities. The results of both studies also stated that Edmodo was able to facilitate students to learn better. This is in line with the results of this study that the Edmodo-based e-module can be used by students well. Students can study independently at home with the help of Edmodo, which can be accessed anytime and

anywhere, so that student learning activities for bustier making materials take longer and students also have a longer time to understand the process of making bustiers and to practice making bustiers with better results

The Effectiveness of the Edmodo-Based E-Module for Making Hosana Moda System Bustier to Improve Learning Achievement

The students who have participated in learning activities will have knowledge, understanding, and skills that tend to be better than before. This can be shown by their learning achievement. Learning achievement is the ability obtained by students after participating in learning activities, which can provide changes in behavior, both knowledge, understanding, attitudes and skills of students, so that they will be better than before. Learning achievement can be obtained by students by taking the tests or questions from the teacher, that measure their abilities, from cognitive, affective, and psychomotor aspects.

The teaching-learning activities in this study applied the use of Edmodo-based e-module on the topic of Hosanna Moda system bustier making materials. Students were asked to download the e-module materials for making the Hosanna Moda system bustier through their respective Edmodo accounts, which then they studied independently at home. In this way, the student learning time is longer when compared to having to study in the classroom, where time for learning activities is limited. This is expected to give additional learning time to students I order to understand the material for making bustier better. Therefore, the development of Edmodo-based e-module in this study is also aimed at improving student learning achievement.

The Edmodo-based e-module was then tested for its effectiveness on student learning achievement. The result of the effectiveness testing shows that the developed e-module is proven to be able to improve student learning achievement in the material for making bustier. This is indicated by an increase in the number of students who achieved mastery criterion after they learned by using the e-module. Although there are still four students who have not achieved the mastery criterion, this number is still lower than that of the students learning not by using the e-module, which is as many as eight students.

The result of this study also shows that the average score of learning achievement of the students who used the e-module is higher than that of those who did not use the e-module. This proves that the developed e-module is able to assist students in strengthening their understanding of bustier making with various materials that are presented in a complete and easy to understand manner.

The students' understanding also has an impact on the form of bustier that is produced according to their expectations. This shows that the students' psychomotor competence or skills in making bustier with the Hosanna Moda system also increased after they studied the materials through the developed Edmodo-based e-module. The students also show that they have better affective competence, meaning that they can learn independently by utilizing the e-module, not making noise during learning activities in class, actively participating in group activities, doing every task given by the teacher, and showing confidence during class activities, such as not copying a friend's work, daring to ask questions, and expressing their opinions in front of the class.

The result also shows that there are still some students who have not achieved mastery criterion in cognitive, affective, and psychomotor aspects. This is because they did not fully understand the material for making the Hosanna Moda system bustier through independent learning with the e-module. This then became a point to consider for the remedial action on the incompletely mastered material. In addition, it is also necessary to question whether or not the Internet network access is a constraint for students in achieving the mastery criterion.

The students who do not have a good understanding means that there are still learning materials that have not been understood, and they do not ask the teacher about them to get the needed explanation. This shows that there are still students who need direct guidance and explanation regarding the materials for making bustier, which means that they have not been able to do independent learning optimally. The students have not been able to produce bustier patterns or designs according to the examples, and cannot help their classmates who are also having difficulties. The difficulties experienced by students in making patterns and in sewing bustier made it take longer

for them so that it had an impact on late submission of assignments. Based on these shortcomings, the teacher explained again in the classroom learning activities about things that had not been understood by the students so that they could have a better understanding.

Nevertheless, the result of this study indicates that the Edmodo-based e-module shows its effectiveness in improving student learning achievement, and this in line with the finding of the research conducted by Suyoso and Nurohman (2014) which showed that the developed e-module was able to improve student achievement. E-module is considered capable of helping students to better understand the learning materials, because students not only learn at school, but also repeat the lessons at their respective homes.

In addition, the result of this study is also in line with the finding of the research conducted by Al-Said (2015) and Magreñán et al. (2015) both of whom used Edmodo as a medium to upload their developed e-module. The study found that Edmodo was effective in improving communication in teaching-learning activities, which in this study was also used so that students could freely ask the teacher if there was something that was not understood. The two studies also state that students' academic results can be improved by using Edmodo in the learning process, which means that the use of appropriate teaching media can improve students' academic achievement.

CONCLUSION

The conclusions of this study are as follows: 1.) The e-module that has been successfully developed contains learning materials on the making of Hosanna Moda system bustier, starting from design analysis, pattern making procedures, and detailed steps for sewing the Hosanna Moda system bustier illustrated by relevant pictures to make it easier for students to understand it when they study independently. Teachers also need an e-module that is cost efficient but still effective, which every student can have so that they can study independently wherever and whenever; 2.) The developed e-module has been declared feasible by three validators, namely material expert, media expert, and linguist, after three feasibility tests were carried out. In the follow-up test, the result of the operational test analysis, for teacher responses, shows that the average score obtained is 5.00 (very good category) which means it is feasible to use, while the student responses show that the average score obtained is 4.59 (very good category) so that the e-module is in the appropriate category and can be used in teaching-learning activities; and 3.) The e-module effectiveness testing conducted on students' learning independence shows that the average score of learning independence of the experimental group was higher than that of the control group, at the significance level of 0.000 (< 0.050). While the e-module effectiveness testing conducted on student learning achievement shows that the posttest average score of the experimental group is much higher than that of the control group, at the significance level of 0.001 (< 0.050). This shows that the Edmodo-based e-module for making the Hosanna Moda system bustier is effective in increasing student learning independence and learning achievement..

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Teaching factory management during the Covid-19 pandemic

Yozi Vidiastuti *, Nurtanio Agus Purwanto (iD)
Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: yozividiastuti.2019@student.uny.ac.id

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ABSTRACT

This research aims to determine how the teaching factory at SMK SMTI Yogyakarta handled during Covid-19 pandemic. A descriptive qualitative case study approach was used as the method. Semi-structured interview techniques, observation, and documentation were used to collect data. The interviewed data was collected from 3 informants. This study used triangulation techniques to check the validity of the data. The triangulation technique in this study used source triangulation, which compares the interview results of 3 informants to check the compatibility of the information obtained, then analyzed using an interactive model from Milles and Huberman. The implementation of the teaching factory at SMK SMTI Yogyakarta aims to improve student competence so that students can adapt and become accustomed to conditions in the real industrial world under the teaching factory's objectives. Schools continue to work with the industry on the implementation of the teaching factory in order to achieve the teaching factory's goals, and SOP (Standard Operational Procedures) are tailored to SOP from industries related to established health protocols. The implementation of the teaching factory can be done by forming a BLUD at the school level, which will form a learning process that is centered on entrepreneurship, with the income generated from the production used as capital, especially for SMK SMTI Yogyakarta.

INTRODUCTION

The Corona Virus Disease pandemic, also known as Covid-19, started in 2019 and was a global disaster that impacted every aspect of life. Covid-19 is a global disease outbreak that can potentially disrupt education systems around the world, especially in developing countries (Wajdi et al., 2020). The United Nations Educational, Scientific and Cultural Organization (UNESCO) also announced that the Covid-19 disease epidemic has now turned into a pandemic and has impacted the global education system (UNESCO, 2020). The entire educational system, examinations, and educational assessments have all been impacted by Covid-19 (Pujari & Shekatkar, 2020).

According to data from the Ministry of Health Republic of Indonesia (2021), reported cases of Covid-19 in Indonesia reached 1,410,134 cases as of March 13, 2021, prompting the Indonesian government to implement a micro-PPKM (Enforcement of Community Activity Restriction) policy in several districts and cities across Java-Bali through Ministerial Instruction No. 3 of 2021. To counter the spread of Covid-19, the Indonesian government has introduced a range of educational policies, including the closure of schools at all levels, from elementary to higher education.

Learning took place remotely or online during the one-year Covid-19 pandemic. This has a huge influence on students' mindsets and psychology. The Covid-19 pandemic has surpassed usual limits, posing a threat to human mental health, causing preparedness for preventive action (Tadesse & Muluye, 2020). Learning that was once done in a traditional classroom setting with direct contact between teachers and students must now be done online or virtually (Zhang, 2020). Online learning is a way to keep the education system running during the pandemic, but it can be a barrier in developing countries because many parents who follow their children to study at home have trouble accessing the internet.

Daniel's (2020) study shows that to increase the capacity to teach remotely, schools and colleges should take advantage of asynchronous learning, which works better in digital formats, and that to increase the capacity to teach remotely, schools and colleges should take advantage of asynchronous learning, which works best in digital formats. A number of tasks and jobs that position Covid-19 in a global context should be included besides subjects. Since 70 percent of learning in SMK is a practical activity, and the remaining 30 percent is an introductory theory, the transition from traditional learning to virtual learning has a major impact on implementing learning, especially practical learning in vocational high schools (Rismawati & Khairiati, 2020). This is a challenge in and of itself for SMK SMTI Yogyakarta, particularly in implementing the teaching factory program, which should be used as learning that refers to production-based standards and procedures in the industry and is carried out in an environment similar to that of industry (Hasanah & Malik, 2018). this cannot normally work because of this pandemic. Therefore, despite the lack of implementation, appropriate learning management is expected to ensure the achievement of learning objectives in schools during this Covid-19 pandemic.

Working for and with a group of people to accomplish desired goals efficiently and effectively is what management is all about (Gulati et al., 2016). Daft and Marcic (2019) define management as the effective and efficient accomplishment of organizational objectives by planning, organizing, leading, and controlling organizational resources. According to Rieley (2020), the field of education is currently grappling with these challenging circumstances. This situation demonstrates the immediate need for educational institutions to prepare and implement learning scenarios in the event of a pandemic. The management function of Terry (in Hasibuan, 2003) is divided into four elements, planning, organizing, actuating, and controlling. The first function is planning; Sukarna (2011) states that planning is used to choose alternatives, formulate goals, design strategies, arrange procedures, and determine what programs will be carried out in an organization.

The second function is organizing, Organizing is the process of assembling and assigning the human, financial, physical, informational, and other resources needed to achieve goals; using resources to comply with predetermined goals is the root of planning (Bateman et al., 2020). According to Latif et al. (2018), the third role is actuating Movement is the basic understanding of the work they do, which contributes to predetermined goals, and offering inspiration, guidance, or direction, in order for them to understand and emerge a desire to work diligently and efficiently control is the last function of management. People can take actions or decisions to achieve their own needs rather than organizational goals if they lack control (Flamholtz, 1996).

The management of the teaching factory during the pandemic will be defined using these management functions in this study. One of the pandemic-affected educational institutions is SMK SMTI Yogyakarta, where the vocational high school (VHS) only opened the teaching factory building in 2020, but the building could not function optimally as it should for all SMK SMTI Yogyakarta students. The building is currently being used to produce GeNose. This Covid-19 detection method results from a partnership between VHS SMTI, Universitas Gadjah Mada, YPTI, and a consortium of five companies in the GeNose project. Students from SMK SMTI class XII majoring in mechanics carry out the development process, which is performed in compliance with health regulations.

This is used as a teaching factory operation in schools, with all the limitations that come with it. The concept of a teaching factory aims to transfer real production OR manufacturing into the classroom environment. A real-life production atmosphere needs to be used to improve the quality of the learning process with everyday industrial practice processes (Rentzos et al., 2014). Implementing a teaching factory is inextricably connected to the fundamental values it holds. According to

ATMI BizDEC (2015) quality, performance, creativity, and innovation are three basic teaching factory values that need to be learned in the learning process for students.

To achieve three basic teaching factory values, so it is needed management. According to Manalu et al. (2017), management in the teaching factory can be described in Table 1.

Table 1. Management Parameters

Parameter	Sub Parameter
Management	Financial planning
	Organizational structure and job description
	SOPs and workflows
	Leadership
	The impact of the Teaching Factory on institutions and the environment

Table 1 explains that teaching factory management includes financial planning, organizational structure, job descriptions, SOPs and workflows, leadership, and the influence of teaching factories on institutions and the environment. This study aims to examine teaching factory management at SMK SMTI Yogyakarta based on criteria published by Manalu et al. (2017). Therefore, this study aims to find out how the teaching factory was managed during the Covid-19 pandemic at SMK SMTI Yogyakarta, which at that time learning activities, especially practice, were limited.

RESEARCH METHOD

This research uses a descriptive qualitative with a case study approach. A case study is a form of qualitative research that aims to investigate a subject by collecting data using appropriate data collection techniques. This research analyzes the management with parameter teaching factory at SMK SMTI Yogyakarta. The subjects in this study were the vice-principal of the curriculum section, the coordinator of the teaching factory organizer, and representatives of staff from a consortium of companies that collaborated in the GeNose production process.

The subject is considered knowing information about the management of the teaching factory at SMK SMTI Yogyakarta. This study used structured interview techniques, observation, and documentation to collect data. Interview instructions, field notes, and documentation notes were used as tools. If the data has been tested for validity, it is declared valid. Validity testing can be done by using triangulation techniques. This technique is used in research to verify data from the same source using different techniques. In this research, technique triangulation was achieved by analyzing the suitability of data from interviews, documents, and observations.

