

Received : 7 June 2022
Revised : 20 December 2022
Accepted : 28 December 2022
Online : 30 December 2022
Published: 30 December 2022

DOI: doi.org/10.21009/1.08214

Needs Analysis for Developing Project-Based Learning Outcomes Assessment Models in Electricity topic at the Center of Excellence Vocational High School

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Abstract

This study aims to analyze the needs of the project-based learning outcomes assessment model at the Center for Excellence in Vocational High Schools. The first step in the research is the development of Project-Based Learning Assessment Models. Electricity was chosen because it is one of the intersecting materials in the departments at Vocational High Schools. The survey method was chosen to collect information on the needs of the assessment model. The survey data were analyzed using descriptive statistics. The mode of the survey data was used to draw the required model conclusions. The number of respondents who filled out the questionnaire was from 10 SMK-PK in DKI Jakarta, West Java, Banten, and Lampung who applied Project-Based Learning in Practical Teaching. From the respondents' answers, it can be concluded that. Most schools require specific Guidelines for the Assessment of Project-based Learning yet to be made available. Most teachers require industry involvement in the creation of Practice-based Learning assignments. A large number of teachers need an assessment of the quality of assignments. Assessment of the Project-based Learning Process tends to be carried out at the implementation stage, while in the planning and reporting stages, it is carried out by a few teachers. The assessment tends to be carried out against groups with aspects assessed as competence and student performance. The assessment techniques carried out include written tests, observations, and portfolios. Standard sample documents required include Instrument Indicators and Rubrics.

Keywords: assessment, outcomes, project-based learning, vocational high school

INTRODUCTION

The Indonesian government has made several policies to develop Vocational High Schools or Sekolah Menengah Kejuruan (SMK). This policy relates to increasing the link and match between the quality of Vocational High School graduates and the competency demands of the Industrial workforce (Eriana 2021). Policies include dual system education, apprenticeship in industry, and teaching factory (Wahjusaputri & Bunyamin 2022). The Center of Excellence Vocational High School or Sekolah Menengah Kejuruan Pusat Keunggulan (SMK-PK) is being fostered (Tanti et al. 2022).

SMK-PK Program develops SMK with specific expertise programs through quality and performance improvement (Novika et al. 2022). These are strengthened through partnerships and alignment with the world of work. This is a reference with an encouraging spirit and a center for improving the quality and performance of other SMKs. In general, SMK-PK Program aims to produce

graduates who are absorbed in the world of work or become entrepreneurs through in-depth and comprehensive alignment of SMK with the world of work and are expected to become centers of quality improvement and reference for other SMKs.

The issue regarding the link and match program launched since 1989 was designed to improve workforce competence with job market needs (Fahmayani 2021). However, based on statistical data on the unemployment rate, high unfilled job vacancies, and low quality of workers, the data analysis shows a mismatch between education and the demands of the industrial world high (Ali, Triyono & Koehler 2020). Link and match are extracting competence in future job market needs. The expected educational orientation paradigm is not again supply-minded but more demand-minded (Kodrat 2021).

The Ministry of Education and Culture uses the 8+i Formula to achieve the goals of a center of excellence SMK (Kemendikbud 2021). The Link and Match 8+i Formula will be explained as follows: (1) The curriculum is prepared by the school together with the industry in line with the strengthening of the aspects of soft skills, hard skills, and work characteristics according to the needs of the world of work; (2) Learning is sought based on real projects from the world of work (project-based learning) to ensure hard skills, soft skills, and strong character; (3) Increasing the number and role of teachers/instructors from industry and experts from the world of work; (4) Fieldwork/industry practice for at least one semester; (5) For graduates and for teachers/instructors, competency certification must comply with the standards and needs of the world of work; (6) Teachers/instructors need to emphasize updating technology through regular training; (7) conducting applied research that supports teaching factories based on cases or industrial needs; (8) Commitment to the uptake of graduates by the world of work.

Special requirements exist to become an SMK-PK in 2023 (Direktorat SMK-Kemendikbudristek 2022). These requirements can be read at <https://smkpk.ditpsmk.net/FAQ>. This requirement does not limit any SMK majors participating in the SMK-PK program. When discussing the majors in SMK, several engineering majors have the same essential subject. Students majoring in engineering will generally study materials about electricity, especially those majoring in electrical installation engineering (Dhemahestri, Rahmawati & Mahandi 2022).

