

Learning management of machining engineering skill concentration in improving the competence of smk students

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ABSTRACT

Facing the increasingly stringent era of globalization, Vocational High Schools have an important role in preparing students who are ready to face the challenges of an increasingly competitive world of work. The purpose of this study is to obtain an overview and analyze the learning management of the Machining Engineering Concentration of Expertise in improving the competence of vocational students. This research uses a qualitative approach with descriptive research methods. The results of the study showed that (1) the learning planning of KK TPM has been carried out well, the curriculum as a learning guide is in accordance with applicable regulations, there are annual programs, semester programs, lesson schedules and teaching modules that refer to the curriculum. (2) The organization of KK TPM learning has been well implemented, there is a division of teaching duties of teachers according to their competence, teachers guide students in learning, students collaborate in their groups working on learning projects and there is support from the world of work / industry which acts as a guest teacher in learning. (3) Implementation of learning KK TPM learning has been carried out well seen in the opening activities, core activities and closing activities of learning are implemented well in accordance with lesson planning. (4) Supervision of KK TPM learning has been carried out well, there is a learning assessment, learning reflection and follow-up in improving the quality of learning. (5) The obstacles faced in learning KK TPM are the limited factors of the machines owned. (6) The solution in overcoming the obstacles faced is setting an effective machine use schedule, using simulator learning media in the form of applications on android phones or computers, collaborating with the world of work / industry in carrying out teaching factory activities in collaboration with industries involving students, and having guest teachers / practitioners from the world of work / industry in learning. This study can be concluded that the learning management of the concentration of machining engineering expertise has been carried out in accordance with planning, organizing, implementing, and supervising. However, there are obstacles in terms of the lack of practical learning facilities owned according to standards and solutions in overcoming these obstacles are using simulator learning media and also collaborating with the world of work / industry in supporting learning.

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Introduction

Education is essentially a process of fostering human resources that emphasizes efforts to develop the potential of students both in terms of physical and spiritual aspects. Learning is part of the educational process. Law No. 20 of 2003 explains that "learning is the process of interaction between students and educators and learning resources in a learning environment". In line with this, Winataputra (Wahab, and Rosnawati, 2021: 3) revealed that "learning is an activity carried out to initiate, facilitate and increase the intensity and capacity and quality of learning in students". Thus learning is a process of interaction carried out by students and educators by utilizing various learning resources in the learning environment to achieve learning objectives.

Facing the increasingly tight globalization era, vocational education has an important role in preparing human resources. Vocational education at the Vocational High School (SMK) level has an important role in preparing students to face an increasingly competitive world of work. In the industrial era 4.0, the demand for workers who have technical skills, especially in the manufacturing industry, is increasing. SMK as an educational institution that focuses on developing vocational skills has an important role in producing graduates who are ready to work. The concentration of machining engineering expertise is one of the fields that is highly needed in the manufacturing industry. With the rapid development of technology, practical skills in mechanical engineering are very important to increase productivity and work efficiency in the world of work/industry. The rapid development of technology in the field of mechanical engineering requires periodic adjustments to the curriculum and learning methods. The rapid development of machines with the latest technology in the industry has not been pursued by the ability of vocational high schools to keep up with machines with the latest technology. There are still several vocational schools that do not have machines with the latest technology.

Vocational High Schools (SMK) also have an important role in preparing graduates who are ready to work. However, in reality in the field, not all SMKs are able to keep up with these developments quickly. There are still many graduates of SMK Mechanical Engineering who still experience difficulties in entering the world of work. One of the causes is the gap between the competencies possessed by graduates and the demands of the industry. The rapid development of manufacturing technology demands a workforce that has more specific and complex skills.

Based on the results of preliminary observations to several SMKs in Subang Regency and SMKs in Purwakarta Regency, especially in the concentration of machining engineering expertise, there are still obstacles in learning. The first obstacle is the limited machine facilities owned by the school for the learning process. Second, the lack of intensity of practical learning, students have to wait for their turn in using practical equipment due to the limited equipment, students use the equipment in turn so that each other waits, so that the impact on learning becomes less optimal. Third, learning methods in SMK concentrations of machining engineering expertise are still dominantly teacher-centered, teachers tend to focus on delivering material through lectures and giving practical assignments made by teachers without any planning process involving students.

