**Praxis Project Based Learning At PIKA Vocational High School Semarang**

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**Abstract.** This study aims to find out praxis project based learning at PIKA Vocational High School Semarang (1) the implementation process; (2) the advantages and the disadvantages;. This research is a qualitative research type of case study. The results of this study showed that: (1) there were two patterns of project-based learning at PIKA Vocational High School Semarang. (2) The advantages of project-based learning were: (a) it trained the students’ sense of entrepreneurship; (b) it developed’ learning motivation; (c) it gave a complete, real and contextual learning experience; and (d) it developed the students’hardskills and softskills. The disadvantages of Project-based Learning were: (a) it required the acquisition competencies to perform project assignments; (b) it took times; (c) it required high operational costs; (d) it required adequate facilities.

1. **Introduction**

Unpredictable changes in the workplace of the 21st century should become the attention of Vocational High School (VHS) to be able to equip students with 21st-century skills. It is necessary for VHS graduates to be absorbed in the labor market and adaptive then anticipatory to change the world of work, both for the current and the future context. The necessary 21st-century skills include verbal and written communication skills, critical thinking in problem-solving, professionalism and ethics in work, teamwork, technological skills, leadership skills, and project management [1].

That expectation has not been fully achieved. The facts show that VHS has not yet succeeded in overcoming the problem of unemployment in Indonesia. The empirical phenomenon shows that some Vocational High School (VHS) graduates have not been able to be absorbed in the job market because their competence is not in accordance with the demands of the world of work [2]. Based on data from the Central Bureau of Statistics quoted from Kompas October 17, 2016, the unemployment rate grew 9.05% in 2015 and increased to 9.84% in 2016. The education sector becomes the thing that contributed the most to the amount unemployment in Indonesia.

The issue of unemployed vocational graduates reportedly is contradictory to the phenomena that occurred in VHS PIKA Semarang. VHS PIKA Semarang is one of the vocational education institutions that consistent in producing superior, skilled, and competitive graduates in the field of furniture engineering. VHS PIKA is able to produce superior quality of human resources to make graduates able to be absorbed in the job market. Almost none of VHS PIKA graduates are unemployed. They are absorbed in the world of work and able to do the entrepreneurship [3]. Based on the empirical study in the field, it was found that: (a) VHS PIKA graduates were able to be absorbed in the job market due to their superior competence; (b) VHS PIKA graduates have the readiness to work in the wood industry; (c) every year many industries are applying for manpower and doing direct recruitment to VHS PIKA [4].

The fact which can indicate that VHS PIKA considered successful in forming its students skilled in the field of wood industry can be seen through the students’ achievement record at VHS PIKA in various competitions skill. VHS PIKA has achieved outstanding achievement in every skill competition from year to year, both at national and regional, even at international level [5]. Performance record ever achieved by VHS PIKA in various skill competitions is presented in table 1.

**Tabel 1.** Achievement Record of VHS PIKA Semarang.

|  |  |  |
| --- | --- | --- |
| **Competition** | **Year** | **Achievement** |
| 1. Asean Skill Competition (ASC) in Malaysia
2. World Skill Competition (WSC) in Brazil
3. Asean Skill Competition (ASC) in Vietnam
4. Lomba Kompetensi Nasional (LKS)
5. Asean Skill Competition (ASC) in Indonesia
 | 20162015201420132012 | Gold Medal Cabinet MakingMedallion for Excellence JoineryGold Medal Joinery, Silver Medal Cabinet MakingFirst rank on JoineryGold Medal Joinery, Silver Medal Joinery, Silver Medal Cabinet Making |

VHS PIKA excellence in producing quality graduates cannot be separated from the process of organized learning. The learning at VHS PIKA is able to produce competent, accomplished, ready to work and global competitiveness output [6]. The documentation of VHS PIKA profile indicates that one of the patterns applied learning in VHS PIKA is a project-based learning model. Project-based learning at VHS PIKA is done by providing project work to students to create a furniture product. The learning pattern provides an opportunity for students to complete project work autonomously.The implementation of project-based learning in VHS PIKA as the actualization of teaching-based system of education industry is done to present the real situation of the industry in the learning process. Learning through real working practices can improve student work competence [7].

Based on the description of an interesting phenomenon of conditions that occur at VHS PIKA, particularly in the implementation of project-based learning as an actualization of learning-based teaching factory, the research is done on the practice of project-based learning in VHS PIKA Semarang. This research is useful to describe how the process of project-based learning in VHS PIKA can form competent graduates and in accordance with the demands of the world of work so that it can be a reflection and solution for unemployment problems that occur in VHS graduates in Indonesia.

1. **Research Methods**

The research was conducted at VHS PIKA Semarang with the aim of describing project-based learning praxis at VHS PIKA Semarang, identifying advantages and disadvantages and revealing the meaningfulness of project-based learning for students, schools and communities. Based on the problems of research that is holistic and departs from the specific cases that occur in VHS PIKA, hence research method used is qualitative research type Case Study. In-depth interviews, participant observation and document content analysis are used for data generation techniques. Data analysis used is the interactive models from Miles and Huberman.