Learning at SMK-PK applies a new paradigm, namely, learning-oriented toward strengthening competence, character, and work culture (Firman & Fathurrahman 2021). This learning is cross-subject and project-based. It was included in the subject of electricity. Electricity is a material taught in class and will be assessed later during practice. The Central Vocational High School's project-based learning model aims to strengthen soft and hard skills. In this lesson, the curriculum is designed together with industry. The project-based learning model or Project Based Learning is a learning model that can make students active and independent in learning (Sinurat, Syaiful & Muhammad 2022). The project-based learning model can apply students' knowledge and train various thinking skills, attitudes, and concrete skills.

This paradigm shift brings change and requires adjustment, so the problem arises regarding the need for a project-based learning assessment model in practical subjects in SMK-PK. Project-based learning involves students working on real projects or activities as the core of teaching to achieve knowledge, attitude, and skill competencies, which are the learning objectives (Megayanti, Busono & Maknun 2020). Project-based learning departs from an authentic, contextual problem, where the project students are working on is a solution or a form of solving the problem in question. In project-based learning, students must investigate, find solutions, plan actions, divide roles or tasks for groups and individuals, implement work plans, and conduct evaluations.

Project-based learning through practical lessons is advanced-level learning (Zhu et al. 2019). Project-based practical learning aims to build student creativity in finding solutions to specific problems, improve the ability to work collaboratively and efficiently, and provide measurable contextual real experience per predetermined learning objectives. There is a difference between practical learning projects and project-based learning. The practical learning project focuses on the product that will be produced solely. Meanwhile, project-based learning in practical learning focuses (Efstratia 2014). In addition to products, namely increasing the competence of students. Students are given experience on how to manage resources, organize work, and manage activities collaboratively, starting from identifying problems, analyzing work, designing solutions, sharing ideas and experiences with work groups, revising design solutions, implementing work plans, evaluating work results,

improve processes, and follow-up plans. The need for mastery of knowledge, practical skills, and work attitudes in students is formed or obtained from their experiences.

The researcher considers information regarding the Project-Based Learning Outcomes Assessment at SMK PK, especially on Electricity Material (Ramdani et al. 2021). So, the researchers wanted a needs analysis to develop an appropriate Project-Based Learning Outcomes Assessment Model.

METHODS

The researchers developed a learning assessment model based on needs analysis in this study. The problem was the need for a product-based learning model outside the classroom and without face-to-face meetings at SMK PK.

Needs Analysis

At the needs analysis stage, it aims to see pictures of the implementation of the assessment that has been running at SMK-PK, and then an analysis is carried out to identify the needs of the school. In this case, SMK-PK will be an assessment model for Project-Based Learning (PBL) . A needs analysis was carried out through a survey of 10 SMK-PK. The steps for the Needs Analysis to Create a PBL Assessment Model are carried out according to the Flow Chart shown in FIGURE 1.

