Implementation Project Based Learning on Local Area Network Training

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Abstract
The main indicators of vocational technology education student’s learning outcomes is the achievement of competence according to the demands and job’s requirements. In reality the constraint prosecution's has not yet achieved optimally because of lack of competence on the suitability of the industry with technological competence in vocational schools. This problem requires vocational education technology to innovative measures to empower all components of education in schools to improve and enhance the quality of learning. Innovative learning model can be used in vocational technology schools is project-based learning. This model is a contextual learning through the activities of the complex job. Project focus on concepts and principles learning’s discipline of study’s core, involving learners in problem-solving investigations and other meaningful tasks, giving students the opportunity to work autonomously construct their own knowledge and ultimately produces a real product. Scope of this project-based learning model includes components: lesson plans, learning implementation, and evaluation of learning outcomes. While the implementation of an integrated model of learning is jobsheet, consisting of: information sheets, instruction sheets, operation sheets, self check, and test.

1 Introduction
Vocational education is special education planned to prepare students to enter the workforce and develop a professional attitude in certain areas of the profession and prepare students to be more capable of working at a job group or field of work than other employment sectors. Vocational education has unique characteristics that seen in the following aspects: education orientation, justification for its existence, curriculum, success, susceptibility to the development of society, logistical supplies, and its relationship with the business community.

Implementation of learning in vocational education and technology industry, particularly in computer engineering and network aims to develop academic and personal potential students, to master standardized competency and internalize the attitudes and professional values as a qualified workforce that excels in accordance with the needs and development of the world of work and current technology, processes and learning activities in accordance with the training participants should plan has been established to achieve mastery of competence. Technological learning process aimed to develop vocational and academic potential of student personality in mastering science and technology and development of the world of work and learning/ training in the world of work that will produce a professional workforce.
Project-based learning is an innovative learning model as emphasizes contextual learning through complex activities. Project Based learning focused on learning the core concepts and principles of a discipline of study, involving learners in problem-solving investigations and other meaningful tasks, giving students the opportunity to work autonomously construct their own knowledge and ultimately produces a real product. Project-based learning can be used to achieve a certain competency through a project within a specified period through the steps of planning, execution, reporting, communicating the results and evaluation activities. (Kamdi, 2008). Blumenfeld et al (1991) describe that model of project-based learning based on the relative maturity of the process, focused on the problem, meaningful learning unit by integrating concepts from a number of components of knowledge either discipline or field of study. When students work in teams, they find the skills to plan, organize, negotiate and build consensus on issues of work to be done, who is responsible for each task, and how information will be collected and presented.

Project-based learning thoroughly the principle of mastery learning. Therefore the assessment is an integral part of the process must be consistent with the principle of completeness. The students just finished learning if actually have qualified for competent under the applicable standards. Project-based learning has the principle that learning a particular skill can be optimized in the form of exercises to do and actually finish the job or task in accordance with program expertise, so that the competencies to be mastered is really achieved through a process of direct experience (learning by doing), through project-based learning the students expected to have competence in accordance with demands of business and industry while increasing the quality of competence quality as human resources to engage in industrial activities.

2 Methodology

This study used Research and Development method According to Borg and Gall (1993:624) ‘Educational research and development (R&D) process is used to develop and validate educational products ‘. The use of the term has a meaning that educational products not only includes a form of research materials such as textbooks or other learning support tools, but also related to the development of learning processes and procedures such as the development of methods of teaching or learning methods to organize, so that research and development approach seems to have relevance to higher learning to develop a model of productive programs in the framework of the implementation of vocational curriculum. In this study the respondent/participant involved is productive teachers and students of vocational high schools in Garut district.

Research and development is done as a simplification of three stages, a preliminary study stage, the stage of development and model validation stage. The third step includes a step in the implementation and development of research methods as proposed by Borg and Gall (1993). The study design was conducted with the stage and the stage of development steps as depicted in the figure 1.
3 Result and Discussion

Implementation of project-based learning model is designed based on competency-based learning concept, production process and field conditions, especially organized on productive learning program with an emphasis on three things, (a) the learning task is given by the principle of the project, emphasis on individual services according to the stages of learning and packaged in a learning module, (b) implement the project includes the implementation guide project format, job sheets, operation sheets, self check, and the optimal evaluation, (c) apply the modular learning. General description of development project-based learning model in a local area network installation training subject is described in Figure.2 below.

![Development Project-Based Learning Model](image)

Figure 2. Development Project-Based Learning Model

Description of project-based learning model for installation of local computer networks developed based on teacher and student activities are made in three stages: preparation, learning and evaluation, the phases described into six stages as follows.