This qualitative research data collection was carried out going forward during the research until the correct data was collected. According to Miles and Huberman (2009), the first step in data analysis in this study is data reduction. Researchers gather data through interviews, observations, and documentation, which is then summarized, selected according to the necessary data, and based on the research objectives. Making interview, area, and documentation notes from the data that has been selected and based on the research objectives is the second phase.

The notes were coded in order to organize the information and make it easier to analyze for researchers. Step three involves presenting the data as a summary or text after it has been coded. The fourth and final stage is verification or conclusion, in which the researcher will draw conclusions based on existing data and evidence gathered during the analysis. This conclusion addresses the questions raised by the problem formulation in this study.

RESULT AND DISCUSSION

Universitas Gadjah Mada (UGM) developed GeNose, a Covid-19 detection tool that was released in early 2021. GeNose uses an AI (artificial intelligence) technology to detect the Covid-19 virus by processing data from human breath collected in special bags. Since the demand for GeNose is growing, UGM is continuing to speed up the production process by collaborating with several

government and private agencies. The Ministry of Industry of the Republic of Indonesia and a private company have selected SMK SMTI Yogyakarta, an SMK under the auspices of the Ministry of Industry of the Republic of Indonesia, to collaborate in the production of GeNose. This GeNose development process took place in the SMK SMTI Yogyakarta teaching factory building, which was also used as a teaching factory activity. Because of the current pandemic's restricted mobility, a few students only carried out the teaching factory practical method and followed strict health protocols. GeNose production is being used as a teaching factory practice equivalent to industrial work practices that XII grade students should carry out but cannot due to the pandemic, so students continue to carry out practical tasks in a school setting. SMK SMTI Yogyakarta will equalize the importance of industrial work practice with the teaching factory practice of making GeNose because it follows Ministry of Education and Culture of the Republic of Indonesia guidelines, which state that schools may simplify the curriculum independent (Ministry of Education and Culture of the Republic of Indonesia, 2020).

Financial Administration

The school and five consortium companies manage the financial administration of the teaching factory at SMK SMTI Yogyakarta. The administration is the process of working with and through others to achieve objectives efficiently (Sergiovanni et al., 1987). According to Syarifudin (2005), financial administration is a collection of processes for managing finances and mobilizing relevant personnel. Financial management is governed by its own set of laws and policies within an institution. PT. Swayasa Prakarsa (part assembly, licensing, standards, QC/QA, and business), PT. Stechoq Robotika Indonesia (pneumatic section), PT. Yogya Presisi Teknikatama Industri (mechanical part), PT. Hikari Solusindo Sukses (electronics and sensors section), and PT. Nanosense Instrument Indonesia (electronics and sensors section) is among the (part of artificial intelligence, electronics, and after-sales).

The five companies are funding the production of GeNose, one of which is the SMK SMTI Yogyakarta production process. Interview data from three sources back this up.

"The GeNose production funds come from the partnership of five firms, which then formed a consortium and collaborated with SMTI. Our internal company manages financial administration such as buying raw materials, purchasing equipment, and student payroll" (ST).

The informant's statement indicated that SMK SMTI Yogyakarta only prepared a place and human resources for the production of GeNose.

"Internal company parties carry out financial administration, so we only provide a report on the compatibility between attendance through signatures and fingerprint attendance for student's payroll purposes, because the company is in Sleman Regency, so the payroll is under the applicable regulations, which is 80% of the UMR amount Sleman Regency" (KT).

Students not only get the knowledge and experience of internships in companies located in the school, but students also get rewards for their performance. In recent years, apprenticeships have become increasingly popular among vocational high schools, as it is considered an important component of education (Wilson & Beard, 2013).

"Regarding school revenue, during the 2015 teaching factory, schools never used the results of the teaching factory, so the aim for our pure teaching factory was to develop students' skills in order to be better equipped for the industrial world and world of business." (WK).

This is also supported by a document of student attendance records for payroll. The interview results show that the teaching factory at SMK SMTI Yogyakarta during the pandemic was used as a forum for industrial work practice or On-The-Job Training (OJT) schools only facilitate the place (teaching factory building) and also coordinate students. Two learning pathways, school-based VET (Vocational Education and Training) with on-the-job learning periods (currently via a training agreement) and apprenticeship training, cannot be considered as parallel (Rintala & Nokelainen, 2020). So, both must be carried out between apprenticeship practices and also learning practices in schools. The GeNose production process at SMK SMTI Yogyakarta is used as a teaching factory,

OJT, or industrial work practices during this Covid-19 pandemic, and students could not practice industry work outside.