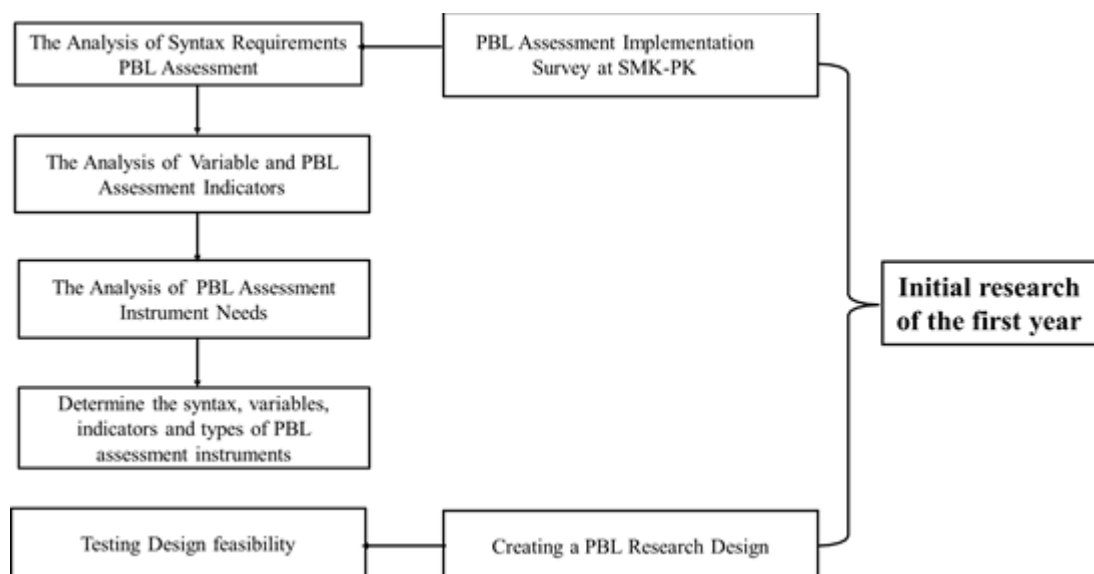


FIGURE 1. Flowchart of need analysis

Design Making

The making design referred to in this study is the Making of Project-based Project Learning Assessment Model Designs. The design was developed based on the needs analysis results and project-based learning syntax or flow. Measurement activities and aspects being measured, the type of instrument used refers to the findings of previous studies. After the design is completed, it is developed based on expert input. The research instrument was in the form of validation sheets from learning experts, material experts, and media experts. Learning expert validation sheet to determine the suitability of learning coverage cognitively, affectively, and psychomotor. The material expert validation sheet is used to determine the suitability of the material presented using the PBL learning model and essentials competence in both textbooks and learning media. At the same time, media expert validation is used to determine the feasibility of media content, language, and presentation of learning media.

The measurement instrument for capturing school needs regarding the project-based learning assessment model was developed from two major sources. Has the school developed or has a standard

project-based learning assessment model? What types of instruments do schools often use in assessing Project-based learning? It is the assessment of project-based practical learning following the project-based learning syntax, namely the assignment of planning, reporting, and product quality or learning outcomes.

Data Analysis Technique

$$percentage = \frac{Total\ score\ obtained}{Total\ maximum\ score} \times 100\% \tag{1}$$

TABLE 1. Criteria for the Percentage of Earnings

Percentage performed Criteria	
81-100	Urgently needed
61-80	Needed
41-60	Sufficiently needed
21-40	Less needed
1-20	Not needed

Descriptive analysis was carried out to analyze the needs in this study for each question the presentation was calculated. Score percentage formula using EQUATION 1 and criteria percentage using TABLE 1,

RESULTS AND DISCUSSION

Starting from the question about ownership of Project-based Learning Assessment Guidelines, 10 SMK-PK as a sample of 60% still needed to have Project-based Assessment Guidelines. Next is assignments to students in project-based learning or project task creation. PBL assignments at SMK-PK involve industry by 58%, only teachers at 37%, and practical learning assignments by industrial instructors by only 5%. The graph is presented in FIGURE 2.

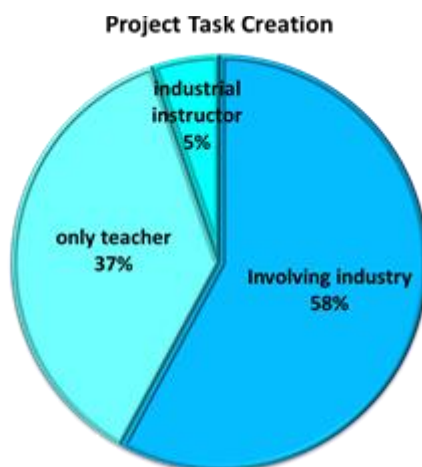


FIGURE 2. PBL assignments at SMK-PK

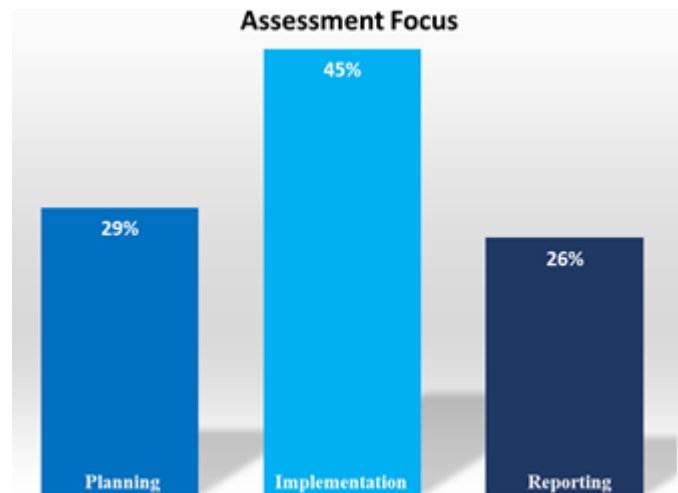


FIGURE 3. Assessment Focus by Teacher at SMK

From FIGURE 3, it can be concluded that making assignments involving industry is quite needed by teachers or schools. Assessment of the quality of assignments given to students participating in project-based learning. Some teachers stated that the school should have evaluated the quality of assignments. Meanwhile, the majority of teachers stated that the school evaluates quality. The focus of teacher assessment is carried out in the implementation process, then the planning and reporting stages for the assessment of planning stated by 29%, respondents in the implementation of 45%, and 26% in reporting.