STAGE 1. Preparation
Projects preparation designed by teachers based on the local computer network subjects to identify training needs based on national standard competence and local computer network competence. The results of preparatory phase is design project contains: Project Description, Project Management Planning, Scenario Learning activities, products will be produced, Project schedule, Learning Outcomes and Evaluation

STAGE 2. Project Theme
Project theme should meet the following indicators: contain common and original ideas and interesting, describing a complex problem includes the relationship of ideas and problem-solving emphasis

STAGE 3. Development Computer Network Project Activities Planning
Students work in groups between 2 to 5 people. Students determine the activities and steps to be taken in accordance with sub-topic, plan processing time from design to create network...
Each student in the group has a task to every jobs and have a sense of responsibility. The teacher is obliged to deliver the project contents plan and as facilitator. Students work activities are: (1) Draw Network development site plan; (2) Network Topology Making; (3) Servers and client computers Placement; (4) measurement UTP cable length to be used; (5) Preparation of computer network topology planning; (6) Work Schedule computer networks development.

STAGE 4. Project Works Process
At this stage students work on the project based on the process design that has been created and implemented in accordance with observed the objects/locations previously. Project work activities include: equipment project preparation needed, building a network in accordance with the network topology plan created, installation of network protocol making, configuration TCIP/IP addresses, testing the connectivity between the computer server with computers client, computer connection testing with a network with ping, install the modem into the computer network and network performance evaluation.

STAGE 5. Finishing
Students create reports, presentations, images, and others a result of its activities. Teacher and students take project notes for further development. Students receive advice in the form of feedback on what they done in the group, friends, and teachers. Online feedback facility provided to allow each individual is directly comment, contribute, and useful to the others.

STAGE 6. Evaluation
Teachers assess all process of the student projects based on participation and productivity in project construction. These steps are carried out, is: Evaluate projects based on the topology that has been made, Testing steps and the results obtained, Evaluating the results, Revised results have been obtained and Classifying the best results.

Student’s project work result processed by sample paired test (t-test). Data showed that There is a significant competence difference between the groups using project-based learning model with the group did not use project-based learning at 95% significance level describes the technical competence of the students who studied with implementation of competency-based learning project showed that there is a significant increase students’ competence before and after implementation of the design of project-based learning model for productive subjects of local computer networks. The result shown at table 1.

Table 1. Result of Paired Sample Test (T-test)

<table>
<thead>
<tr>
<th>School Object</th>
<th>Activity</th>
<th>Sample Number (N)</th>
<th>Correlation ($r^2$)</th>
<th>Standard Deviation</th>
<th>$t_{count}$</th>
<th>Df</th>
<th>$t_{table}$</th>
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<td>Vocational High School A</td>
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<td>20</td>
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<td>5.02173</td>
<td>-13.827</td>
<td>19</td>
<td>2.093</td>
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<td>3.82512</td>
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<td></td>
</tr>
<tr>
<td>Vocational High School B</td>
<td>Current Learning</td>
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</table>
Paired Sample Correlation of the two-way test (t-test) obtained that the value of the correlation level students competence on local area network building training subject before and after learning with project-based learning model for vocational high school A=40.2%. This means that the model of project-based learning in vocational A contributes to the students competence by 40.2%, while 58.8% is determined by other variables. For vocational high school B=14.6%. This means that the model of project-based learning in vocational B contributes to the improvement of students' practical abilities of 14.6%, while 85.4% is determined by other variables, for vocational high school C=18.5%. This means that the model of project-based learning in vocational C contributes to the improvement of students' practical abilities of 18.5%, while 82.5% is determined by other variables and at vocational high school D=26.6%. This means that the model of project-based learning in vocational D contributes to the improvement of students' practical abilities of 26.6%, while 73.4% is determined by other variables.

4. Conclusion

Conclusion based on the results development competence of vocational high school students with project-based learning model are as follows:

1. Project-based learning model can be developed and applied in a productive program at Computer Engineering and Networks department where which vocational high school does not yet have the right industrial partner. The model has two main parts, framework model and standard operating procedures of model application. Framework model include the design of lesson plans, learning implementation, and learning outcomes evaluation.

2. Project-based learning model has a highly applied to: a) students competence enhancement, b) support for Provides the ease of preparing lesson plans, implement the learning process, and carry out evaluation of learning outcomes, c) the substance of the description lesson plans, learning implementation, and evaluation of learning outcome contents, d) support resource and materials; e) Potential role of relevant stakeholders support.

3. Specifically major impact project-based learning models Implementation are improving students competence and provide the ease in implementing the learning task for teachers in preparing lesson plans, implement learning and evaluating learning outcomes.

References