Organizational Structure and Job Description

The structure of the organization matters in achieving the objectives of an organization. This correlates with Liao et al. (2011), who believe that organizational structure is valuable for directing individual behavior through shared values, norms, and objectives. Organizational structure can be defined as a mechanism that connects and coordinates individuals within their framework, roles, powers, and powers in an organization (Kanten et al., 2015). SMK SMTI Yogyakarta formed a special team to manage GeNose's teaching facility. This team comprised the managing director, the supervisor of the department of mechanics, the instructor of mechanics as manufacturing assistants, and other teachers who supervised the department of administration. The structure and job description can be seen in Figure 1.

```
        ┌─────────────────────┐
        │ Principal (In Charge)│
        └─────────────────────┘
                  │
           ┌─────────────┐
           │ Coordinator │
           └─────────────┘
              ┌────┴────┐
        ┌──────────┐ ┌────────────────┐
        │   Tutor  │ │ Administration │
        └──────────┘ └────────────────┘
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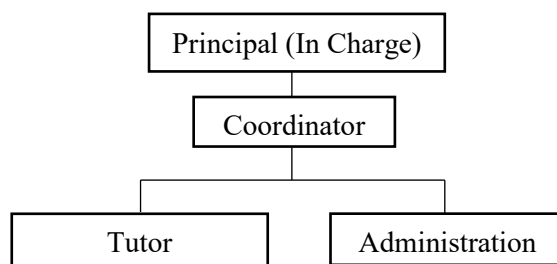
Figure 1. Teaching Organizational Structure Factory of SMK SMTI Yogyakarta

The organizational structure of the Teaching Factory at SMK SMTI Yogyakarta (Figure 1) is a functional organizational structure. It is an organizational design that unites positions into units based on skills, expertise, and resources in organizations that perform as functional units (Samah et al., 2019). The organizational structure in the teaching factory must also be clearly compiled with a description of the work of each member. It compiles the existing organizational structure at school to achieve the goals of school programs that have been designed so that the program can run effectively and efficiently (Nurmalasari & Syah, 2019). Job descriptions at the teaching factory of SMK SMTI Yogyakarta can be seen in Table 2.

Table 2. Job Description Teaching Factory at SMK SMTI Yogyakarta

Position	Job Description
Principal (In charge)	1. Signed an MOU with related companies 2. Making policies related to the teaching factory 3. Create a teaching factory team and determine the duties and functions of each member
Coordinator	1. Responsible for all production implementation processes 2. Coordinate with industry and school principals regarding production developments 3. Perform control related to the technical implementation of production
Tutor	1. Absent student attendance list 2. Helping students if there are barriers in the production process 3. Coordinate with the teaching factory coordinator regarding production implementation 4. Recording daily production activities
Administration	1. Make a recap of student attendance for payroll purposes 2. Preparing reports based on regular production activity records and inventory reports. 3. Recapitulating the sum of incoming products and raw materials to be distributed

The job description is a description or explanation of the job in accordance with the position of the position set earlier (Mondy & Martocchio, 2016). Therefore, many organizations work hard to ensure that the job description they have is useful for effectiveness and productivity in achieving organizational goals (Raju & Banerjee, 2017). Standard operating procedures are planned in advance to draw up guidelines to be carried out and measures according to the location and nature of events in an emergency (ATMI BizDEC, 2015). The job description in Table 2 contains the main tasks and functions of each position that must be carried out to achieve the Teaching Factory's goals at SMK SMTI Yogyakarta.

SOP and Work Flow

Standard operating procedures (SOP) are instructions for operating procedures that comply with established requirements. These guidelines are used to ensure that all behavior and equipment usage is carried out properly, allowing operations to operate effectively and efficiently (Tambunan, 2013). SOP is a written policy, procedure, and standard for production, marketing, management required for the organization's success (Balcı, 2005).

At SMK SMTI Yogyakarta, the teaching factory is currently being introduced using SOPs and workflows that have been customized to the pandemic's conditions. As specified in the Decree of the Four Ministers (2021) regarding guidelines for implementing learning during a pandemic, SOPs must follow government health protocols. Implementing (wearing masks, washing hands, keeping the distance, staying away from the crowd, and reducing mobility), restricting the number of students' learning, and controlling the distance between students during practice are all health guidelines that must be followed. The findings of interviews and documents relevant to the SOP teaching factory support this:

"There are two kinds of SOP for teaching factory here. The first is SOP for the production process and for administration, compiled together with the principal and industry, and the teaching factory team."

Many educational institutions have tried to bring their educational practices closer to the industry and the concept of teaching factories using SOP with industry standards (Tisch et al., 2013). *"We already have SOPs ourselves, then we submit them to school. In this pandemic situation, of course, we adjust our SOPs to strict health protocols" (ST).*

SOP teaching factory at SMK SMTI Yogyakarta uses SOPs from related companies. Then it is reviewed and adjusted to the existing conditions in the school. Reopening the school after social restrictions became another challenge by using the new standards operating procedures (Pokhrel & Chhetri, 2021).

Leadership

Since the principal is the school's leader, school leadership is mostly associated with school principals; however, everybody has a leadership spirit, including teachers and school staff. Many types of research on educational leadership have been performed not only by school principals but also by teachers. In terms of problem-solving, decision-making, and effective action, the context of educational leadership, has become incredibly complicated (Chukowry, 2018).

Teacher leadership is the teacher's ability to influence, direct, and guide students in the learning process, both inside and outside the classroom (Supardi, 2013). Teacher leadership through delegation of responsibilities can meet the demands of 21st-century education (Shah, 2017). In this study, teacher leadership refers more to the ability of teachers who are part of the teaching factory team to direct and guide students in the implementation of the GeNose production process and coordinate with related industry parties. This was confirmed by interviews:

"The principal delegates authority, forming a teaching factory team, administering the Memorandum of Understanding, and managing all aspects of the teaching factory's growth. We have assigned the remaining tasks to the relevant team" (WK).

Delegation can be defined as the transfer of centralized administrative tasks to organizations. With delegates, centralized administration will divert decision-making and responsibility (Balcı, 2005). A delegation is a form of decentralization. Decentralization refers to the delegation of authority to decisions and duties themselves to those who actually do (Şahin, 2018).

"We coordinate with the accompanying teachers regularly" (ST).

Coordination is part of achieving the organization's objectives because coordination is joint work that is done effectively and efficiently (Salvato et al., 2017).

"There is a teaching factory supervisor drawn from one of the productive mechanics instructors, and a companion teacher who accompanies the students in the development process" (KT).

In management, it includes leadership in the management function, according to Allen (in Manullang, 2015), which is referred to as leading. This leading function includes decision-making, coordination, and communication with related parties, encouraging subordinates, and directing and guiding subordinates to achieve the desired goals (Manullang, 2015). Leadership includes command and coordination activities (Conkright, 2015).

Teaching factory Impact on Institutions and the Environment

This research is included in the control management function in managing the impact aspect. There must be control over the impact of the teaching factory so that the operating process has an impact on both the organization and the environment. Control is a management function in which managers at all levels of an organization are responsible for their roles in achieving organizational objectives (Čambalíková & Misun, 2017). Employee development and continuous improvement can be used to exert control (Schraeder et al., 2014). Employee development and promoting continuous improvement in this research, namely the development of student competencies through teaching factory activities and continuous improvement related to student career development.

"Our students can continue to do industrial work practices at school or outside of school. If they practiced outside of school, the school would substitute them with other students for the GeNose manufacturing process at the teaching factory" (KT).

Control activities in this study also include the impacts of implementing the teaching factory, both for SMK SMTI Yogyakarta and the environment (industry). This is supported by the results of interviews from interviewees:

"Of course, the impact of the teaching factory is to improve student's skills. This teaching project brings the industry to schools; students learn to accord to the norms and procedures in the actual industry" (KT).

Through teaching factory learning, students learn to develop the necessary strategic skills to readily enter the workforce and live in society through the development of personal qualities (honest, disciplined, independent, creative, achievement motivation, and good work ethic), become independent students, interpersonal relationships, cooperation, creative thinking, decision making, and problem-solving (Lucyana et al., 2017).

"The impact of the teaching facility was sole because of students' needs in relation to school income from the teaching factory until now schools were not focused on it. The corporation, therefore, pays no rent for the house or the like, only the students' payroll. I don't believe there would be any negative effects as the GeNose waste generated is also not liquid waste like a hand sanitizer. The waste is only the waste of cables that can be recycled" (WK).

SMK SMTI Yogyakarta prioritizes enhancing students' competency in accordance with the purpose of the teaching factory. Until this time, the school was never oriented to the profit from implementing the teaching factory.

"As an industry working with SMTI, we will benefit from this project as our demand continues to grow. We can now produce 300 a day, so this partnership with SMTI is very beneficial" (ST).

The impact of the teaching factory at SMK SMTI on schools and the environment (industry) is positive. This teaching factory serves as a forum for students' competence in schools because the teaching factory aims to bring a real production/manufacturing atmosphere into classroom learning. Real-life production sites have been used for teaching purposes to improve teaching activities with knowledge, which are in the process of daily industrial practice (Chryssolouris et al., 2016). teaching factory at SMK SMT also serves as a valuable resource for the environment (industry) in achieving GeNose needs.

CONCLUSION

SMK SMTI Yogyakarta is currently using the momentum of this pandemic by collaborating in the production process of GeNose, a Covid-19 detection tool whose demand is increasing. The collaboration was carried out with five consortium companies so that the school formed a teaching factory team to organize the production process, starting from arranging student schedules, student attendance for payroll, and coordination with industry. This teaching factory is used as an industrial practice carried out in schools to get work wages under applicable regulations. Until now, schools have not been oriented towards turning the teaching factory into a BLUD (Regional Public Service Agency) at the school level. The teaching factory implementation at SMK SMTI Yogyakarta is solely for improving the student competence so that students can adapt and get used to conditions in the real industrial world under the objectives of the teaching factory. The preparation of SOPs is adjusted to SOPs from related industries, which are of course guided by existing health protocols, and schools continue to coordinate regarding the development of the teaching factory with the industries involved so that implementing the teaching factory runs in accordance with the objectives previously set.

Because of this study, several suggestions for the SMK SMTI Yogyakarta, associated industry parties, and researchers have emerged. According to the Ministry of Education and Culture of the Rupublic of Indonesia, implementing a teaching factory can be created by forming a BLUD at the school level, which will establish a learning process centered on entrepreneurship, with the revenue generated from the production results being used as capital for the SMK itself. SMK SMTI Yogyakarta may undertake research into the future development of teaching factories in order for later schools to create BLUD at the school level, with the proceeds being used to cover additional school operational costs.

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The determinant factors of mothers' ability to choose healthy food

Nurul Ridhi Utami *, Endang Mulyatiningsih (iD)
Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: nurulridhiutami@gmail.com

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ABSTRACT

This study aims to reveal: 1.) The size of the capital city in consuming healthy food; 2.) Selection of healthy food between working and non-working mothers; 3.) Choosing mothers in healthy food between families with a budget for food costs per person per day; and 4.) Choosing mothers in healthy food according to the number of family members. This research is a quantitative survey. The population was the research of PKK mothers in Delta Pawan and Benua Kayong districts, Ketapang, West Kalimantan. Samples of 90 can be responsive using cluster area random sampling. Validity is based on content validity. The reliability of the instrument was calculated using the Guttman Split-half. Data analysis used descriptive and comparative analysis of K sample one way ANOVA. The results showed that: 1.) The choice of mothers in healthy food consumption was seen from the high category knowledge with a frequency of 58.8%. Attitude category is sufficient with a frequency of 52.2%, high category skills with a frequency of 54.4%; 2.) There is a positive and significant difference in the selection of mothers who lack healthy food in terms of working and non-working mothers $0.003 < 0.05$; 3.) There is a positive and significant difference in the choice of mothers in healthy food consumption in terms of family income, namely the budget for food costs per day per person of $0.000 < 0.05$; and 4.) There is a positive and significant difference in the choice of mothers in healthy food consumption in terms of family type, namely the number of family members of $0.003 < 0.05$.

INTRODUCTION

Food has an important role in the survival of a person. Good food can maintain health while bad food can cause disease. The phenomenon seen in the Ketapang Regency area is that there are still many people who do not consume enough water, vegetables, and fruit. Riskesdas 2013 data show 93.5% of the Indonesian population over the age of 10 years consume less vegetables and fruit (Claudina et al., 2018). The consumption of unbalanced/unfavorable food causes various sources of disease or interferes with daily activities.

The role of housewives in providing healthy food is needed to fulfill the nutritional needs of each family member. Mothers who do not work have more time to provide food for the family at home than mothers who work. The diet of a family whose mother does not work should be better than the diet of a family whose mother works. Mothers in choosing healthy food consumption can be classified based on their knowledge, attitudes, and actions. The research conducted by Johnson et al. (2011) and Hasibuan et al. (2019) found that a mother is responsible for providing healthy and

nutritious food for family members and the need for mothers to improve knowledge and attitudes in food selection (Fuada et al., 2019; Martiyana et al., 2018; Setyani et al., 2019). The importance of the mother's ability to provide healthy food is to protect the body from degenerative diseases. Research conducted by Hasibuan et al. (2019) and Savage et al. (2007) found that healthy food is good to eat to prevent the body from degenerative diseases. Maintaining a good diet is expected to prolong a person's life and prevent degenerative diseases. Knowledge of the right diet prevents degenerative diseases and can be a capital in choosing healthy foods. The Bureau of Research and Health Development of Ketapang Regency conveyed that the results of measuring cases of primary hypertension in Ketapang Regency increased from 13,253 in 2018 to 15,290 in 2019 (Dinas Kesehatan Kabupaten Ketapang, 2017).