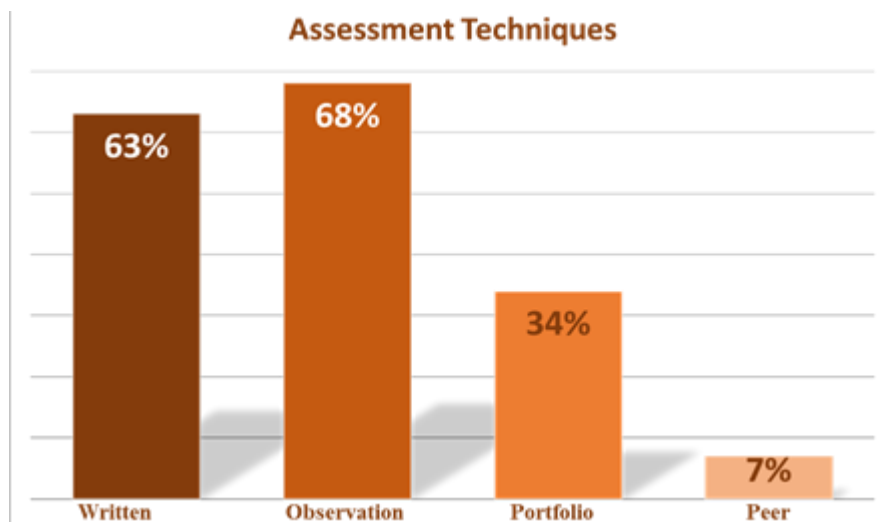


FIGURE 4. Assessment Techniques by Teacher at SMK

Based on the data in FIGURE 4, the priority for assessing the processes needed by schools is the implementation process. In contrast, planning and reporting assessment processes are unnecessary, and evaluating products is unnecessary. The teacher's project learning can explain this includes theoretical and practical learning. Even though the findings in the field are like that, for practical learning, product assessment must be carried out. Whether the assessment is carried out in groups or individually, it turns out that in both cases. First, teachers carry out group assessments, and second, teachers conduct them individually.