An effective learning process is inseparable from how learning management is carried out in schools. Learning management for the concentration of mechanical engineering expertise can be optimized to improve the competence of vocational students. As is the case at SMKN 1 Cipunagara, which is one of the SMKs in Subang Regency, which has a Concentration of Mechanical Engineering Expertise that has won the SMK Center of Excellence (SMK PK) from the government through the Ministry of Research, Technology and Technology of the Republic of Indonesia, the SMK implements TPM learning management that refers to the SMK PK program and the Merdeka Curriculum with one of its characteristics is implementing project-

based learning. Likewise, SMKN 1 Cibatu Purwakarta Regency is also one of the SMKs in Purwakarta Regency which has a Concentration of Mechanical Engineering Expertise as a Center of Excellence SMK that implements the SMK PK program and the Merdeka Curriculum with one of its characteristics is implementing project-based learning. Based on this, the author is interested in delving deeper into the learning management implemented at SMKN 1 Cipunagara and SMKN 1 Cibatu and analyzing its impact on improving student competence. This research is expected to contribute to the development of learning management in the field of mechanical engineering, so that SMK graduates can be better prepared and competent in entering the world of work.

Method

This research uses a qualitative approach with descriptive methods to find out thoroughly about the learning management of TPM KK in improving the competence of vocational students. "Qualitative research is research that uses a natural background, with the intention of interpreting the phenomena that occur and is carried out by involving various methods available in qualitative research." (Denzin and Lincoln in Sidiq and Choir, 2019). Meanwhile, descriptive research is research that describes or describes a problem. This descriptive research aims to describe a population, situation or phenomenon accurately and systematically "(Fiantika, 2022)

The data collection technique of this research was carried out by Observation, Interview and Documentation Study to obtain comprehensive and in-depth information related to the learning management of KK TPM at SMKN 1 Cipunagara and SMKN 1 Cibatu. Data collection in this study was carried out by direct observation to the research location to subject teachers and class students to obtain information related to this research. Interviews in this study are intended to obtain an overview to analyze the learning management of the TPM Group to improve the competence of vocational students. Interviews were conducted with the Principal, Head of Expertise Program, Teachers and Learners. Documentation studies were conducted at SMKN 1 Cipunagara and SMKN 1 Cibatu to obtain information related to this research. Documentation study as a way of collecting data through documents related to research problems. The documents collected in this study consisted of curriculum documents, school profiles, documentation of the school's vision, mission and objectives, organizational structure, learning schedule documents, teacher and administrative list documents, student list documents, teacher teaching module documents, annual programs, semester programs, practical learning group division activity schedules, documentation of learning activities.

Result and Discussion

From the results of research findings in the field, researchers conducted a discussion related to the theory of *planning, organizing, implementing, and controlling*.

Planning for TPM Group Learning

Planning (planning) learning KK TPM in learning management carried out is the preparation of the curriculum as a guide to the implementation of education in schools prepared by the curriculum development team, the second is the teacher compiling an annual program, the third is the teacher compiling a semester program, the fourth is the teacher compiling lesson plans in the form of teaching modules, the fifth is the existence of a lesson schedule prepared by the curriculum section to regulate the time of implementation of teaching and learning activities at school. This is in line with research conducted by Ahmad Yani (2023) "Islamic religious education learning planning, teachers make learning plans including the preparation of annual programs, semester programs, syllabi, lesson plans, minimum graduation criteria, and details of effective weeks". The current curriculum refers to Permendikbudristek Number 12 of 2024 "The curriculum is a set of plans and arrangements regarding the objectives, content, and subject matter as well as the methods used as guidelines

for organizing learning activities to achieve certain educational goals". The curriculum as a reference in planning learning programs in the form of annual programs, semester programs and lesson plans / teaching modules carried out by teachers refers to the applicable curriculum according to Permendikbudristek Number 12 of 2024.

Learning planning for the TPM group in vocational schools has been carried out in reference to Permendikbudristek Number 12 of 2024. The lesson plan is prepared by teachers as an effort to carry out learning in order to achieve learning objectives optimally. This is in accordance with the theory of management functions regarding planning according to George R. Terry (Utomo, 2018: 3) "Planning is an activity to determine the goals to be achieved and the ways to achieve these goals". In the learning planning carried out, it is also in line with the teleological value system according to Sanusi (2017: 35) "the value that is manifested in useful, useful, according to its function, developing / progressing, organized / disciplined, integrative, productive, effective, efficient, accountable, innovative". Learning planning is in accordance with this value, it can be seen from the planning that is made has a value of usefulness for increasing the competence of students. Learning planning for the TPM KK in improving the competence of vocational students has been carried out properly in accordance with applicable regulations, namely Permendikbudristek Number 12 of 2024 and is translated into the curriculum as a guideline that regulates the implementation of learning, the existence of annual programs, semester programs, lesson schedules, and teaching modules.