1. **Results and Discussion**

Project-based learning at VHS PIKA is a learning process that involves the students a project work. The project in question is the assignment of work assignments to students oriented on the manufacture of furniture products (product oriented). The application of the project-based learning model is based on the view that the learning model is suitable for teaching practice in VHS based teaching factory as it can present a real and contextual learning situation (not-simulation) in accordance with the characteristics of the work of manufacturing-based furniture industry

Conceptually, the project-based learning model is chosen as the embodiment of teaching factory teaching where there is a mix between learning process and production process [12]. The production process is used as a learning media to form students' work competence. In the learning process, students are given the task to realize the project manufacture of products through the manufacturing process both in the workshop and in the production unit. Project is designed by adjusting the substance of competence to be achieved.

Looking at the project-based learning praxis applied in VHS PIKA, the learning theory that can be used as the foundation is work-based learning and constructivist theory. Work-based learning theory emphasizes learning mastery in accordance with industry standards [13]. The foundation of constructivist learning theory can be understood from the role of students and teachers in the learning process. Students are required to be active and independent in building their knowledge through interaction with learning resources. The teacher acts as a facilitator and supervisor.

The praxis project-based learning in VHS PIKA has two different types of patterns. The first pattern as an internal apprenticeship program in a production unit intended for class XIII. The second pattern is applied as a method of delivering productive practice materials in class X, XI and XII.

* 1. First Pattern

Praxis Project-based Learning as an internal internship program is organized with the aim to strengthen the competencies of students who have been obtained in class X, XI and XII. Stabilization of work competence is done to prepare students in the program of external internship in the industry. It is done in the hope of minimizing the competency gap that has been gained with the demands of the industrial world. Competencies already taught in class X, XI and XII are strengthened by work-based learning experiences integrated with the manufacturing process.

The focus of project-based learning on an internal internship program is to provide students with a series of production work tasks similar to those in the manufacturing process in the industry. Teachers drafting such a way of learning that can be used as a guide project implementation. Guides are used to help students understand clearly the procedures and steps to be taken in the learning process. Aspects to be considered in the lesson planning are presented in Table 2.

**Table 2.** Planning Aspects

|  |  |
| --- | --- |
| **Aspect** | **Description** |
| 1. Purpose
2. Target
3. Material
4. Type of project
5. Scheduling
6. Division of groups
7. Working procedures
8. Reporting results
9. Product Marketing
10. Assessment
 | Refers to the standard of competenceThe specific size of the objectives achievementKnowledge needed in practiceThe type of product that will be done by studentsWork time targetDivision of groups based on student potential analysisThe steps of work to be undertaken in learningSigns in writing the work reportThe method used to market the products of students' workThe design of the types and criteria used for the assessment  |

The next stage is the implementation of learning. The stages of activities in the implementation of project-based learning include: pre-production, production and post-production activities. As shown in Figure 1.

|  |
| --- |
|  **Production:*** Material Process
* Construction Process
* assembling process
* finishing process

**Pre Production:*** Briefing
* Dividing the group
* Determining type of project
* Searching and selecting design
* Designing project

 **Post-Production:*** Report Writing
* Product Exhibition
* Presentation of result work

  |
| **Figure 1.** The stages of activities in the implementation of project-based learning |

**Pasca Produksi:**

* Penulisan Laporan
* Pameran Produk
* Presentasi Hasil Kerja

**Produksi:**

* Proses Pembahanan
* Proses Konsruksi
* Proses perakitan
* Proses finishing

**Pra Produksi:**

* Briefing
* Pembagian kelompok
* penentuan jenis proyek
* Pencarian dan pemilihan desain produk
* perancangan proyek

**Pasca Produksi:**

* Penulisan Laporan
* Pameran Produk
* Presentasi Hasil Kerja

**Produksi:**

* Proses Pembahanan
* Proses Konsruksi
* Proses perakitan
* Proses finishing

**Pra Produksi:**

* Briefing
* Pembagian kelompok
* penentuan jenis proyek
* Pencarian dan pemilihan desain produk
* perancangan proyek

**Pasca Produksi:**

* Penulisan Laporan
* Pameran Produk
* Presentasi Hasil Kerja

**Produksi:**

* Proses Pembahanan
* Proses Konsruksi
* Proses perakitan
* Proses finishing

**Pra Produksi:**

* Briefing
* Pembagian kelompok
* penentuan jenis proyek
* Pencarian dan pemilihan desain produk
* perancangan proyek

**Pasca Produksi:**

* Penulisan Laporan
* Pameran Produk
* Presentasi Hasil Kerja

**Produksi:**

* Proses Pembahanan
* Proses Konsruksi
* Proses perakitan
* Proses finishing

**Pra Produksi:**

* Briefing
* Pembagian kelompok
* penentuan jenis proyek
* Pencarian dan pemilihan desain produk
* perancangan proyek
	1. Second Pattern

Project-based learning on productive practice programs is different from apprenticeship programs. In learning productive practice teachers make design and project design as a task that must be done and realized by students. The project is designed as a training medium to develop productive competencies so that project design adjusts competence demands and learning quality dimensions at each grade level. Differences in competence demands and the quality dimensions of learning in each class make the learning-based have different characteristics.

