
**NEED ANALYSIS OF TEACHING MATERIALS FOR PROJECT-BASED LEARNING
FRAIS MACHINING FOR INCREASING THE COMPETENCE OF VOCATIONAL
STUDENTS**

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ABSTRACT

The purpose of this study was to analyze the needs of SMK Citizens students for teaching materials based on Project Based Learning Frais machining to improve student competency. The research method used is descriptive analysis by analyzing the needs of students using a needs analysis questionnaire for teaching materials based on project- based learning Frais machining. The results of the study based on the analysis of student needs is 84% of students' answers require teaching materials Frais machining based on project-based learning, especially on rectangular beam refracting material so that learning is more effective and enjoyable. Frais machining technique teaching materials make it easy for students to improve their competence in both cognitive, affective and psychomotor aspects. The presence of teaching materials will make students experience real learning so that students are more interested and become more active, do more exercises following the quality of self, and get lots of opportunities to collaborate, think critically, and increase the ability of creative skills in problem-solving. So the teaching materials for Project-Based Learning Frais Machineries are appropriate to be used early to introduce how the process works in the industrial world or building an independent business.

KEYWORDS: Teaching Materials, Frais Machining Techniques, Project-Based Learning, Student Competencies.

1. INTRODUCTION

Education is one part of the development carried out in Indonesia, specifically directed at creating quality human resources in various disciplines, including education carried out by Vocational High Schools (SMK). Vocational High School (SMK) is a school that aims to prepare graduates to enter the workforce. The main objective is the development of vocational education in the future is certainly inseparable from the characteristics of the world of work and labor needed in the future. However, the reality in the field shows that the presence of SMKs is currently not able to prepare graduates for a ready-to-use workforce. The results show that there is a gap between academic preparation and workforce skills (Cassel, 2018; Sparks & Waits, 2011). Based on the results of research conducted (Callen, 2003; Clarce, 2007)

prove that educational and industrial goals are different because industrial schools expect to get high scores in a short time, while the industry expects skilled graduates with good skills and good

attitudes. The above phenomenon is proven by the high number of unemployment, especially at the SMK level. For vocational education, the basic question that needs to be answered is how relevant the learning outcomes produced by the education world with the characteristics of the workforce needed in the future (Sofyan, 2016). Based on data from the Central Statistics Agency (BPS) on May 6, 2019, it shows that the level of open unemployment continues to increase at all levels of education from 2017 to 2019. However, when viewed from all levels of education, SMK graduates are still recorded as occupying the highest category, namely February 2017, the unemployment rate is 9.27% while in February 2018 it dropped to 8.92%. And in February 2019 the unemployment rate of SMK graduates decreased by 29 basis points and 35 BPS when compared to February 2018 which was 8.63%.

The high unemployment rate among SMK graduates is caused by the crisis of workplace confidence in the quality of SMK graduates. The crisis of workplace confidence in vocational graduates is one of the problems in the world of education. This was confirmed by Efendi, Radhia, Rizki (2017) that the crisis of workplace confidence in vocational graduates was aimed at the quality of graduates, knowledge, basic skills and work attitudes possessed by vocational graduates who were inadequate to enter the world of work, especially the world of industrial work.

The learning process at SMK requires students to be able to master the three domains of competence namely cognitive, affective and psychomotor because SMK is required to be able to create human resources that can adapt to the development of science and technology. Therefore, education in vocational schools is developed so that the graduates have the ability and skills that are ready to be used in the world of work.

The results of observations with teachers in the field of Frais machining techniques before research that, the learning strategies used by teachers are often teacher-centered (dominated by teachers), teaching styles tend to be conventional, student activity and creativity is very low in participating in learning, still often found students do not want to ask the teacher about the material presented. So we need a learning strategy so that student competency increases. The same thing is supported by Tabrani in Septian (2014) that, the success of students in improving learning outcomes in schools is influenced by several factors. These factors can be factors from within students (internal) and factors from outside students (external). To overcome this problem, a competency-based curriculum was applied for vocational high schools. One of the competencies that must be possessed by vocational students in the Mechanical Engineering expertise program is the defrauding competency. To master the refinement competence requires the ability of knowledge about machining and the skills to operate a Frais machine. One strategy to encourage students to improve their knowledge, skills, and attitudes is to use media and learning methods that produce project-based work. Project-based teaching materials will encourage students to actively learn, students will take roles, ask questions, make decisions, analyze, think critically, construct and present learning outcomes as people who think independently (Klein, 2009).

Based on the description above we need a teaching material that can facilitate the learning process to be more effective and efficient. Therefore this study aims to analyze the needs of students for teaching materials based on Project Based Learning Frais machining in Vocational High School Surakarta. This was done to obtain concrete data as a reference in developing teaching materials under the needs and characteristics of students to improve student competency in terms of cognitive, affective and psychomotor according to the demands of the 2013 curriculum.

2. METHOD

The research method used is descriptive analysis which focuses on analyzing students' needs for teaching materials based on project-based learning Frais machining. When the study was conducted in May-July 2019 with the subjects in this study were teachers and students of class XI. The location of the study was conducted at the Surakarta City Vocational School. Samples in research using Purposive Sampling techniques. Purposive sampling is a technique for determining the sample chosen deliberately based on certain criteria (Sugyono, 2008).

