

Hybrid Project-Based Learning Process for Students

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Abstrak. Several expert opinions regarding Project-based Learning (PjBL) are used in the appropriate learning process for students of the Department of Mechanical Engineering Education, Universitas Negeri Medan. The implementation is constrained by time allocation. This study provides solutions through hybrid learning collaborations with PjBL, aimed at equipping students with real problem-solving actions to create independent students and groups capable of critical thinking to find problem solutions packaged into projects through their skills and innovation. This research is a case study and analysis of project-based hybrid learning process management, especially in vocational education. The results of the study were obtained based on an agreement between the research team and internal vocational education curriculum experts by considering the time allocation for semester meetings, namely 16 meetings, that the project-based hybrid learning management process for vocational education consists of 4 steps, namely; 1) preparation stage, 2) planning stage, 3) implementation stage, 4) assessment and submission stage. This study refers to concepts previously used by experts by aligning the needs of students, attainment of course competencies and applying hybrid learning regulations that universities have set. Thus, the implications of hybrid project-based learning process management will be used as a reference in writing a pocketbook. Hybrid Project-Based Learning Process for Students.

Keywords: Hybrid Learning, Project-Based Learning (PjBL), Learning Process Management

1 Introduction

Changes need to be taken in higher education to face many challenges in the 21st-century era. Students' competence is one of the requirements to get a job according to their field and expertise [1]. Continuous change actions need to be carried out, one of which is through the management of the learning process [2]. Answering the need for several vocational skills, the management of the learning process is designed so that it can be implemented in all courses [3] in the mechanical engineering education department.

Classroom exploration learning is used to develop vocational skills. Students can directly relate to external stakeholders, increasing creativity and innovation [4]. In its implementation, it requires clear and accurate stages so that it can be used as a guide for students [5],[6] learning models are used in this case to determine these stages, namely the Project-based Learning (PjBL) model assisted by the case method and team-based project. However, the current obstacle is the allocation of face-to-face/offline learning time allocation, so the solution is to use a hybrid learning model in the learning process.

1.1 Project-based Learning Hybrid

The basic principle of project-based learning is based on the philosophy of constructivism because the learning approach is student-centred, such as problem-based learning, where students can carry out real activities, namely by conducting explicit investigations, metacognition, and creativity to transfer skills and knowledge [7]. Another approach is the constructionist approach initiated by Papert, that learning will take place effectively if students are active in real work [8]. Project-based learning is influenced by the philosophical foundations of Constructivism and Constructionism.

Project-based learning is comprehensive teaching involving students in continuous cooperative provision by linking technology with real-life problems [8]. Challenges and problems faced in the real world can allow students to develop their knowledge and skills through making or producing products [9]. The benefits students get from professional project-based learning if they are directly involved in active learning will get deeper into the material and apply their ideas in work [10].

Hybrid learning is a combination of learning that is very effective and time efficient because it is supported by technology (online) and face-to-face (offline) in teaching. In the hybrid learning process, the face-to-face learning process can be carried out directly in the classroom or the laboratory, while carrying out direct field learning activities (outside the classroom) can be done properly if it is assisted by technology to regulate the distance education process [11][12]. Several web platforms are used to present and manage learning materials in distance learning which have functions for discussion, evaluating and observing student performance, and exams, including web platforms that can be used, including Moodle, Google Classroom, Google Docs, Zoom Meeting, Google Meet, Whatshap, Youtube, Google Forms, Quizizz[13].

A result of the literature analysis shows that combining the project-based Learning model with hybrid learning in the learning process provides a more flexible learning time space that affects knowledge and skills so that academic achievement increases. This evidence will be achieved if lecturers can fully facilitate students in the learning process and provide encouragement so that the project is completed[11][12][13].

1.2 Learning Process Management

Through the regulations of the Ministry of Research, Technology and Higher Education of the Republic of Indonesia concerning the National Standards of Higher Education, it has been stated that in the series of fulfilling learning outcomes, graduates in the management of the learning process are required to use effective learning methods by the characteristics of the courses [14][15]. Deriving from the existing regulations, the Department of Mechanical Engineering Education at the State University of Medan, in fulfilling the learning outcomes of graduates in all courses, uses the Project-based Learning learning model in the learning process.

The learning process management is designed to refer to the existing curriculum structure. Its implementation in the form of learning theory lectures, practicums and field practices for implementing learning during the full semester is different for each subject. There are five steps of the project-based learning process as follows[2]:

Step 1 preparation: the lecturer provides information on the material's scope and asks questions about the main problem.

Step 2 literacy study: students study the scope of the material from some information and look for it from various websites to get answers to the lecturer's questions.

Step 3 topic determination: teamwork is carried out at this stage to determine the project topic. The lecturer reviews and approves the topic of the group project after the group has agreed to plan the implementation schedule for making the project and dividing the tasks of each function.

Step 4 creation and testing: each group member has duties and responsibilities according to their knowledge to create a project. At this stage, it is carried out synchronously and asynchronously according to input and suggestions from the lecturer. After completion, must test the product for effective.

Step 5 presentation: student groups prepare presentations to be exhibited through various online platform tools.