Organizing TPM Group Learning

In managing an activity, the organizing management function is very important to carry out the activities to be carried out. In this case, it is the organization of learning KK TPM carried out at SMK. According to George R. Terry (Utomo, 2018: 6) 'Organizing is the act of seeking effective behavioral relationships between people, so that they can work together efficiently, and gain personal satisfaction in carrying out certain tasks, in environmental conditions'. Based on the results of the research, the organization of TPM learning in SMK is determined based on the Principal's Decree on the distribution of teaching assignments based on the field of teacher certification and adjusted to the linearity of the diploma, this is intended so that the teaching teacher is in accordance with the competencies he teaches. Based on the results of interviews, observations and documentation studies at the two schools involved in learning KK TPM consisted of teachers, students and guest teachers from industry. The teacher acts as a companion and facilitator in learning. Students act as implementers in KK TPM learning activities, in learning a study group team is formed with a division of tasks consisting of a chairman, secretary and team members. Practitioners from industry act as guest teachers in KK TPM learning to assist in industry-based learning at SMK. The organization of learning that has been carried out is in line with the teleological value system according to Sanusi (2017: 35) "the value that is manifested in useful, useful, according to function, develop / advance, order / discipline, integrative, productive, effective, efficient, accountable, innovative". This can be seen from the elements involved in learning to carry out their roles and functions properly, so as to provide benefits to increasing the competence of students.

Learning KK TPM in SMK is carried out by KK TPM teachers based on the Principal's Decree, students and practitioner guest teachers from the world of work / industry. The organization of KK TPM learning in improving the competence of students has been carried out well, it can be seen from the involvement of KK TPM subject teachers in accompanying students from the beginning to the end of learning activities, students are seen actively collaborating in their groups to work on learning projects to make products using machines in the workshop and the presence of guest teachers from the world of work / industry school partners who provide material in learning, it supports in improving the competence of students in both schools.

Actuating KK TPM Learning

In managing an activity, the implementation management function is supported by the efforts of each team member to achieve goals in accordance with the plans that have been prepared. Implementation (actuating) is an effort to achieve goals or objectives that have been

planned in order to be realized. In carrying out activities, the role of organizational members is very important, because each member will carry out activities in accordance with the division of tasks and their respective roles. The implementation of TPM KK learning in SMK refers to lesson planning which consists of an annual program, semester program, and lesson schedule. Learning implementation consists of 3 activities, namely opening activities, core activities, and closing activities. This is in accordance with the theory expressed by Utomo (2018: 105) "the implementation of learning is the implementation of the lesson plan. The implementation of learning consists of introductory activities, core activities and closing activities". Teachers carry out learning scenarios referring to the teaching modules that have been made, students are given assistance in learning by directing students to achieve the competencies of the TPM KK. The competencies in question are the learning outcomes contained in the curriculum. These learning outcomes are competencies that must be achieved by students, as explained in Permendikbudristek Number 12 of 2024 "Competencies as referred to in Article 8 letter a are formulated in the form of Learning Outcomes." Learners carry out learning in accordance with the learning outcomes (CP) which are translated into KK TPM learning objectives. The implementation of KK TPM learning is carried out with a project-based and learner-centered learning model, in its implementation students in groups collaborate in working on product manufacturing projects with teacher guidance. In the learning process, teachers carry out project-based and learner-centered learning, this is in line with the Regulation of the Head of the Education Standards, Curriculum and Assessment Agency of the Ministry of Education, Culture and Research No. 032/H/Kr/2024 explaining that the learning process is based on project-based and learner-centered learning. 032/H/Kr/2024 explains that "The implementation of student-centered learning in Mechanical Engineering can apply inquiry-based learning, problem-based learning, project-based learning, teaching factory, visits and direct practice in the world or other relevant methods in order to realize the profile of Pancasila students who believe in, and fear God, have noble character, work together, are independent, reason critically, and creatively done collaboratively in the form of group work".