The determination of the sample in this study is based on field observations of class XI students who are considered to be good enough in the Frais machining technique. Data collection using observation techniques, interviews and questionnaires. The interview instrument for teachers is used to obtain information on student learning outcomes and teaching materials that are implemented during the learning process of frais machining techniques. While the questionnaire instrument was used to determine students' views of the needs for teaching materials Frais machining techniques.

3. RESULT AND DISCUSSION

Table 1. Student learning outcomes in the 2018/2019 school year odd semester

Recapitulation of Class XI Student Learning Outcomes		
Class	Knowledge	Skills
XI M1	52%	49%
XI M2	46%	62%
XI M3	56%	21%
XI M4	18%	40%
Average	43%	46%

Source: Student Learning Outcomes Odd Semester 2018/2019

Table 2. Student learning outcomes in the 2018/2019 school year even semester

Recapitulation of Class XI Student Learning Outcomes		
Class	Knowledge	Skills
XI M1	60%	56%
XI M2	27%	70%
XI M3	56%	40%
XI M4	18%	20%
Average	40%	47%

Source: Student Learning Outcomes Even Semester 2018/2019

Based on the above table, it can be seen that the average student learning outcomes in the 2018/2019 school year odd semester XI M1 on the aspect of completed knowledge as much as 52% while on the aspect of skills as much as 49%. Class XI M2 knowledge aspects as much as 46%, skills aspects as much as 62%. Class XI M3 level of mastery learning outcomes in the aspects of knowledge by 56% 21% skills aspects. And class XI M4 in the aspect of knowledge by 18% and skills 46%. Thus it can be concluded that the average completeness level of student learning outcomes in the aspect of knowledge is 43% while the aspect of skills is 46%. While the acquisition of even semester student learning outcomes in aspects of class XI MI knowledge by 60% and skills aspects by 56%; class XI M2 knowledge aspects of 27% and 70% skills; class XI M3 in the aspect of knowledge by 56% and skills by 40% and class M4 in the aspect of knowledge by 18% and skills by 20%. The average score of the overall class score in the aspect of knowledge is 40% and in the skills aspect is 47%. Thus it can be concluded that the overall class is not enough 50% who have completed both the aspects of knowledge and aspects of skills. Whereas in terms of the acquisition of the average value of students in the aspect of knowledge decreased by 3% and in the aspects of skills increased by 1% compared to the odd semester.

This is according to the subject teacher frais technique low student learning outcomes caused by the lack of literature used by teachers in delivering material in the learning process. Based on the results of interviews with the teacher said that the book used is still far from renewal and practicality. The results of the interview excerpt are as follows:

"Teaching materials in schools should be updated because progress and knowledge are also increasingly developing. Relevant teaching materials are, of course, teaching materials that can increase student competency: among them, the teaching materials must be accurate, focused and up to date by the existing syllabus. Then the examples and applications in the teaching material must be by the conditions in the field/workshop so that students hope it is easier to understand the material being taught "(Parjito, ST. Quote Interview September 16, 2019).

Based on that, practical media and updates for learning are chosen, namely Frais Machining Engineering teaching materials. The reason for choosing Frais Machining Technique teaching materials for delivering material is because the users of teaching materials are good as a means of supporting practice and students can learn independently. The results of interviews with students also illustrate the lack of availability of teaching materials used so far. When alluding to the teaching material used is related to the material of Frais Machining.

"In my opinion, actually the Frais Machining Technique lesson was very enjoyable especially when we were practicing directly in the workshop. Because learning directly in the field is more challenging than learning theory, sometimes it makes you tired and sleepy. I am happier when the teacher explains the theory directly along with the practice in the workshop than in the classroom. But the problem is the number of machines available is not proportional to the number of students, sometimes one machine is used for 2-3 students. So we have to queue up first "(Malvino Muhammad Ajrin. Interview Quote September 18, 2019)

Based on the results of the interview above, the subject of Frais Machining is liked by students, but the teacher has not been able to create an atmosphere of learning by the wishes of the students themselves. On the other hand, vocational high schools, in general, have entered the formal operational stage and therefore according to Piaget's theory of development students must be able to create and explore their concepts of knowledge. Therefore, the developed teaching materials must be able to provide many opportunities for students to be active in searching the material independently without having to depend on the teacher. Interviews that have been conducted with Surakarta Citizens Vocational School students have given information that the source of learning especially the teaching materials used so far are very minimal and far from renewed. The same thing also expressed by Bian Khahlil Ardiansyah, according to him the learning of machining techniques during the Frais has been too focused on the material contained in just one book.

According to M.Akhyar's research results (2009: 4) that in the context of technical and vocational education, work-based learning styles are relevant to be applied in vocational high schools, because according to the National Technical and Vocational Education and Training Program (1996), because vocational education is directly related by preparing someone to enter market work. So with the use of Project- Based Learning materials, there is a change in learning management. These changes, namely; changes in school conditions such as industry conditions, generally describe work in industry, a description of the workforce of vocational school graduates in industry, a description of a junior technician, an assessment system of work products in industry, and discipline, work ethic and productivity (Baiti and Munadi, 2014: 164- 180). Thus the use of Project-Based Learning-based teaching materials on students is expected to be able to design products that include the preparation; the importance of products made, the advantages and functions of products/services, sketches/working drawings, materials, facilities/equipment, production processes, budget plans, target markets/users, and implementation schedules.

4. CONCLUSION

This Project-Based Learning based Frais Machining teaching material is appropriate to introduce early how students are trained to work in the industrial world or build independent businesses.

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