Based on Riskesdas data in 2018, Ketapang Regency has a prevalence of diabetes mellitus, according to a doctor's diagnosis of 1.01% of the population. More accurate data based on blood tests of residents aged 15 years show the prevalence of diabetes mellitus has increased from 0.40% cases in 2013 to 1.44% cases in 2018. This is due to a declining healthy lifestyle, abandoned exercise habits and irregular eating habits. Based on the type of respondents work, it was found the risk of heart disease and stroke. The prevalence of heart disease, based on doctor's diagnosis in terms of age characteristics in West Kalimantan Province in 2018, showed the people above 75 years old were at 4.01%. According to job characteristics, civil servants, TNI, Polri, BUMN, BUMD are at the highest percentage compared to people having other occupations, which is 2.30% at risk of heart disease and 13.22% at risk of stroke (Kementerian Kesehatan Republik Indonesia, 2018). Foods that contain excess oil and sugar result in degenerative diseases such as stroke and heart disease.

The data show that the average daily consumption of fatty foods in Ketapang Regency is 28.52% while in Sintang Regency it is only 6.89% (Kementerian Kesehatan Republik Indonesia, 2018). A diet that contains too much fat and sugar can lead to obesity. Food consumed can be a source of energy but if excessive can cause degenerative diseases. Dinas Kesehatan Kabupaten Ketapang (2017) research findings showed that 38.27% of the respondents were obese from the number of respondents who were examined for obesity in Ketapang Regency (Dinas Kesehatan Kabupaten Ketapang, 2017; Pebriyandini et al., 2015).

The phenomenon that occurs in Ketapang Regency is that many people consume food without paying attention to the element of balanced nutrition, buying food at food stalls for geprek chicken, instant noodles, fried chicken, and others. Flour-fried chicken has a high salt and fat content, while rice contains high carbohydrates so that it lacks a balanced nutritional content. The geprek chicken dish only consists of rice and chicken, no vegetables and lots of seasoning, so the food contains only carbohydrates and protein but lacks minerals, vitamins, and dietary fiber. Attitude is an evaluation response. Kuswardinah (2016) writes that this response can occur if the individual is stimulated by a personal response. Utami et al. (2017) writes that Indonesia is ranked second in instant noodles consumption with a total of 14.9 billion packs. According to Utami et al. (2017), awareness of the Indonesian people in consuming healthy food is still lacking, seen from the consumption of instant noodles in Indonesia which surpasses Japan, which only consumes 5.66 million servings.

The types of food that people are interested in include fast food or often known as junk food. Junk food has an unbalanced nutritional content, and is high in sugar, salt, and fat. If junk food is consumed continuously, it can apprehensively interfere with digestion. The results of Palupy's et al. (2020) showed that 80% of Indonesians prefer to eat at fast food outlets, followed by hawker centers or food courts which rank second with 61%, and middle-class restaurants or cafes with 22%. There is still a high percentage of the population in West Kalimantan who consume junk food, which has an unbalanced nutritional content and is high in sugar, salt, and fat (Palupy et al., 2020).

Degenerative disease is a disease that arises due to the decline in cell function from normal conditions that can occur in old age. Several degenerative diseases such as coronary heart disease, hypertension, diabetes mellitus, and ulcers (Minsanis, 2019) can be prevented with a healthy diet. Setyawati and Rimawati (2016) presented findings that fast food generally contains high protein, high calories (especially fat and simple sugars), high salt, cooking spices, preservatives, dyes, and low fiber (Setyawati & Rimawati, 2016). Meanwhile, according to Atmarita (2014), foods that can cause degenerative diseases include fatty meats, junk food, soft drinks, butter/margarine,

creamer/coconut milk/oil, alcohol, and sugar. The Ministry of Health Regulation (Permenkes) No. 30 of 2013 stipulates the inclusion of information on the content of sugar, salt, fat, and health messages for processed food and ready-to-eat food. Kementerian Kesehatan Republik Indonesia (2018) data show that based on research findings, in West Kalimantan there are several characteristics of different patterns of sugar, salt, and fat consumption. In Sekadau Regency, 78.99% of the population consume sweet foods more often, in North Kayong 29.22% of the population often consume salty foods, in Singkawang City 35.77% of the population consume fatty foods 26.23% and 85.25% of the population like to consume seasonings (Kementerian Kesehatan Republik Indonesia, 2018).

The work that is usually the responsibility of the mother at home includes providing food, clothing, housing, and household management, as well as educating children. According to Pratiwi (2015), the task of children at home is to learn and help parents. The phenomenon that occurs shows that many working mothers have dual roles, namely as career women and as caretakers of the household. Many factors can affect mothers in providing daily food for the family. Housewives or non-working mothers have more time to provide food for the family at home than working mothers. Housewives are expected to provide a more complete menu with varied processing techniques. Kuswardinah (2016) conveys that one of the aspects of family formation is that food in the family is an activity ranging from preparing to daily food dishes. According to observations from several families with non-working mothers, it turns out that the cooked food menu is still simple and incomplete because the purchasing power of food ingredients is still low.

The budget for food per person per day can affect the mother in providing food for family members. Families with high economic status can provide more and more quality food than families with incomes below the minimum wage. Food consumed by rich families (high economy) does not necessarily guarantee health in old age. According to the results of Wynalda and Hidayat (2017), the subject's food preferences are significantly related to the region's per capita income (p <0.05).

An extended family with more than five family members is likely to cook their own food because it saves money for shopping. The findings of the research conducted by Septianasari et al. (2015) show there is a significant relationship between the number of family members and the provision of food for the family. Through this research, it is necessary to know whether the food provided by the nuclear family is healthier than the food provided by the extended family, or vice versa. Based on the description above, in this study the author wants to know what factors affect the mother's ability to provide food for the family. The title that will be researched is "A study of the differences in determining factors of mother's skills in providing healthy food".

The definition of the ability to provide healthy food in this study is the ability of a mother to find and process information, face problems in the household courageously, namely providing safe food products, then proactively and creatively, and provide food responsibly. For example, for people with sensitive digestion, limited food can be consumed by elderly family members. With good life skills, housewives are expected to be able to provide healthy and balanced nutritious food for the body needs of family members. The Ministry of National Education of the Republic of Indonesia divides life skills in the Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System article 26, paragraph 3, which states that there are four types, namely: (a) personal skills which include self-awareness and rational thinking skills, (b) social skills, (c) academic skills, and (d) vocational skills (Corliana & Giyanti, 2016; Ferazona, 2020; Fitrihana, 2008; Fluerentin, 2012; Marwiyah, 2012).

Healthy food must consist of main food and supporting food and it includes other nutrients; it meets health requirements that the body needs and if eaten does not cause disease and poisoning. Ferazona (2020) conveys Permenkes No. 41 of 2014 concerning balanced nutrition guidelines. Food intake is obtained from a variety of foods and beverages as a source of energy, growth, and replacement of damaged cells so that the body becomes healthy. According to Kusumawati and Yudhastuti (2013), food is a very important need for human life and it provides the energy and materials needed to build and replace tissues, carry out activities, and maintain the body from disease. According to Rismayanthi (2010), basically, everyone needs food that contains enough carbohydrates, proteins, fats, enough vitamins, and minerals. The balanced nutrition policy is regulated in Health Law number 36 of 2009 which states the improvement of food consumption

patterns in accordance with balanced nutrition. The logo for balanced nutrition guidelines, is in the shape of a cone/tumpeng, known as food ingredients that are categorized based on the function of nutrients, namely three uses of food (Rismayanthi, 2010). The Ministry of Health conducted a campaign regarding the reference for one-serve meals, namely "fill my plate" or "4-star concept" (Minsanis, 2019), and has been promoting it since 2017.

Various physical and psychological demands arise when choosing to become a career woman or a working mother to become an entrepreneur, civil servant (PNS), private sector, or housewife (Apreviadizy & Puspitacandri, 2014). According to Wardyaningrum (2010), the impact of the type/number of family members on the provision of healthy food, namely the habit of consuming food type, extended families have obstacles in determining food consumption because of the large number of family members. On the other hand, families with less than four members have difficulty communicating about food habits (Wardyaningrum, 2010). A nuclear family consists of husband/father as head of the family, wife/mother as executor of housekeeping and children with family members of < 3 people, 4-6 people or extended family with > 7 people in one house.

The research problem can be formulated as follows: How big is the level of mother's choice of healthy food? The novelties of this study include: differences in the choice of healthy food between working and non-working mothers, differences in mothers' choice of healthy food between families with a food budget per person per day, differences in a mother's choice of healthy food as seen from the number of family members.

The hypotheses in this study include: There is a difference in the choice of healthy food between working and non-working mothers. There is a difference in a mother's choice of healthy food between families with a food budget per person per day. There is a difference in a mother's choice of healthy food seen from the number of family members. The purpose of this research is to reveal the level of mother's choice of healthy food, the choice of healthy food between working and non-working mothers, a mother's choice of healthy food between families with a food budget per person per day, and a mother's choice of healthy food seen from the large number of family members.

RESEARCH METHOD

This research used the survey method. It was conducted in 2019-2020 in the Districts of Benua Kayong and Delta Pawan, Ketapang, West Kalimantan. The population in this study is mothers of Family Welfare Empowerment (PKK) in Delta Pawan District and 90 people in Benua Kayong District consisting of representatives from each village. The research sample was established using the cluster area random sampling technique. The data collection used a test (Guttman scale), questionnaire (Likert scale), and a closed family food menu quality form. The validity test used content validity and construct validity. Reliability test used Cronbach's Alpha formula. Reliability means that it has a level of constancy even though it has been tested many times. The instrument is declared reliable if it has rxy coefficient 0.80 (greater or equal to 0.80) (Novahadi et al., 2013). The data analysis technique used descriptive analysis and the hypothesis testing analysis used a one-way ANOVA.

RESULT AND DISCUSSION

The results of the analysis of 90 respondents show that 53 respondents are in the high category with a relative frequency of 58.8% and 37 respondents in the moderate category with a relative frequency of 41.1%. Based on the analysis of the data above, it can be explained that the knowledge of mothers in choosing healthy food in all sub-districts under study is in the high category, with a frequency of 58.8%. This result can be seen in Figure 1. Figure 2 shows that of the 90 respondents, 43 respondents are in the high category with a relative frequency of 47.8%, and 47 respondents are in the moderate category with a relative frequency of 52.2%. Based on the analysis of the data above, it can be explained that the mother's attitude in choosing healthy food in all sub-districts under study is in the sufficient category with a frequency of 52.2%.

Figure 1. Category of mothers' knowledge skill

Figure 2. Category of mothers' attitudinal skills

Figure 3 shows that out of 90 respondents, 49 respondents are in the high category with a relative frequency of 54.4%, and 41 respondents are in the moderate category with a relative frequency of 45.5%. Based on the analysis of the data above, it can be explained that the actions of mothers in choosing healthy food in all sub-districts under study are in the high category with a frequency of 54.4%.
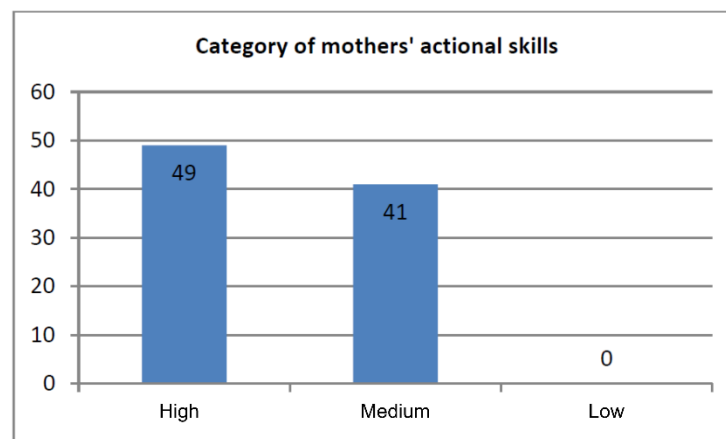
Figure 3. Category of mothers' actional skills

Differences in mothers' choice of healthy food in terms of work, family meal budget, and family type can be seen in Table 1.

Table 1. Cross tabulation of mother's choice of healthy food viewed from occupation, family food budget, and family type

		Knowledge		Attitude		Action	
		n	Mean	n	Mean	n	Mean
Mother's Job	Work (private)	14	52.21	14	88.00	14	62.00
	Work(self-employed)	29	64.41	29	99.17	29	65.86
	Work (PNS)	18	86.11	18	110.6	18	64.22
	Does not work	29	98.31	29	120.38	29	64.86
family type	3 people	45	61.36	45	96.07	45	64.56
	4 – 6 people	39	92.95	39	113.78	39	64.57
	7 people	6	100.00	6	113.00	6	65.00
Meal budget	Low	52	64.38	52	97.87	52	64.44
	Currently	28	94.71	28	114.07	28	64.79
	Tall	7	100.00	7	127.86	7	64.14
	Very high	3	100.00	3	134.00	3	67.00

The results of the analysis above can explain the choice of healthy food by mothers in Ketapang, West Kalimantan. These skills are measured by looking at the mother's knowledge, mother's attitude, and mother's actions. Mothers' knowledge in choosing healthy food consumption in all sub-districts understudy is in the high category with a frequency of 58.8%. This means that mothers in the selection of healthy food in all sub-districts are classified as high because mothers are able to choose healthy food for their families with academically good knowledge. Mothers have a good understanding of healthy food, consisting of consuming a variety of foods; eating food to meet energy adequacy; eating foods that are a source of complex carbohydrates; limiting the consumption of sugar, salt, fat, and oil; consuming side dishes that contain high protein; getting used to breakfast; drinking enough clean and safe water; doing activities regularly; eating foods that are safe for health; reading labels on packaged foods.

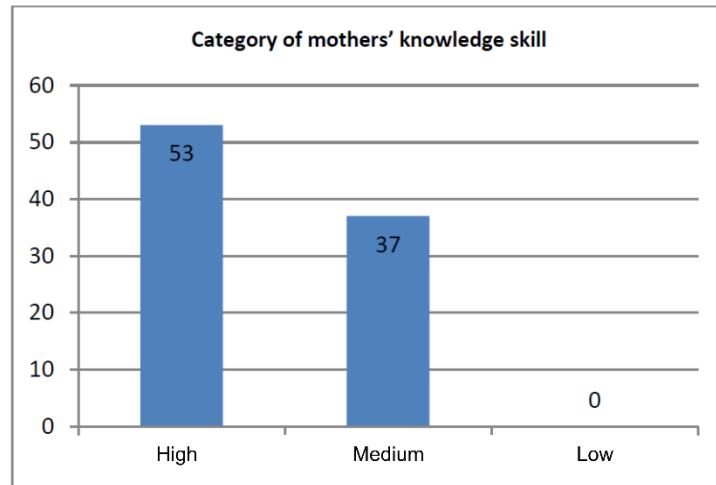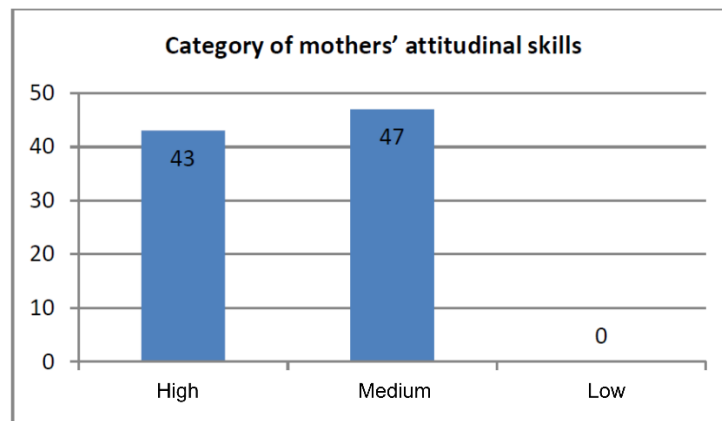Mother's attitude in choosing healthy food in all sub-districts understudy is in the sufficient category with a frequency of 52.2%. This means that mothers' attitudes to healthy food in all sub-districts understudy are quite positive because they are quite able to choose healthy food for their families in a rational way. Attitude is measured as the mother's response to choosing healthy food which consists of consuming a variety of foods; eating food to meet energy adequacy; eating foods that are a source of complex carbohydrates; limiting the consumption of sugar, salt, fat, and oil; consuming side dishes that contain high protein; getting used to breakfast; drinking enough clean and safe water; doing activities regularly; eating foods that are safe for health; reading labels on packaged foods.

Actions/skills measured by looking at the mother's actions in choosing healthy food which was studied are in the high category, with a frequency of 54.4%. Mothers' skills in choosing healthy food were obtained from interviews or recording meal menus using food recall for 3x24 hours which were distributed to 90 respondents. Data processing was done by recording the food consumed by the respondent, then the existing food ingredients were converted into grams and analyzed using Nutrisurvey. The assessment was carried out by comparing food consumption per day with the rubric for assessing the quality of the food consumed. Food consumption was analyzed in the form of proportions of balanced nutrition, variety of food ingredients, processed side dishes, sweet dishes, the taste of food, salty/preserved foods, vegetables, and fruits that lack vitamin C.

The proportion of balanced nutrition was measured by looking at the consumption of staple foods, side dishes, vegetables, and fruits. Variations in food ingredients were seen from the source of nutrients. Sources of staple food are carbohydrates derived from foodstuffs such as rice, corn, sweet potatoes, potatoes, wheat flour, tea, and fruit. The main source of protein comes from foodstuffs such as mackerel, chicken eggs, salted fish, and tempeh. The main source of fat comes from foodstuffs such as palm oil, mackerel, and chicken eggs. Processing techniques by not using a lot of oil help reduce fat consumption in providing healthy food. For example, boiling, steaming,

burning, baking, etc. can reduce the consumption of fat in the body. Good food processing is also useful for limiting the consumption of sugar, salt, fat, and oil that enters the body. While vitamins and minerals can be obtained from vegetables and fruits.