Learners are directed by the teacher to carry out learning with a project-based learning model. In carrying out the project, students design the project by making a jobsheet consisting of the project title, tools, materials, design drawings and work steps. Furthermore, students work on projects in the form of making products using machines according to the competencies they learn. Learners show their activity in using various equipment in accordance with the products they make, so that the competence of students is increasingly honed and increased. In addition, students are also involved in teaching factory production activities (TEFA) which are part of the industry-based TPM KK learning program at SMK. In TEFA activities, students work on products ordered by the industry. In TEFA activities, they get intensive assistance from teachers and practitioners from the industry to produce products that are in accordance with industry standards. Through this TEFA activity, students get intensive practical experience, so that the competence of students increases in accordance with industry standards.

The implementation of TPM KK learning in vocational schools is in accordance with the theory of management functions according to George R. Terry (Utomo, 2018: 8) 'actuating is an effort to move group members in such a way that they are willing and strive to achieve the company's goals and the goals of the company's members because the members also want to achieve these goals'. The implementation of learning that has been carried out shows the achievement of learning objectives in accordance with the planning that has been done, this is in line with the logical value system, according to Sanusi (2017: 35) "logical-rational value, which is manifested among others in logic / match between facts and conclusions, precise, appropriate, clear, real, identity / characteristics, processes, circumstances / conclusions match". Logical-rational value in this study is realized by the suitability of the implementation of KK TPM learning. The implementation of KK TPM learning in improving the competence of vocational students has been carried out well. This can be seen from the learning process carried out by teachers and students starting from the opening of learning, core learning

activities and closing learning activities implemented in accordance with the learning planning that has been carried out.

Supervision (Controlling) of TPM Group Learning

Supervision (controlling) in an activity is carried out as a control to control that activities run according to plan to achieve goals. With good supervision, it can be known and analyzed that tasks and activities are running according to the plans and goals that have been set. Supervision also helps in identifying problems or obstacles that may arise, so that we can immediately solve them and prevent delays or failures in achieving goals.

Based on the results of the research, supervision in the learning activities of the TPM KK is carried out by the teacher, starting from the opening activities of learning, core learning activities, and closing activities. In controlling activities, assessment, reflection and follow-up activities are carried out. Reflection activities are carried out at the end of learning activities. Learners are asked to convey their reflections on the learning that has been done. Learners convey learning experiences, understanding of the material learned, practical experience using the machine. The results of the reflection are input to develop a follow-up plan at the next meeting. Learning assessment carried out in the TPM KK is carried out by providing knowledge tests in the form of knowledge questions and practical tests to measure aspects of skills and work attitudes. From the results of this test can measure the achievement of student competence in accordance with the learning outcomes of KK TPM.

Supervision (Controlling) of learning carried out at SMK is in line with the opinion of Utomo (2018: 8) "Supervision is an activity that seeks to control so that implementation can run according to plan and ascertain whether organizational goals are achieved. If there is a deviation, where is the deviation and what action is needed to overcome it".

The supervisory function is very important in an activity as a control of the implementation of an activity, so as to ensure that the implementation of activities goes according to plan to achieve goals. In the context of learning management, controlling is a job done by a teacher to determine whether the functions of the organization and its leaders have been carried out successfully to achieve the specified goals. If the goal has not been achieved, then a teacher must re-measure and organize a situation that allows the goal to be achieved.

As part of the process of controlling learning, a learning assessment process is carried out to measure the achievement of learner competencies, in addition to reflection and follow-up activities to improve and improve the quality of learning. This is in line with Utomo's explanation (2018: 108) "assessment is carried out by teachers of learning outcomes to measure the level of achievement of learner competencies, and is used as material for preparing progress reports on learning outcomes, and improving the learning process." According to (Davis, 1990) (Syafaruddin, 2019: 105) 'activities related to learning supervision are evaluating the learning system, measuring learning outcomes and leading guided by goals'.