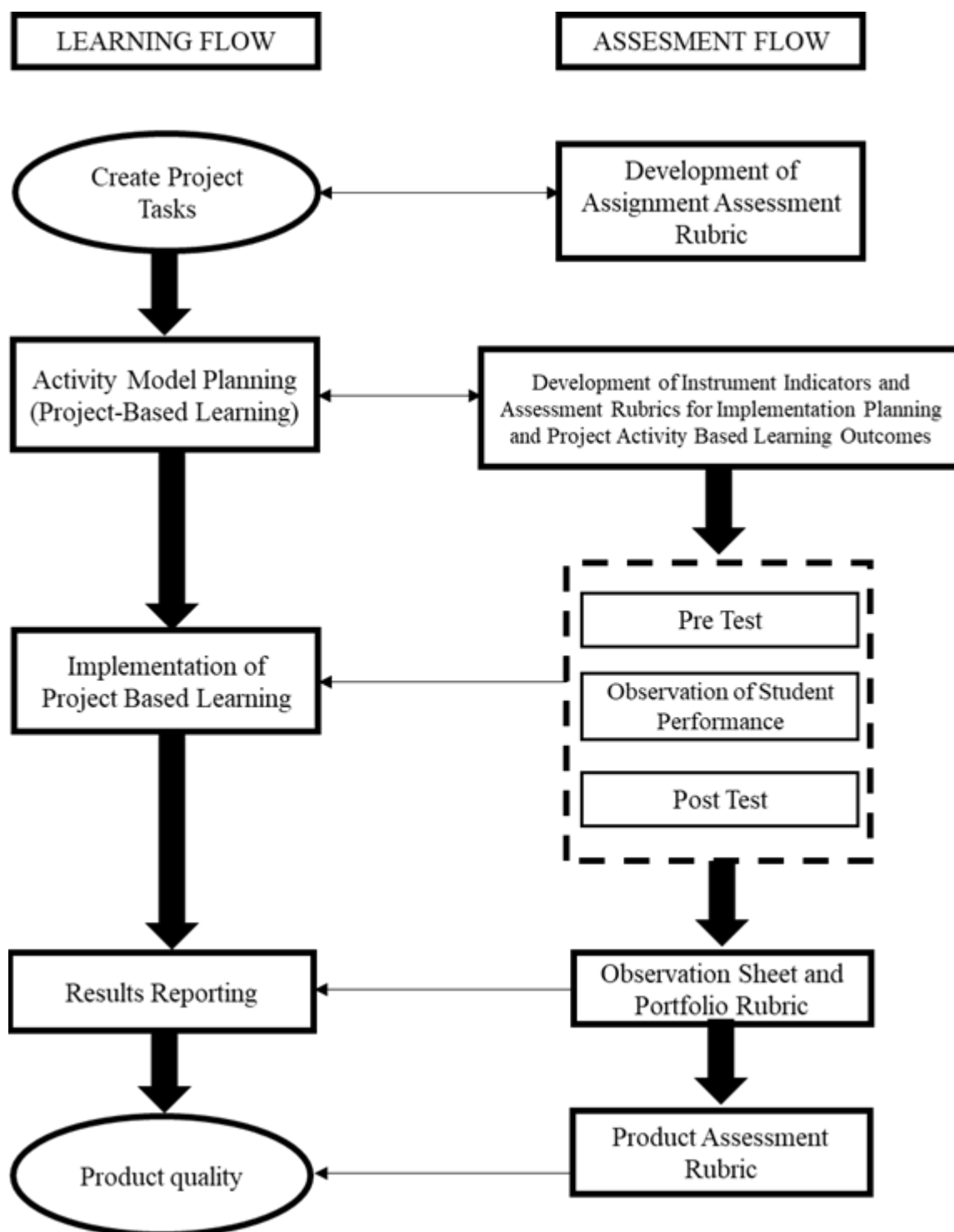


FIGURE 5. Project-based learning assessment design for practice courses

Thus it can be concluded that both group and individual assessments are needed. The data FIGURE 4 shows that teachers need competency and performance assessment equally. The assessment technique used by the teacher at the Vocational High School that became the research sample was not much different from other Vocational Schools (Putra, Borman & Arifin 2022). The assessment techniques include written tests 63%, observation 68%, Portfolio 34%, and peer assessment 7%. The availability of standard references in schools or study programs tends to be limited, while teachers are said to be needed (Pudyastuti, Ginting & Ginting 2022).

TABLE 2. Availability of assessment reference documents in schools

Standard/Reference	Percentage No Documents Available %
Indicator/grid	87
Instrument	74
Rubric	77
Indicators/grids and instruments	93
Instruments and Rubric rubric	87

Based on the data, the respondents' answers in this study prove that all schools need a Project-Based Learning assessment model. This is reinforced by Juntunen and Aksela's findings (2013), that the project-based learning model can increase students' existing knowledge, train various thinking skills, form cooperative attitudes, and train concrete skills, as well as psychomotor assessment in learning, can be increased through practical activities (Juntunen & Aksela 2013). The results of Sumarni et al. research (2016) concluded that learning with project work in the form of props is a student-centered learning laboratory distillation that is essential and beneficial for students to develop the three domains of learning, namely; cognitive, affective, and (Sumarni et al. 2016) so that the development of project learning research models from the results side can be carried out by measuring the cognitive, affective and psychomotor domains. Whereas Mursid (2013), based on the results of his research, concluded that the implementation of process and product evaluation in production-oriented competency-based practical learning could be carried out by carrying out formative tests, summative tests, assignments, products, reports, folio portfolios, and competency tests. (Mursid 2013), these findings can be referred to as developing a project-based learning assessment model. This result applies not only to the electricity subject but also to all subjects and all majors in SMK.

The researcher developed one model based on the needs analysis for developing project-based learning outcomes assessment models. The model chosen by the researcher is to provide a framework for theory development and research directions. The model chosen by the researcher will provide several inputs to improve the resulting product. The learning assessment model product developed is Project-based learning on Practical Learning. This development research procedure has two main objectives. The first objective is to identify the needs of SMK-PK in assessing project-based learning. At the same time, the second goal is to develop a project-based learning assessment model design for practical subjects. Project-based Assessment Design in FIGURE 5.

CONCLUSION

A survey has been carried out to draw the required model of Needs Analysis for Developing Project-Based Learning Outcomes Assessment conclusions. The number of respondents who filled out the questionnaire was from 10 SMK-PK in DKI Jakarta, West Java, Banten, and Lampung who applied Project-Based Learning in Practical Teaching. From the data and needs analysis, it can be concluded that schools need the following:

1. Most schools require Specific guidelines for project-based Assessment of Learning that have yet to be made available.
2. Most teachers require industry involvement in creating Practice-based Learning assignments.
3. An assessment of the quality of the assignment is required for the size of the teacher.
4. Assessment of the Project-Based Learning Process tends to be carried out at the implementation stage, while at the planning and reporting stages, it is carried out by a few teachers.
5. Assessment tends to be carried out against groups with aspects assessed as student competency and performance.
6. Assessment techniques include written tests, observations, and portfolios.
7. The required standard sample documents include Instrument Indicators and Assessment Rubrics.

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