The high level of activity can be seen from the quality of the food consumed according to the body's needs per day. It can be seen that the proportion of food consumed is not balanced. For example, there are still many respondents who consume enough vegetables and fruit per day. Various food ingredients are found on the menu that is consumed a day. In addition, the food ingredients are also more than nine variations. The technique of processing the side dishes consumed is also diverse. However, there were still respondents who still liked to eat salty/preserved foods such as salted fish, sardines, meatballs, and instant sausages in reasonable quantities. Based on the explanation above, a mother's choice of healthy food is a mother's ability to develop knowledge (academic), attitudes (rational), and actions (vocational) dealing with problems in the household, namely choosing healthy foods. The ability to find food information and to understand the content of oral and written information or mothers' skills in choosing good quality food that is needed by the body for family members in Delta Pawan and Benua Kayong Districts, Ketapang, West Kalimantan is very important.

The result of the first hypothesis testing shows that the hypothesis is accepted, which means there is a positive and significant difference in the choice of healthy food between working and non-working mothers, at the significance level of $0.003 < 0.05$, and thus it is declared "different" significantly. The result of the second hypothesis testing shows that the second hypothesis is accepted hypothesis, which means there is a positive and significant difference in the mother's choice of healthy food in terms of family income, namely the daily food budget per person of $0.000 < 0.05$, and thus it is declared "different" significantly. The result of the third hypothesis testing shows that the third hypothesis is accepted, which means that there is a positive and significant difference in the mother's choice of healthy food in terms of family type, namely the number of family members of $0.003 < 0.05$, and thus it is declared "different" significantly

The research that supports this research findings includes the research conducted by Febryanto (2017), which aims to analyze the relationship between knowledge and attitudes with the behavior of consuming healthy snacks. The results showed that there was a significant relationship between the respondents' knowledge and attitudes and their behavior of choosing healthy snacks. Another supporting study was conducted by Johnson et al. (2011) which aimed to reveal the daily food choices of mothers. The results showed that mothers with more dietary criteria were set to make healthy food choices for themselves and similar food choices for their children. In addition, they exhibited behaviors that positively affected their children's food choices.

Other supporting studies are as follows. The research conducted by Putri and Sudhana (2013), Astuti (2012), and Pariyanti (2017) reported that mothers who did not work were women or mothers who did not work outside the house and women who tried to carry out their roles as housewives and took care of household management. The research conducted by Antwi et al. (2019) reported that low income families lacked nutritional food, unsafe food, or participation in nutritional assistance programs. The research conducted by Tondang (2017) on the effect of family income level and food intake on the nutritional status of kindergarten children. The research conducted by Sanjaya and Dewi (2017) reported that there was a positive and significant effect of income, family type, and education on consumption patterns of poor households.

CONCLUSION

The choice of healthy food made by PKK mothers living in Delta Pawan and Benua Kayong Districts, Ketapang, West Kalimantan is affected by mothers' knowledge, attitude, and actions. Knowledge affects the most. It is in the high category, with a frequency of 58.8%. Attitude is in the sufficient category, with a frequency of 52.2%. Skill is in the high category, with a frequency of 54.4%. There is a positive and significant difference in the choice of healthy food between working mothers (private, self-employed, civil servants) and non-working mothers in Ketapang, West Kalimantan. This means that the choice of food made by a working mother is different from that by a non-working mother. There is a positive and significant difference in the choice of healthy food among families with a low, medium, high, and very high food budget per person per day in Ketapang,

West Kalimantan. This means that the mother's choice of healthy food for families is different depending on the budget for the cost of eating per person per day for the low, medium, high, and very high-income groups. There is a positive and significant difference in the choice of healthy food among the mothers with three family members, 4-6 family members, and seven family members. In other words, the more the number of family members, the more a mother in choosing healthy food consumption.

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Implementation of electro-pneumatic practices learning model based on troubleshooting to improve students' creativity

Septian Eko Cahyanto * [iD]**, Sudji Munadi** [iD]
Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: septianeko.2019@student.uny.ac.id

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ABSTRACT

This study aimed to develop students' creativity through troubleshooting learning models in practical electro-pneumatic. This study was conducted during the Covid-19 Pandemic where learning was carried out online. This troubleshooting practice learning is applied to simulation applications so that it can be a solution in implementing learning that cannot be carried out directly. This study used a quasi-experimental researched method with a controlled group pretest-posttest design pattern. The sample consisted of 60 students majoring in mechanical engineering, State University of Semarang was divided into two classes. The experimental class applies the troubleshooting-based practical learned model, while the controlled class implements practice learned without using the troubleshooting learned model. Based on the research result, the pretest mean value in the experimental group was 76.26 with a standard deviation of 11.97, while the pretest mean value in the control group was 74.53 with a standard deviation of 10.31. Meanwhile, the posttest mean score in the experimental group was 77.5 with a standard deviation of 7.62, while the posttest mean score in the control group was 64 with a standard deviation of 8.84. The average post-test score in the experimental group is higher than the control group so it can be concluded that the learning outcomes of the experimental class using a troubleshooting-based practical learning model are higher than the control class where troubleshooting learning models are not implemented in electro-pneumatic practice.

INTRODUCTION

The rapid development in technology makes the world of education must adapt and be responsible for creating a good system to create competitive human resources and be ready to face rapid changes. Educational institutions must apply various kinds of learning strategies to improve the quality of learning. The role of educational institutions is very important to prepare educators to create good Vocational Secondary School (VSS) graduates. Media use in learning has a role in creating higher-quality learning processes and outcomes. Learning is not only theoretical but also practical, economical, and easy to access so that learning from pneumatic and hydraulic practices will be stronger in the system (Munadi, 2012). In Vocational Secondary Schools (VSS), learning media in practice is needed to facilitate students' understanding because VSS is an educational institution that prioritizes practical learning without excluding theoretical learning to educate graduates ready to work. Practical learning can equip students to prepare themselves to achieve

competence in the world of work. The right learning process is very influential in achieving a good level of student understanding.

Vocational education equips students with various knowledge, skills, and educational experiences so they can be involved in certain jobs needed for themselves, the field of work, and national development (Murniati & Usman, 2009). Another definition Another definition in Government Regulation of the Republic of Indonesia Number 29 of 1990 Article 2 Paragraph 1 concerning the purpose of vocational schools states that VSS is a school at the secondary level that prioritizes the development of students' abilities to be involved in a job. Vocational education is an educational system that focuses on preparing students to face the job market (Djojonegoro, 1998). In accordance with what is described above, vocational education is an education system carried out in various fields as provisions by students to gain knowledge, skills, and experience to be able to face the world of work according to their choice or to go to a high level. One form of vocational education is VSS.

In an effort to create quality graduates, vocational secondary schools must innovate in perfecting the learning system. One of them is to prepare qualified prospective educators who can carry out the learning process according to their fields so that they can create graduates who can master the material and practice well and create quality graduates. Higher education is an institution that aims to produce professional and quality graduates in the world of education. The quality of learning needs to be improved to provide good services to create competent prospective educators. According to Pusparisa (2019), the number of unemployed vocational school graduates decreased to 6.9%, from 9.3 million to 8.3 million unemployed, while the number of unemployed university graduates has increased quite drastically. Diploma graduates increased by 8.5%, from 6.3 million to 6.9 million unemployed. The increase in the number is still somewhat smaller than the increase in unemployment for S1 graduates. Data shows that the number of unemployed undergraduate graduates has increased by 25%, from 5 million to 6.2 million unemployed. According to these data, higher education graduates need more attention, so they do not continue to increase.

The purpose of this study is to compare the creativity of the class that uses the troubleshooting-based practical learning method and those that do not use the troubleshooting-based practical learning method. This goal is one of the efforts to create a better practical learning system when learning is carried out online. In addition, this research was also conducted to find out the effect of the Troubleshooting-based practical learning method on students' creativity so that this learning model can be applied in practical learning with similar competencies.

Some factors that can influence learning are internal and external. Internal factors can occur in each individual. These include motivation, interests, talents, and creativity. External factors are influenced by the environment, such as educators, media, infrastructure, facilities, and the learning environment. These factors are interrelated, so there is a need for development to achieve maximum learning outcomes. The internal factor that is still not being paid attention to is creativity because every student has various levels of creativity. In addition, the creative thinking skills of students in Indonesia are still not being paid attention to.

The results of Reynawati and Purnomo's (2018) research show that in the creativity category, the average student's creative thinking skills score is 28.53. Most students cannot train their thinking skills (Rizal et al., 2018). Students' creative thinking skills showed poor test results (Sirait et al., 2018). Students can only answer by providing solutions in terms of creative thinking. The dimensions of fluency, flexibility, and originality are still lacking. Developing the creativity aspect of the younger generation is one of the important aspects so that this nation has a competitive and independent generation in the era of globalization (Triyono et al., 2017). These elements have been employed to construct a framework of creative problem solving, which may be used to foster creativity among young people under instruction and provide a cognitive explanation of the origin of new ideas (Aldous, 2012). Therefore, it is necessary to hone and develop creativity through a learning model in accordance with existing fields.

Educators as teaching agents for students can choose a learning model for the lessons to be delivered. This learning model is expected to be innovative for developing students' internal factors, especially creativity. Educators must also innovate in every existing development in order to make it easier for students to understand lessons and produce competent graduates. Internal factors are the

main capital in shaping students' character so that when they graduate, they can develop their potential independently. The purpose of developing a learning model is to develop the quality of human resources so that they are better prepared to face national or global competition. In the current development, educators are expected to be able to innovate to prepare students to face any changes, in accordance with Laws of the Republic of Indonesia No. 20 of 2003 concerning the National Education System, which reads "paying attention to the dynamics of global development." One of the cases of contemporary development is tighter labor competition, the lack of individual ability to develop independently, and the development of science and technology so that we are required to adapt quickly. Thus, the times that exist require each individual to be better prepared to get every opportunity. This is a challenge that must be faced so that we as Indonesians have a high level of competence both nationally and globally.

Department of Mechanical Engineering, Semarang State University, a vocational education institution in the technology field, has three Study Programs. These study programs are S1 Mechanical Engineering Education, S1 Automotive Engineering Education S1, and S1 Mechanical Engineering. Two of the three study programs are study programs that produce prospective educators for secondary vocational schools. In addition to being educators at VSS, graduates from the Mechanical Engineering department can compete in the industrial world according to their respective choices. So it is necessary to have a good debriefing to create competent graduates.

Therefore, improving the quality of learning is necessary so that students can master theoretical and practical fields. To improve the quality of practical learning, both the learning curriculum and the completeness in practice need to be improved. The curriculum and the completeness of practical facilities and infrastructure are important factors in creating a conducive learning atmosphere for students. A conducive learning atmosphere can make it easier for students to improve their abilities and skills individually and in groups. This can be a reference for creating competent graduates.

Electropneumatics is one of the competencies in the pneumatic hydraulic course in the mechanical engineering department, which contains theory and practice in the implementation of learning. Pneumatic competence is very important for the industrial or production world. According to Sumbodo et al. (2008) stated that compressed air can be used in many production purposes, for example in creating manual mechanical movements, such as pressing, pushing, sliding, lifting, etc. Pneumatics is based on the fluid power system principle, which states that gases and liquids under pressure are used to transmit energy over long distances. Such systems are referred to as fluid power systems (Barala et al., 2014).

Pneumatic components can also perform mechanical movements, such as air cylinders, pneumatic motors, translational robots, rotations, or combinations. Electro-pneumatics were also extensively used in manufacturing, assembly, and packaging systems. Relays have been integrated into electro-pneumatic control systems to satisfy the increasing call for more flexible automation (Pereyras, 2020). For a continuous and flexible production process, the mechanical movements of the pneumatic actuators can be combined into mechanical movements. In the field of production, the use of the pneumatic system has experienced rapid development, especially in manufacturing, electronics, pharmaceuticals, food, chemistry, etc. Compressed air (pneumatic) was chosen as the control system in the automation process because pneumatics has the following advantages: easy access, elimination of dust and hazardous chemicals, easy distribution via small ducts (hoses), explosion-proof and short circuit safety hazards, overloading, no sensitivity to temperature changes, etc.

In the pneumatic and hydraulic course at the Department of Mechanical Engineering, Faculty of Engineering, Semarang State University, the mastery of the practicum field is not maximal in electro-pneumatic practice. The lack of learning outcomes is because, in the learning process, students feel that using time is less effective, so students lack understanding in mastering the knowledge given. The time allocated is not sufficient to increase understanding. Inefficient use of learning time forces students to learn independently, which causes them to lack understanding. Students are expected to be able to be more creative independently in developing the lessons that have been given outside the existing class hours. Students should not only be fixated on the material (series) that has been given. If you only stick to the material (series) that has been delivered, there