Based on the results of the research, students who take part in KK TPM learning, all students in class XI TPM are declared to have achieved competence in learning outcomes, this can be seen in the report card documents of students in both schools which show the graduation of KK TPM learning outcomes. As explained in Permendikbudristek Number 12 of 2024 that "Competencies as referred to in Article 8 letter a are formulated in the form of Learning Outcomes". This shows that students have achieved competence and there is an increase in the competence of students in KK TPM subjects in SMK. The implementation of learning supervision is in accordance with the teleological value system, supervision has the value of benefits to control the learning process in order to achieve learning objectives, as revealed by Sanusi (2017: 35) "values that are manifested in useful, useful, according to function, develop / advance, order / discipline, integrative, productive, effective, efficient, accountable, innovative". This value system is in line with the TPM KK learning supervision process so that learning activities have useful, effective and efficient value in an effort to improve learning quality.

Supervision (Controlling) of learning KK TPM learning has been done well. Teachers supervise through learning reflection activities carried out at the end of each lesson followed

by follow-up learning improvements, and to measure the achievement of learner competencies carried out by learning assessments on students.

TPM KK Learning Constraints

The implementation of learning in schools is always faced with various challenges and obstacles. However, a teacher's ability to manage learning is the main key in overcoming these challenges. Based on the results of observations, interviews and documentation studies, the obstacles faced in the learning process at SMK are the lack of practical learning facilities in this case, namely the limited number of CNC machines owned in the two schools. Referring to the SMK workshop standards for the concentration of machining engineering expertise published by the Directorate of Vocational Schools, Director General of Vocational Education, Ministry of Education and Culture in 2021, the minimum standard for CNC machines is 3 units / practice room. In reality, what is an obstacle in SMK is that there are still machines that have not been fulfilled based on the standard number owned in the two schools, namely CNC machines. Based on the minimum standard of CNC machines that must be owned are 3 units of CNC Lathe machines and 3 units of CNC milling, while the two schools only have 1 CNC machine each. This is still less than the required standard.

Solutions to overcome learning obstacles

The implementation of learning in schools is always faced with various challenges and obstacles. However, a teacher's ability to manage learning is the main key in overcoming these challenges. Based on the research results, the solution carried out by SMK to overcome the constraints of machine limitations in learning KK TPM is good learning management. As revealed by Syafaruddin (2019: 30) "as a professional task, teaching activities created by teachers should not be done just like that. However, it needs to be managed as well as possible according to the principles of teaching and good management. Moreover, teaching and learning activities in schools are very strategic to achieve educational goals".

The solution to overcome the constraints of machine limitations in learning KK TPM is to arrange a schedule for effective machine use practice, carry out routine machine maintenance to keep the machine in good condition to streamline time so that it is not wasted due to machine damage. Conduct evaluation, reflection and follow-up as an effort to improve the quality of learning. An alternative in CNC learning is with learning media in the form of CNC simulator applications that can be installed on android phones, laptops and PCs. The next solution is the presence of guest teachers from the world of work / industry who become learning resources. In addition, in improving the competence of students, there are teaching factory activities (TEFA) to work on work projects ordered from industries / companies that are school partners. Production activities with industry standards add to the experience of students in operating CNC machines, this is an added value for students in supporting the improvement of their competence.

Conclusion

Based on the results of the research, it can be concluded that in general this research is able to obtain an overview of the learning management of the SMK Machining Engineering Concentration Expertise. 1) Planning for learning KK TPM in improving the competence of vocational students has been carried out well. It can be seen from the existence of a curriculum as a learning guide in accordance with applicable regulations, the existence of annual programs, semester programs, lesson schedules and teaching modules that refer to the education unit curriculum. 2) Organizing KK TPM learning in improving the competence of vocational students has been carried out well, it can be seen from the division of teaching duties of teachers according to their competence, teachers guide students in learning, students collaborate in their groups working on learning projects and there is support from the world of work / industry which acts as a guest teacher in learning. 3) Implementation (Actuating) of learning KK TPM learning in improving the competence of vocational students has been carried out well, seen in the opening activities, core activities and closing activities of learning are implemented properly in accordance with lesson planning. 4) Supervision (Controlling) of

learning KK TPM learning in improving the competence of vocational students has been carried out properly. The form of supervision is the existence of learning assessments, learning reflections and follow-up in improving the quality of learning. 5) The obstacles faced in learning KK TPM are the limited machine facilities owned. 6) The solution in overcoming the obstacles faced in learning KK TPM in SMK is setting an effective schedule for using the machine, using simulator learning media in the form of applications that can be installed on android phones or computers, collaborating with the world of work / industry in carrying out teaching factory activities (TEFA) in making products ordered from industries involving teachers and students, and having guest teachers / practitioners from the world of work / industry in learning.

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