Therefore, this research is a case study and analysis of hybrid project-based learning process management, especially in vocational education, a technical guide as a project-based learning guide. The learning process management plan is designed by the regulations on the national standards of higher education in Indonesia by the characteristics of the courses at the Department of Mechanical Engineering Education, Universitas Negeri Medan.

2 Research Method

Rencana penelitian tim melakukan studi kasus dari beberapa dokumen hasilnya dijadikan bahan diskusi pada forum group discussion membahas tentang teori yang relevan untuk proses pembelajaran berbasis project hybrid dilakukan dengan pakar kurikulum pendidikan kejuruan internal. Hasil diskusi menghasilkan flowchart teknis manajemen proses pembelajaran berbasis project untuk pendidikan kejuruan, seperti yang diperlihatkan dalam hasil penelitian.

3. Results and Discussion

3.1 Result

The results of case study research and group discussion forums are entered into a written flowchart, technically the design of hybrid project-based learning process management for vocational education, as shown in Figure 1. The project-based learning process uses the case method and team base project methods in its implementation as four stages are; 1) the preparation stage, 2) the planning stage, 3) the implementation stage, and 4) the assessment and submission stage.

Obtained this stage based on an agreement between the research team and internal vocational education curriculum experts by considering the time allocation for semester meetings, namely 16 meetings. The design of this learning process is more concise and effective according to the character of students majoring in mechanical engineering education at the State University of Medan than the design of learning process management developed by previous experts.

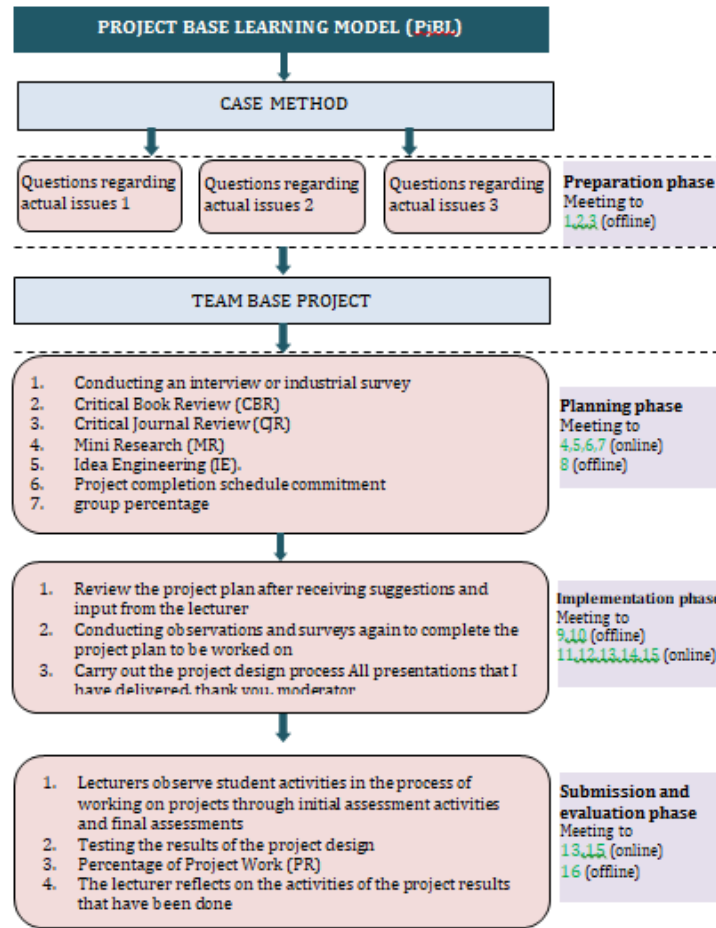


Figure. 1 Hybrid project-based learning process flowchart

3.2 Discussion

The management of the hybrid project-based learning process is planned to have four stages, namely; 1) the preparation stage; in this stage, the lecturer asks questions related to actual problems according to the subject matter 2) the planning stage; this stage the student group looks for several sources of information to answer questions such as field observations, journal reviews, book reviews, mini research and industrial engineering, in the end, the student group presents their group work to determine the topic of the project the lecturer's task provides feedback, 3) the implementation stage; The lecturer provides an opportunity for the student group to correct and resubmit the topic title to the lecturer for approval, after being approved by the student group, they will arrange a schedule for implementing project work. and 4) the assessment and submission stage; at this stage, the process of making or working on a project is assessed through initial and final assessments, and the final process is project submission. Here the student group prepares the presentation of project results and tests the project.

4 Conclusions

The findings of this study provide technical guidelines for the project-based learning process for the mechanical engineering education department at the State University of Medan, learning steps that can provide real problem-solving actions to create independent students and groups who can think critically to find problem solutions. The solution generates or produces projects through effective, time-efficient student skills and innovations. Thus the project-based hybrid learning management process for vocational education is planned to consist of 4 steps, namely; 1) preparation, 2) planning, 3) implementation and 4) assessment and delivery. This study was obtained based on an agreement between the research team and internal vocational education curriculum experts, considering the time allocation for semester meetings, which is 16 meetings. Thus, the implications of hybrid project-based learning process management will be used as a reference in writing a pocketbook.

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