will be less creativity in learning development. Therefore, students must be innovative and creative in developing lessons. The importance of creativity in this competency is that students can hone skills in creating and assembling new series according to the conditions to be faced. So, this factor is very influential so that students can increase their potential independently after graduating.

There are several factors behind success in learning. One of them is learning media. The existence of good media will help lecturers provide learning materials and increase student understanding of learning materials. The use of media must be in accordance with the curriculum with goals and abilities in accordance with the achievements of students in their studies. Fluidsim simulation applications and electro-pneumatic props are learning media that can be applied in electro-pneumatic competencies. In the application of media simulators, a problem-solving learning strategy is needed in solving problems related to the pneumatic electro system to improve students' skills and competence in understanding components and understanding the pneumatic system circuit to the maximum, so we need appropriate learning media to overcome the limitations of practical learning (Ramdani et al., 2019).

To develop and hone student creativity, it is necessary to apply a troubleshooting learning model. Troubleshooting is a model for finding root causes systematically so that problems can be resolved and potential causes of problems can be eliminated. When problems inevitably arise, operators spend considerable time troubleshooting those problems by identifying root causes and correcting them. The cost of troubleshooting is substantial (Attariyan & Flinn, 2010). Troubleshooting is usually associated with solving problems physically or mechanically in the work system so that the system can return to normal operation. Argues that the concept of troubleshooting is an effort to find problems with components or work systems and provide solutions so that the system can return to normal work (Jonassen, 2010).

The troubleshooting process is often used to diagnose the cause of failed products in the production systems. This method is employed to repair rejected products and to find the root causes of problems so that failed products can be usable again (Mahmood et al., 2016). Misconfiguration troubleshooting is particularly challenging because configuration information is shared and altered by multiple applications (Wang et al., 2004). Troubleshooting allows students to hone thinking skills so that they can increase creativity. However, this troubleshooting learning model has not been implemented even though this troubleshooting model can not only be implemented in teaching aids but can also be implemented in the fluids simulation application, which can be studied by students independently outside of class or practical hours.

In 2020, Indonesia experienced a pandemic in the face of the Covid-19. This pandemic makes the world of education conduct online learning. This is in line with the Minister of Education and Culture of the Republic of Indonesia in letters No. 2 of 2020 and No. 3 of 2020 concerning procedures for handling and preventing the development of the Covid-19 virus. One of them is implementing online learning from home and working from home (WFH). Online means connecting to a computer network. According to Thome in Kuntarto (2017), online learning is learning that utilizes online technology such as multimedia, video, virtual courses, online text animation, voice messages, email, conference calls, and online video streaming.

Online learning in question is a learning system that is directly connected to a computer or other device connected to the internet in its implementation. E-learning activities can increase the effectiveness and efficiency of learning activities. The effectiveness and efficiency are in terms of applying the principles of learning that are made easier and the various benefits offered to be able to increase learning time in the classroom (Wang et al., 2020). E-learning for vocational education should make it easier for students to access anytime and anywhere using electronic media such as smartphones (Ahmad et al., 2020). It is widely acknowledged that online learning has been common practice in Indonesia and in most other parts of the world due to the outbreaks of the Coronavirus, which have forced people to study from home and work from home (Mulyanti et al., 2020).

Coronavirus has been impacting the face-to-face education system of developing countries. Therefore, developing countries should enhance broadcast teaching, online teaching, and virtual class infrastructures (Tadesse & Muluye, 2020). Students feel that online learning has not provided better experience and productivity in mastering competencies but can provide motivation and ease in their learning (Syauqi et al., 2020). In this electro-pneumatic practice learning, the use of simulations using

the application of the fluid will be maximized. The simulation aims to provide an initial picture to students before being applied to an electro-pneumatic teaching aid or system. However, the practice of using teaching aids will be difficult to implement during a pandemic like this. Therefore practical learning using this simulation will be carried out optimally, and a troubleshooting-based learning model can be implemented in the simulation application.

RESEARCH METHOD

In this study, researchers used quantitative methods with a quasi-experimental research design. This quantitative method is designed to ensure that the research carried out does not deviate from the research objectives. Experimental methods are usually applied in research to see the effects of treatment. The design in this study used a control group pretest-posttest design, namely by conducting pretest and posttest in both classes. Data collection on student learning outcomes was carried out by providing an electro-pneumatic practical learning model based on Troubleshooting in the experimental class. The control class does not use an electro-pneumatic practical learning model based on Troubleshooting. The dependent variable is the learning outcomes based on creativity in students, while the control variable is the two classes that have the same teacher with the same material in each class.

The study program in the mechanical engineering department is Mechanical Engineering Education (MEE) S1, Mechanical Engineering (me) S1 students, and Automotive Engineering Education (AEE) which consists of 7 classes. The researcher used the subject of the AEE S1 2017 students, which consisted of two classes; the two classes were chosen because they carried out the Hydraulic Pneumatics course in the 2020/2021 odd semester. In determining the number of samples, the researcher used the slovin method with a tolerance of difficulty α = 5%. With the number of students in the class collected as many as 70 students, it can be concluded that the research sample conducted in this study was 60 students. Calculation of sampling using proportionate stratified random sampling technique with the results of each class consisting of 30 people. Samples were selected randomly/random sampling. Based on this technique, AEE S1 class 1 becomes the experimental class and AEE S1 class 2 becomes the control class.

Several data were collected, including students 'initial electro-pneumatic in the form of pretest scores and students' electro-pneumatic creativity abilities in the form of posttest scores. This learning outcome test instrument is in the psychomotor domain that explores students' creativity. This value is used in analyzing the treatment results that will be applied in the learning process. This test gives a multiple choice question consisting of four answer options. Questions are also arranged in such a way that they can find out the results of the practical learning that has been given.

Before the two groups were given treatment, both groups were given a pretest. The initial test is useful in observing the initial abilities of the experimental group who will be given a Troubleshooting-based practical learning model and the control group that does not use the Troubleshooting learning model. It is hoped that from the pretest conducted in both groups, it can be concluded that the two groups have the same initial ability. In knowing the difference in the initial ability of the two groups, the t-test can be used.

After the treatment was given to the experimental and control groups, a test was carried out to retrieve value data in the experimental and control groups. The values obtained from the data were analyzed and compared to find the higher results between the experimental and control groups through hypothesis testing. Hypothesis testing is the last stage of research. Hypothesis testing will analyze the data that has been obtained from both classes after being given treatment. If the test results are normally distributed and homogeneous, then the next step is to test the hypothesis. In testing, a proposed hypothesis can use a t-test.

Internal validity comes from the implementation of the research itself, which is related to the treatment given and whether it causes the results observed in the study. Some of the things contained in the internal validity that can be a threat in this study are as follows. History is an event that occurred in the vicinity or environment at the same time that the experimental variable was carried out through testing. Judging from the history of class formation in the control and

experimental groups, it was not specifically formed. Thus, the experimental and control group students had the same learning experience.

Maturity refers to the process of change that occurs in the subject who is made into the experimental group. To overcome this, research is carried out using the same time period for the experimental group and the control group so that they will have the same experience of maturity. The time period used was six to six meetings to conduct treatment in the experimental group and the control group, in addition to the use of the control group, which had students of the same age as the experimental group. So, the conclusion of this research is free from the threat of maturity factor. Subject's attitude in research, the subject may realize that he is a participant in the experiment, so a feeling of pride arises because someone is paying attention, let alone it is known that this research is to improve the condition of the subject. In this study, the attitude of the subject can be overcome by seeking students to assume that this research is a routine matter, and in this study, the teacher is the teacher himself so that students do not cause excessive reactions or attitudes.

In addition to internal factors, other external factors have an influence on research results, namely external validity. External validity refers to generalization and regarding how far we can generalize research results outside the research setting. The threat of external validity that needs to be considered and how to overcome it in this study is the interaction between subject selection and treatment. Talking about the relationship that occurs can be generalized to the category of subjects that can be a threat to high external validity. It is necessary to consider the subject's characteristics with the treatment given. In this study, members were selected randomly (randomly) to determine the sample to obtain a representative sample of the population. The sampling technique used in this study is the Random Sampling technique by drawing lots on the population that has been formed in classes so that each class in the population has the same opportunity to be used as a research sample.

RESULT AND DISCUSSION

Before being given a treatment for each class, their initial abilities were analyzed first. The initial ability analysis process is based on the pretest score in each class. The following are the results of the student pretest which can be presented in Table 2.

Table 2. Pretest Mean Value and Standard Deviation

Class	Number of Students	Mean Score	Standard Deviation
Experiment	30	76,26	11,97
Control	30	74,53	10,31

Table 2 shows the pretest average for the experimental class of 76.26 with a standard deviation of 11.97. The pretest score for the control class is 74.53, and the standard deviation is 10.31. The table above shows that the pretest average value of the experimental class is relatively higher. In accordance with the results of the t-test on the pretest, the value of t_{count} 1.346 < t_{table} 1.67 at $\alpha = 5\%$ with DK = 58.

Table 3. Pretest Data Similarity Test Results

Group	Mean	t_{count}	t_{table}	Criteria
Experiment	76,26	0,6	1,67	No different
Control	74,53			

Table 3 shows that each class has the same initial abilities. Therefore, the pretest score can be a reference in knowing that the different posttest scores later are purely from treatment and not from different conditions from the start in each class. Furthermore, a posttest was carried out for analysis in further research. The following are the results of the post-test in each class which is presented in Table 4.

Table 4. Posttest Mean Value and Standard Deviation

Class	Number of Student	Mean Score	Standard Deviation
Experiment	30	77,5	7,62
Control	30	64	8,84

In table 4, the post-test result in the experimental class after applying the troubleshooting-based electro-pneumatic practice learning model is 77.5, with a standard deviation of 7.62. After implementing electro-pneumatic learning but not using the troubleshooting model, the post-test results for the control class were 64, with a standard deviation of 8.84. The post-test results, according to table 4, show that the post-test scores of the experimental class are higher.

The Chi-square formula in this study is applied to determine the normality of the data. The data is declared normal if the significance value is higher than the error level of 5% or 0.05 at DK 30 - 1 = 29. The following are the results of the normality test in learning electro-pneumatic practice, both from the pretest and post-test data in each class which is presented in Table 5.

Table 5. Data Normality Test Results for Experiment Group and Control Group

Data Source		$X^2{}_{count}$	$X^2{}_{table}$	Criteria
Pretest	Exp	29,86	42,6	Normal
	Control	33,59	42,6	Normal
Postest	Exp	18,02	42,6	Normal
	Control	6,25	42,6	Normal

In the normality test, the pretest and post-test values of the two classes are summarized in table 5 above, explaining that the learning outcome data is normally distributed because the X value is less than the X table for $\alpha = 5\%$ with DK = 29. Next is the hypothesis test that can be used with the F Test formula. The F test is applied to test the homogeneity of this study. The pretest and post-test data criteria are homogeneous if the data has a significance level higher than the error level of 5% or 0.05. If the data is homogeneous, do the t-test, but if the pretest and post-test data criteria are not homogeneous, the t-test cannot be used. After the homogeneity test was carried out on the electro-pneumatic practice values, both pretest and post-test, the values obtained are presented in Table 6.

Table 6. Data Homogeneity Test Results

Data Source		F_{count}	F_{table}	Criteria
Pretest	Exp	1,346	1,85	Homogeneous
	Control			
Postest	Exp	1,345	1,85	Homogeneous
	Control			

Table 6 above shows that after the homogeneity test of the data with the F test was carried out, the results obtained were that the value was less than 1.85 at $\alpha = 5\%$ and DK = 58. Therefore, it can be concluded that the pretest and post-test data in both classes are homogeneous, so the t-test can be performed. Based on the normality test presented, the data from the pretest and post-test in the experimental class and control class were normally distributed, and the homogeneity test presented gave the data results from the pretest and post-test in the experimental class and control class with the homogeneous distribution. Therefore, in testing the hypothesis in this study using parametric statistics. The condition for using parametric statistics is that we can determine that the distribution we observe has met the normal distribution. The results of the t-test to test the hypothesis on the learning outcomes of electro-pneumatic practice in the two classes are presented in Table 7.

Based on the t-test on the learning outcomes of electro-pneumatic practice in both classes, the value of t_{count} 6.335 > t_{table} 1.67 at $\alpha = 5\%$ with DK = 58. Therefore it can be stated that the learning outcomes of students in electro-pneumatic practice by applying the troubleshooting learning model experienced a significant increase compared to the learning outcomes of students who took electro-pneumatic practical learning without applying the troubleshooting learning model.

Table 7. Difference Test Results in the Experiment Group and the Control Group

Group	Mean	t_{count}	t_{table}	Criteria
Experiment	77,5	6,335	1,67	Significant
Control	64			

Table 7 illustrates that the value of troubleshooting-based electro-pneumatic practice learning in the experimental class is higher than in the control class. One of the successes in this learning is due to the use of the appropriate learning model according to the conditions and learning objectives. This is because the learning model is a system that is applied in creating a curriculum (learning plan), compiling materials for the learning process, and guiding the learning process in class or other learning spheres (Rusman, 2014).