 Project-based learning in class X focuses on developing basic individual competencies such as: making of work piece dimensions, various construction of wooden connections to small size furniture products so that the resulting product is still in the form of fragments. The units of competence to be achieved are translated into working drawings and used as project assignments of students. Making the product is done individually using manual equipment. Learning emphasizes the dimension of the **sense of quality** so that students understand the quality of work, the results of work and attitudes appropriate to industry standards. The cultivation of a sense of quality is done by minimizing tolerance to error, either from the working process or from the product produced.

Project-based learning in productive practice in class XI is the development of learning in class X. Class XI project learning becomes a vehicle for applying the competencies taught in class X. Basic skills taught and accumulated learning experiences in creating fragmented products are used as stock to do more complex project work. The project is made already in the form of simple furniture products. Dimensions of the quality of learning to be achieved more emphasis on the **sense of efficiency**. Therefore, in the learning in class XI students are required to be able to do the work using basic machines.

Project-based learning in class XII is a learning development applied in class XI. Project design is more complex both from specification and detail of construction. The process is already using industrial machines. The focus of competency development is on the ability to manage projects collaboratively. It is based on the dimensions of the quality of learning in class XII that emphasizes the **sense of teamwork**. Thus, learning is done to apply the skills that have been obtained in class XI and at the same time train students' leadership skills to manage and complete the project collaboratively.

**Table 3.** Characteristics Differences

|  |  |  |  |
| --- | --- | --- | --- |
| **Aspect** | **Class X** | **Class XI** | **Class XII** |
| **Project type** | Fragment shape | Simple furniture  | Furniture set |
| **Quality dimension** | *Sense of Quality* | *Sense of Efficiency* | *Sense of Teamwork* |
| **Work System** | Individual | Individual | Collaborative |
| **Tools** | Manual | Basic Machine | Industrial Machine |

* 1. The advantages of project-based learning

First, project-based learning will train students' independence in their work. Students are required to be active in building the knowledge of the project completion process and the teacher acts as a facilitator. Second, project-based learning will improve students' learning motivation. Learning motivation arises from the challenges and demands to complete the project. Challenges and demands will stimulate diligence and hard work of students in completing projects. Diligence and hard work will also arise when the idea of the project comes from students. Such as project-based learning applied to class XIII.

Third, project-based learning can bring real and contextual learning nuances. Learning is real (real) and contextual because the learning process is integrated with the production process and learning materials are directly related to the work in the industry. The learning experience gained will be memorable and keep in mind by the students. An industry-like learning climate will enable increased understanding, reminders and re-implementation at work [14].

Fourth, project-based learning can develop both soft skill and hard skill skills. The skills of the trained soft skill include: creative thinking ability, oral and written communication skills, collaborative skills and teamwork, problem-solving skills and leadership skills in managing projects. In addition, project-based learning can also develop hard skill abilities, including: the ability to use machinery, identify materials, use software and others.

* 1. The disadvantages of project-based learning

In addition to having advantages, project-based learning also has a lack of aspects that can be used as a consideration of schools to apply project-based learning. The first shortcoming, project-based learning will be effective when students have mastery of the concept of knowledge needed to perform the job task (project). Therefore, teachers should carefully consider whether students already have the necessary skills to perform the job tasks. Second, project-based learning requires a considerable length of time in a single project. Teachers are required to be able to estimate the time of project construction so as not to neglect other learning activities.

Third, project-based learning requires substantial operational costs. Large operational costs are identified from the type of projects made by students in the form of furniture products in terms of material needs costly. It starts from direct costs for the main materials such as wood, glue, finishing layer, and indirect cost in the form of electricity usage, material delivery and others. Fourth, project-based learning requires the availability and preparation of adequate facilities and infrastructure. Without the availability of adequate facilities and infrastructure, the learning will not run effectively and efficiently.

1. **Conclusion**

Project-based Learning Practice in VHS PIKA Semarang has two different types of patterns. The first pattern is a learning process in a production unit within the context of an internal internship by assigning tasks to students for autonomous product manufacturing projects, from designing products to production processes to reporting results and selling/marketing. The second pattern is a method of delivering learning materials productive practice through project tasks provided by the teacher by adjusting the substance of competence on each grade level.

Advantages of project-based learning, among others: (1) train students' sensitivity towards independence (sense of entrepreneurship); (2) improving learning motivation; (3) provide a real and contextual learning experience of the furniture manufacturing process; (4) develop student employability skill. Meanwhile, the disadvantages of project-based learning, among others: (1) project-based learning cannot be effective when students have not mastered the competencies required to carry out project tasks; (2) requires a long duration of time; (3) require high operational costs for material procurement and equipment operationalization; (4) require adequate facilities with industry standards.

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