The use of this troubleshooting-based electro-pneumatic practice learning model allows students to develop creativity in problem-solving systematically so that students' creativity can be developed through an understanding of solving problems. Therefore we need encouragement in an environment that is based on the creative potential that exists in each person. Then, between environmental factors and the potential for creativity, collaboration is needed so that the development of individual creativity will accelerate through cognitive skills. Creativity is the result of learning cognitive skills so that creativity can be learned (Slameto, 2015). The characteristics of creativity are divided into two categories, namely cognitive and non-cognitive. Cognitive characteristics include originality, flexibility, fluency, and sophistication (Slameto, 2015). Meanwhile, non-cognitive characteristics include motivation, attitude, and personality creativity. These two characteristics are important in learning. Intelligence, if not supported by creativity, cannot create something. Creativity can be born from intelligent people with good mental conditions. Creativity is not only about the brain's ability but also the emotional and mental health variables that influence the creation of creative work. Without common sense, it will be difficult to create creative work.

Iskandar's (2015) research stated that there are differences in troubleshooting learning in the automotive expertise program that already exists, and the development of learning models is carried out. The research results are: (1.) In accordance with the quantitative research method, it is known that the total post-test score of the experimental group is higher than the total score of the control group, so the development of this learning model can significantly improve learning outcomes in improving skills; and (2.) The use of this Troubleshooting learning model can be applied and in accordance with the 21st century and is proven to be effective in improving the skills of students, and creativity is a useful basis for the world of work. After implementing this model, it is hoped that SMK graduates will be able to increase their competitiveness at the ASEAN level to welcome the ASEAN Economic Community (AEC) and AFLA in 2020 and be able throughout the world in 2000 to meet global needs.

Damayanti's et al., (2020) research stated that there are differences between students when applying the PBLFC model, PTFC model, and DI model in physics lessons. The PBLFC learning model has a better level of creativity than the class that applies the PTFC learning model. At the same time, the class that uses the PBLFC learning model has better creativity than the class that applies the DI learning model. And the class that uses the PTFC learning model has better creativity than the class that uses the DI learning model.

The pre-test results show that both classes have the same initial ability, so the same initial ability in the two classes qualifies for further research. The successful use of the troubleshooting-based practical learning model has been proven from the post-test mean score of the experimental class higher than the practical learning without using the troubleshooting model in the control class. So, the application of this troubleshooting learning model can be used as a learning model solution for teachers during the learning process. Conversely, lower control class post-test results can occur because students feel that learning tends to be monotonous and that there is a lack of a learning system that can sharpen the brain and increase students' creativity. The t-test analysis that has been carried out on the post-test scores shows an increase in learning outcomes that comes from the treatment and does not occur because of different initial conditions because the initial abilities of the two classes have different criteria.

The application of troubleshooting-based electro-pneumatic practice learning models has a significant impact on increasing the creativity of students. The dimensions of creativity used in this research instrument are fluency, flexibility, originality, and elaboration. Creativity is the interaction between each individual towards the environment based on data, communication, or previously known elements from the family, school, or community environment (Munandar, 2009). Troubleshooting learning models are usually applied to train skills in repairing problematic products or systems by searching logically and systematically for the source of the problem to get a solution to solve it. Troubleshooting is expected to increase creativity because it can train psychomotor skills in students.

In addition, this research was carried out during the Covid-19 Pandemic, where learning was implemented using an online system. The method of learning with an online system or online is a learning system in which the implementation process is not carried out face-to-face but is carried out using the internet network. Therefore, the learning process must continue with a switch of methods very different from pre-pandemic learning methods, namely face-to-face learning methods replaced with online ones. So, students do not get practical experience directly using practice props. The learning process of troubleshooting practice is carried out in a simulation application, where the process of giving problems to the circuit is carried out by combining changing component symbols, changing the direction of the circuit, and replacing several processes that occur in a series. Therefore, the ability to think and creativity of students can be honed in the process of finding a problem and finding a solution to the problem so that the system in the electro-pneumatic circuit normally runs again. In addition to honing students' thinking skills, this learning model can increase students' enthusiasm for the learning process.

Troubleshooting learning models can be applied in electro-pneumatic competencies. As a problem-solving model, troubleshooting has two main models: design and implementation. The model design focuses more on designing activities related to several factors and teaching steps to be applied. Using troubleshooting-based practical learning models can increase students' creativity and positively contribute. This is evidenced by the t-test analysis on the pre-test and post-test in both classes so that it can be a solution for other educators in implementing similar practical learning to develop creativity in students, especially if learning is still using an online system (Iskandar, 2015).

CONCLUSION

According to the results of the research and discussion, the researcher can conclude that there is an increase in learning outcomes in the experimental class by applying a troubleshooting-based practical learning model compared to the control class, which does not apply the troubleshooting learning model in electro-pneumatic practice. This statement can be proven from the post-test scores in the experimental class with the application of the troubleshooting-based electro-pneumatic practice learning model with an average score of 77.5, better than the post-test learning outcomes in the control class with an average score of 64 so that the troubleshooting-based electro-pneumatic practice learning method is feasible to use, especially during a pandemic that requires learning to be carried out online.

Based on the findings that have been discussed, the suggestions given by the researcher are: First, educators are advised to use various learning models that are in accordance with the material and objectives presented, which can be a good stimulus for the learning process. In particular, electro-pneumatic learning can use problem-solving practice learning models. Second, further researchers who are interested in the topic of problem-solving learning models in providing systematic problems can be done in stages. The creativity of students in the classroom that uses the Troubleshooting-based practical learning method is higher than in the Classroom Learning Outcomes that do not use the Troubleshooting-based practical learning method. So, this troubleshooting-based electro-pneumatic practice learning method affects increasing student learning outcomes.

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Occupational Health and Safety Management System (SMK3) at the workshop of vocational high schools

Adilla Desy Rizbudiani * [ID], **Amat Jaedun** [ID]
Universitas Negeri Yogyakarta, Indonesia.
* Corresponding Author. Email: adilladesy.2019@student.uny.ac.id

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ABSTRACT

This research aims to identify the planning implementation, idenfety Management System (SMK3) at the workshop of vocational high schools in the major of construction and property engineeringtify the implementation, and identify the evaluation of the implementation of the Occupational Health And Safety Management System (SMK3) at the workshop of Construction and Property Engineering Study Program, one of the Vocational High Schools in Central Java. This research is qualitative by using data collection techniques in interviews, observations, and documentation the validity of the data using source triangulation. Data analysis used descriptive qualitative. The results show that the workshop building at one of the Vocational High Schools in Central Java has been well planned in its implementation of OHS. The implementation of OHS is categorized as quite well implemented. The evaluation of the implementation of OHS is categorized as quite well done. Hence, the Occupational Health and Safety (OHS) management system at the Vocational High Schools needs to be improved. The school can collaborate with stakeholders to follow up on the management system of OHS.

INTRODUCTION

Occupational safety and health (OHS) has been regulated in Law Number 1 of 1970, where occupational safety and health is on land, air, or in water as long as it is within the scope of Indonesia's territory. However, this problem is neglected in Indonesia (Lestari et al., 2013; Ramdan & Handoko, 2016; Wirahadikusumah, 2007). The construction sector is a very high risk of work accidents due to neglected occupational safety and health factors besides other primary sectors such as agriculture, fisheries, mining, and timber (Khosravi et al., 2014; Rofiah, 2016). Construction projects consist of resource aspects to achieve a quality product efficiently and effectively at the appropriate price (Widiastuti & Widowati, 2014). One of these resources is manpower.

The central statistics agency showed that the number of construction experts based on qualifications increased from 2017-2019 (Badan Pusat Statistik Republik Indonesia, 2020). These expert workers include working in the development sector, such as building buildings, roads, and so on. The labor calculation is as follows: there were 167,713 people in 2017, 244.930 people in the following year, and 263.598 people in 2019. Furthermore, BPJS for employment has reported 147.000 cases of work accidents or 40.273 cases of work accidents per day in 2020 (Maudica et al.,

2020). In the case of developing countries, the death rate from work accidents in construction projects is three times greater compared to developed countries (Haris, 2017; King & Hudson, 1985; Wirahadikusumah, 2007). In the implementation of construction projects, the most dangerous work is carried out at heights and excavation (Wirahadikusumah, 2007).

In minimizing work accidents, it is necessary to carry out a policy for OHS worker protection. Various safety factors such as organizational management, physical work environment, safety behavior, and safety climate can be used as approaches to prevent work accidents (Satoto & Khoiroh, 2018). The International Labor Organization (ILO) is a policy regarding OSH in the Guidelines on Occupational Health and Safety Management System, where the ILO standards have the same principles as OHS in Indonesia. However, implementing ILO standards without certification is allowed. In addition, integrating SMK3 is also allowed with existing management in the work environment (Maudica et al., 2020). The rules regarding organizational management related to OSH are written in the Minister of Manpower Regulation Number 5 of 1996 concerning the OHS Management System and Government Regulation of the Republic of Indonesia Number 50 of 2012 concerning the Implementation of the OHS Management System. The existence of an OHS management system can reduce work accidents, both from the workforce's behavior and the work environment's conditions (Maudica et al., 2020; Satoto & Khoiroh, 2018).

The Occupational Health and Safety management system (SMK3) voluntarily applies an international standard called the Occupational Health and Safety Assessment Series (OHSAS) 18001. However, as time goes by, several organizations plan to implement SNI ISO 45001:2018 from Government Regulation Number 50 of 2012 (Indrajaya & Suhendar, 2021; Masjuli Masjuli et al., 2019). SNI ISO 45001:2018 was built with a "plan-do-check-act" or PDCA approach (Masjuli Masjuli et al., 2019; Morgado et al., 2019). Thus, there is an integration between ISO 45001:2018 and Government Regulation Number 50 of 2012 regarding the requirements of the ISO 45001:2018 clause that is relevant to the article in Government Regulation Number 50 of 2012 (Hanifah et al., 2020). Various industries and organizations have implemented SNI ISO 45001: 2018, including PT Putrajaya Suskes Makmur (Indrajaya & Suhendar, 2021), CV Javatech Agro Persada Pati (Prastawa et al., 2021), and PT Petrindo Semesta (Yoshana et al., 2019).

The Occupational Health and Safety management system (SMK3) includes planning, implementation, responsibilities, procedures, processes, implementation, achievement, review, and maintenance of occupational safety and health policies. In terms of the education aspect, OHS planning has been integrated with the vocational high schools curriculum, which has been regulated in Ministerial Regulation Number 34 of 2018 concerning National Standards for Vocational High Schools Education/Vocational Madrasah Aliyah (Hidayat & Wahyuni, 2016; Miftachul & Suparman, 2017).

Law Number 20 of 2003 concerning the National Education System states that Vocational High Schools are secondary school level that prepares students to work in specific fields. One of the vocational education's goals is to improve intelligence, knowledge, personality, noble character, and the student's ability to live autonomously and take further education under their vocational program. In addition, the Industrial Revolution 4.0 also expects an appropriate and supporting curriculum for Vocational High Schools to improve the vocational skills of undergraduates. Hence, they can work in industry or the business world (IDUKA). In facing the Industrial Revolution 4.0, revising the SMK curriculum to suit the students' ability and the business and industrial world is significant (IDUKA) (Pangestu & Sukardi, 2019).

The Construction and Property Engineering skill program is related to construction work, where the learning process is more during practice in a workshop building. The work accident often happens in this building since the machines and equipment are the carried out practicum (Miftachul & Suparman, 2017). School workshops building is school facilities in the form of places and spaces commonly used by teachers and students for the teaching and learning process. The workshop has criteria to achieve the school program objectives. In one of the observations made in several schools, several workshops majoring in construction and property engineering did not comply with Standard Operating Procedures, such as outdated equipment. The requirements include workshop planning, workshop management and maintenance, and workshop management (Ramadina & Hadi, 2015). Various types of risk occur in building workshops during practice, including material handling,

workplace design, hand tools, and machine protection. Furthermore, work organization, worker facilities, noise control, vibration, and electricity risk are considered as the risks (Hargiyarto, 2011; Hidayat & Wahyuni, 2016).

According to previous research, to determine the importance of the topic, some products have been developed in information systems that can support and provide services regarding workshop management in vocational high schools (Ramadina & Hadi, 2015). In accordance with the finding above, other studies also have demonstrated the application of OHS in an automotive workshop at a university in Yogyakarta (Khurniawan, 2016). Specifically, such an evaluation of workshop facilities and infrastructure has been examined in fulfilling standard facilities and infrastructure for the practice of computer and network engineering expertise packages (Susanto & Sudira, 2016).

In this study, the term occupational safety and health management system (SMK3) is based on Government Regulation Number 50 of 2012. This study focuses on the occupational health and safety management system (SMK3) in the construction and property engineering vocational school. Thus, students will have knowledge and skills related to safety. This knowledge consists of preventing work accidents, developing concepts, assessing the importance of OHS, understanding hazards in the workplace, and using preventive measures. The matters studied are related to OHS planning, OHS implementation, and evaluation of OHS implementation in the construction and property engineering department. This research aims to identify implementation planning and implementation and evaluate OHS implementation in construction and property engineering vocational school workshops..

RESEARCH METHOD

This research was a qualitative study. It was related to the planning, implementation, and evaluation of OHS in a workshop building. This study used one of the vocational high schools in Central Java which has a construction and property engineering expertise program. The focus of this study was the workshops contained in the construction and property engineering expertise program, namely the Interior Design and Furniture Engineering (DITF) workshop and the Sanitation and Maintenance Building Construction workshop (KGSP). The sampling technique used snowball sampling with a willingness to be a respondent and fill out informed consent in the research as the requirement, including productive teachers of the construction and property engineering expertise program, related workshop technicians, and students of the property and property engineering expertise program as many as six teachers, one tool man, and eight students.

The instruments used are interview guides, documentation sheets, and observation sheets. Researchers made direct observations of every activity every day for observation and documentation. The interview was recorded using a smartphone. Data collection techniques through interviews, documentation, and observation. The data validity technique in this study used source triangulation. These sources come from the results of interviews, observations, and results of documentation reviews. Data analysis used descriptive qualitative with outlined the Occupational Health and Safety Management System (SMK3) in the vocational high school building workshop.

RESULT AND DISCUSSION

This finding raises interesting questions about the nature and extent of the occupational safety and health management system (SMK3) in the workshops of vocational high schools. In order to develop a broader picture of occupational safety and health in the OHS workshop, further study on the occupational safety and health management system (SMK3) is required, following the curriculum from the ministry of education and the vocational curriculum under the auspices of the Ministry of Industry and is integrated with the existing needs in industry and the business world (IDUKA).

Work safety is concerned with soft and hard equipment and the way it works. Occupational health is a means to achieve the welfare of the workforce (Hargiyarto, 2011). In addition, safety is a safe physical, social, spiritual, emotional, psychological, and at work from the threat of danger

(Komarudin et al., 2016; Kuswana, 2014). To avoid the threat of danger, an OHS Management system is needed where the OHS Management System has basic principles, including commitment and policy, planning, implementation, measurement, and evaluation, as well as review and improvement (Alokabel et al., 2014).

Table 1. OHS Analysis in One of the Vocational High School in Central Java

Sub Variable	Indicators	Findings
Planning Implementation of OHS	Planning of OHS	Quite well done
	Standard of implementation OHS	Require further examination
	Information broadcast related to OHS	Carried out well
	Implementation of OHS	Carried out well
	Workshop's tools and supplies	Require further examination
Implementation of OHS	Inter-system management	Carried out well
	Reporting the flow of work accident	Have not done yet
	Observing OHS while the practice occurs	Carried out well
	Maintenance of workshop's tools and supplies	Quite well done
Evaluation of OHS	Evaluation of OHS implementation	Quite well done
	OHS improvement of the workshops	Carried out well

Table 1 shows that the result of observations related to the planning of OHS, OHS implementation, and OHS evaluation in one of the vocational high schools in Central Java will be described by the following variables: 1.) OHS implementing planning; 2.) Implementation of OHS; and 3.) Evaluation of OHS Implementation.

OHS Implementing Planning

On variable planning implementation of OHS in SMK contains aspects of the plan for implementing OHS and standards of OHS. In the plan of OHS, the results found are that there is still a lack of knowledge regarding the OHS implementation plan for both teachers and technicians at the school. The standard of OHS contains the principles and standards of the OHS Management System based on Government Regulation Number 50 of 2012 regarding the implementation of OHS. In the results found regarding the OHS implementation plan and standards in OHS planning, teachers and technicians can still not explain the standards for implementing OHS based on these rules. The following is an excerpt from a statement from a resource person regarding the workshop's OHS plan:

"Regarding planning, yes, from central regulations, adaptation schools from the center." – Mr. AG (head of the KGSP department and KGSP teacher)

Furthermore, the resource person also explained the OHS plan of the school as part of education with the following quote from the statement:

"I think yes, some of it has been planned, but it has not been fully fulfilled, because we are also not purely for the industrial world, but we are the world of education" (AG)

The teachers and technicians only know that there are regulations governing workshop OHS, but if they are asked about it in detail, they still cannot answer it. This is shown in the following excerpt from the conversation by the teacher resource person:

"Not yet, don't know more about the standard yet." (AY/DITF teacher)

"I don't even know." (SY/KGSP teacher)

*"There are regulations regarding SMK3, but I don't really know the details yet *laughs*" (KS/DITF teacher)*

This is supported by previous research, which showed that the OHS plan containing the OHS policy in the workshop at one of the vocational high schools majoring in the building had reached 67% (Miftachul & Suparman, 2017). OHS implementation standards required further examination. The role of productive teachers and technicians is understood only about OHS regulations in general. This result might be related to previous research, which contained hazard identification reaching 100% (Miftachul & Suparman, 2017). It was meant that all productive teachers could identify potential dangers and OSH risks associated with productive learning, both theoretical and practical learning (Miftachul & Suparman, 2017). Thus, the OHS implementation planning variable with indicators of the OHS implementation plan is included in the "Good enough" category, and the OHS standard is included in the "Require further examination" category.

Implementation of OHS

The implementation of OHS contains seven studied aspects: the dissemination of OHS information, the application of OHS, equipment, inter-system involvement, reporting of work accidents, supervision during practice, and maintenance of workshop facilities. The first aspect, the dissemination of OHS information, has been carried out well. Dissemination of information related to OHS was obtained from the teacher's explanation before doing the practice. The following statement from the source shows this:

"Oh yes, the way is when we put the theory in there at the beginning, we want to use this tool, the safety of the work is like this, avoid parts like this. That's all. Usually, the theory runs out for a while, our children take it to the workshop. This is the tool, we have to avoid like this like this." (WY/DITF teacher)

In addition, OHS information is obtained from the internet. The school facilitates with wifi. The following student statements support this:

"... if other additions come from the internet" – MJ (student of class X1 KGSP).

"Yeah.. that's your teacher. Continue to use the internet using the school's wifi.. there is no school yet to bring a speaker about OHS.. " (DV/Student of class XI KGSP).

The findings in this aspect are that students obtain information from teachers when they want to teach practice and the internet. This finding is supported. It also accords with earlier observations, which showed that the information spread through posters and slogans installed in workshops (Miftachul & Suparman, 2017). The second aspect is the application of OHS is carried out well. OHS implementation indicators include understanding OHS according to teachers and students, how teachers apply OHS in workshops and student behavior or culture during practice. The following statement proves the understanding of OHS:

"..the point is that K3 is.. hmm.. so that we can work comfortably and maximally so that there is no such thing as interference, there is an accident that causes the student to not be able to take lessons." (AH/Head of the KGSP department and KGSP teacher).

"Yes, in my opinion, the effort or method to maintain occupational safety, health and security from the workpiece, ourselves and work tools." (DN/student of class XI DITF)

The Standard Operation Procedure (SOP) application is only attached to the wall for application in the workshop. The following statement evidences this:

"Actually, the SOP itself has been pasted, so students can immediately know. There are SOPs for tools; only some didn't have time to install." (WY/DITF teacher)

This statement is supported by Figure 1 regarding the SOP posted in the following workshops.
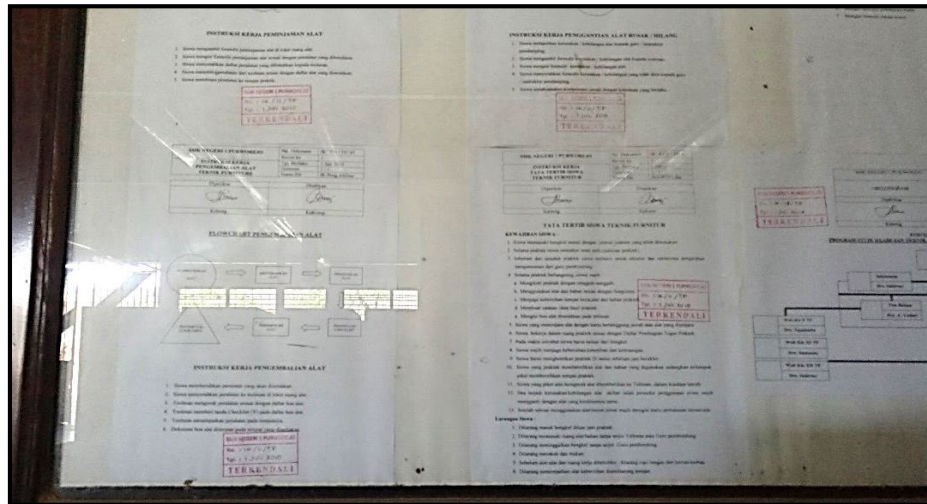
Figure 1. Standard Operation Procedure (SOP) in the Workshop

This is due to the research findings that the regulations required the students to be disciplined and obedient, firmed by teachers when teaching field practice, and a school environment that supports students to always be on time. The results support previous research, where individuals and groups have achieved information about OHS (Nugroho et al., 2019). In addition, there was also a significant influence of OSH knowledge and attitudes on the implementation of OHS (Pangeran et al., 2016; Sidauruk et al., 2014; Simanjuntak et al., 2012). In addition, the implementation of OHS also included the workshop work environment. The work environment in both workshops required attention and improvement. The requirements for the workshop work environment should have a balanced layout, such as sorting by a group of workers and re-adjusting tables, chairs, and tools to make them more ergonomic. For example, a workshop floor needs repair.

Figure 2. Cement-Patched Workshop Floor

This finding is in line with other results that facilities, lighting, working weather, and control of noise, vibration, and electricity hazards must be considered (Hargiyarto, 2011). The third aspect in the equipment and supplies for the workshop was carried out well due to the terms of procurement and purchase of goods and services under the workshop's needs. It can be said to be quite good because the workshop space is still limited. This is under the statement of the following sources:

"...just an untidy arrangement. The space is not wide enough. After all, the room is still 1.5x how much should it be widened to 3x3." (AG/Head of the KGSP department and KGSP teacher)

The results of this study also support evidence from a previous study with 100% achievement regarding the importance of buying goods by including product specifications and storing them properly (Miftachul & Suparman, 2017). However, some equipment (the cement mixer machine at the KGSP workshop) does not have a specific storage location due to inadequate space (Hidayat & Wahyuni, 2016). In addition, the students explained that improvements in practical questions were required. An appropriate and adequate workshop atmosphere should meet the standards to achieve the main goal of the workshop itself (Pangestu & Sukardi, 2019).

The fourth aspect in the implementation of inter-system engagement runs well. This was found through the findings that the involvement relates to teachers and technicians, teachers and students, technicians and students. The results follow the student involvement during the implementation of OHS at one of the universities in Indonesia in a workshop. It has an average of 3.32 which means good (Hidayat & Wahyuni, 2016).

The fifth aspect, the accident flow report, is classified as unfulfilled. Reporting accident flow report itself begins when the person is in an accident and then reports to the school clinic. After that, check the section affected by accident, whether it needs to be followed up in the hospital or needs to rest if it feels necessary to be taken to the public health center. If seriously referred to the hospital with the school clinic team and the M&R team from the school. This depends on the seriousness of the injury due to a work accident. This statement is supported by the results of interviews with the following:

"Yes, we usually report it at the school clinic; later from it, there is a record for reporting to the school, there is data like that." (AY/DITF teacher)

"Not yet, yes, for example, if it happens, we give first aid, we give iodine and then go to the UKS if necessary to go to the hospital, but not here yet." (HY/KGSP teacher)

The findings are obtained; thus, the victims were never seriously injured, yet minimal work accidents in the two- workshops building. Previous research stated that the achievement was 62.5%. Schools should have a flow in an effort to deal with emergencies in the event of an unwanted event (Miftachul & Suparman, 2017). The sixth aspect, supervision during practice, has been carried out well by productive teachers and technicians to students. This is because the research findings show that teachers provide control when students practice in the workshop, such as if there are students who have difficulty, the teacher will guide them. The statement of SY:

"We watched together, sometimes left and sometimes accompanied them. If accompanied continuously, students will feel bored and afraid because this assistance's name can be good. It cannot be good. The child whose name is being waited for is even fearful of doing it, not being able to. But if you leave it, it's terrible because the child will later be confused if he wants to ask. Suppose the children here are not crowded when they stay. And the children here are still relatively good.."

Previous research has also reached 100% where it has supervised practicing students and informed them about the dangers of the tools to be used and their prevention (Miftachul & Suparman, 2017). In addition, other research shows the lower the supervision of the workforce, the greater the unsafe action taken (Suryanto & Widajati, 2017). The supervision of the teacher is going around and checking the work of students and paying attention to the completeness of the use of Personal Protective Equipment (PPE) during practice (Erfian & Raharjo, 2020).

The seventh aspect in the maintenance of the OHS facilities of the two workshops was in a good category. The results are the role of the Maintenance and Repair (M&R) team at the Vocational School, teachers, technicians, and students. They were mutually responsible for borrowing and returning tools to them. This is supported by one of the following statements by the informants:

"Yes, there is already an M&R Team, so later we will schedule the damage to the equipment which will be repaired." (KS)

Previous research with 69% achievement stated that they had not implemented a schedule for usage cards, offer cards, and repair cards (Miftachul & Suparman, 2017). It is significant to have practical facilities and infrastructure to build student competence in vocational education (Pangestu & Sukardi, 2019; Susanto & Sudira, 2016).

Evaluation of OHS Implementation

The OHS evaluation that will study consists of evaluating the application of OHS and improving OHS in the workshop. In the evaluation of the application of OHS containing the evaluation of the OHS policy of the workshop according to the rules, the results found are that the teachers only evaluate students' performance when doing practice, not related to OHS policies. This is indicated by one of the following quotes from the teacher resource person statement:

"… the school just gave an appeal for the arrangement of the workshop space, right there are rules and regulations, so what kind of machine is arranged, how is the circulation arrangement already there, only here it will only be made, such as a green line and then limits on the placement of machines or furniture has a yellow line or something like that, yes, there is an appeal." (AY/DITF teacher)

In the aspect of improving OHS, the results found are OHS socialization. The school will also revamp the workshop and adjust it to the workshop in the industry so that students are ready to compete in the business and industrial world (IDUKA). The statement of the following:

"Well, this may be later. With the existence of an independent Adiwiyata, it will be completed. Until then, safety posters must exist. In general, there are still posters about going to the school environment. But in the future, you will stay there because that is one of the conditions for Adiwiyata to be independent, right? That's one thing. Secondly, these two schools will lead to the industrial class. This will be monitored directly by Toyota. Yesterday it was surveyed." (SY/KGSP teacher)

Thus, the SMK in the aspect of evaluating the workshop policy is quite good, and the aspect of improving the OHS of the workshop is quite good. In previous studies, the improvement of OHS in the workshop with 100% achievement, the school handled the problem by helping with transportation and providing insurance costs to students who got work accidents. In addition, the policy evaluation with the achievement of 25%, the school was still not maximally evaluating the OHS policy for the workshop (Miftachul & Suparman, 2017).

CONCLUSION

The OHS Management System (SMK3) obtained in a vocational school building workshop in one of Central Java in the aspect of planning the implementation of OHS has been implemented quite well. In the aspect of implementing OHS implementation, it is categorized as quite well implemented. The aspect of evaluating the implementation of OHS is categorized as being well done. Thus, the OHS Management System (SMK3) at the SMK needs to be improved. The school can work with stakeholders to follow up on the OHS Management System. With the planning and implementation of an excellent occupational safety and health management system (SMK3) in-school workshops, students will be more self-aware regarding work safety. Thus, students can apply the behavior to obey their work safety in the industrial world (IDUKA).

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