*Research Article*

# DEVELOPMENT OF INDUSTRY RECOMMENDATION PROJECT-BASED LEARNING MODEL ON VOCATIONAL HIGHER EDUCATION

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**Abstract**: The abstract should summarize the contents of the paper and should contain at least 70 and at most 200 words. It should be set in 9-point font size, justified and should have a hanging indent of 2-centimenter. There should be a space before of 12-point and after of 30-point.

**Keywords**: The paper must have at least one keyword. This paragraph should be justified with a linespace of exactly 11-point, special indentation of 2-centimeters and with a spacing before of exactly 48-points. The text should be set in 9-point font size and without the use of bold or italic font style. For more than one keyword, please use a comma as a separator. Keywords must be titlecased.

## 1 INTRODUCTION

Vocational education at the higher education, basically prioritizes to prepare graduates of the workforce who have skills. Where the nature of vocational education must quickly adapt to changes. Unemployment of vocational graduates is something that must be anticipated by every educational institution. One of the efforts for that there must be a relevance between education and the conditions of the world of work that continues to develop. The demand for relevance between the world of education and the world of work in a broad sense implies the need to master a number of competencies that can be demonstrated at work. The issue of the relevance of education is still a work unfinished house. According to Bhattacharyya (2018), to be ready to work, various attributes and other skills are needed which have been considered as determinants in the era of the industrial revolution 4.0 such as adaptability, critical and innovative entrepreneurial mindset, accountability, driven by goals and enthusiasm and other skills deemed relevant to work. employed and ready to work.

Vocational education institutions themselves need to be able to contribute to economic competitiveness, through increasing hard skills, soft skills, and increasing the use of technology. It is necessary to strengthen vocational education graduates by providing skill-up in the form of training for fresh graduates to be better prepared to enter the world of work. Indonesia has compiled Making Indonesia 4.0, which is an integrated roadmap to implement a number of strategies in entering the era of Industry 4.0. Ngakan Timur Antara (2019) emphasized that all institutions that produce human resources, including general and

vocational education, must change the paradigm of thinking in providing education. The curriculum must be adapted to the needs of industry and economic actors in the future.

The success of formal education is strongly influenced by success in the implementation of teaching and learning. This teaching and learning activity cannot be separated from the whole education system. Improving the quality of teaching and learning activities can be done through various efforts such as: applying an understanding of the pattern of teaching and learning activities, adjusting teaching methods, improving classroom management, applying appropriate learning models, and adjusting learning assessments.

One way to improve the quality of learning can be done by applying various appropriate learning models. The model is always used in every teaching and learning process. The importance of applying various learning models really needs to be considered because students have differences in abilities, talents, interests, resilience, and enthusiasm. Differences in learning styles are also an important factor in the learning process. For this reason, a diversity of various teaching models is needed to achieve maximum learning outcomes.

The learning model is a conceptual framework that describes a systematic procedure in coordinating the learning experience to achieve certain learning objectives. This reference serves as a guide for designers and learners in planning and implementing the learning process activities. Basically, the selection of learning models must be based on various considerations, including; learning materials, the level of student cognitive development, and available facilities. So that the learning objectives can be achieved.

One learning strategy that can help students have creativity, problem-solving, and interaction and assist in research leading to real problem solving is project-based learning (PjBL). It shows students the real-world problems that require a combination of skills and knowledge to solve. In this student-centered model, the role of the teacher is to help students build interdisciplinary knowledge, and at the same time complete social activities, so that the self-awareness and knowledge of learning depend on the context. PjBL is a new high-impact pedagogy that helps to create and utilize knowledge about technology and business-driven information. Most international and national certification bodies use project-based learning as the quality standard of education.

In Indonesia, ministry of education and culture through the Directorate General of Higher Education facilitates universities to succeed the curriculum of Merdeka Belajar Kampus Merdeka (MBKM). There are 8 KPIs stated as Indikator Kinerja Utama (IKU) that are the basis for the transformation of higher education initiated by the Ministry of Education and Culture. One of the manifestations of higher education KPIs is changing and transforming their education towards project-based learning, where students not only learn to listen and to get information, but also learn to be able to apply it through group work and then produce real work.

Based on the target of improving the quality of higher education set out in the KPI, one can draw the idea that in order to improve the quality of higher education, the achievement of performance indicators with the established criteria must be implemented. Specifically on the target of improving the quality of curriculum and learning carried out by lecturers, it is determined by definitions and criteria that must be of particular concern to educators in higher education. The expected learning innovation based on the KPI is a learning process carried out using one or a combination of case-solving learning methods and project-based

learning methods. Students are trained to act as figures who try to solve cases, students conduct case analysis to build recommendations for solutions to the problems they face.

The target of implementing vocational education learning refers to the criteria for a learning system that uses one or a combination of two learning systems. Collaborating the case study learning system with project-based learning is considered appropriate in meeting the goals of vocational education. The collaboration of the two systems through the application of the development of project-based learning models will provide students with a learning experience by playing the role of "protagonists" who try to analyze and solve cases. Then they will build recommendations for problem solutions through group discussions. Formation of classes whose activities are dominated by students, while lecturers act as facilitators in the discussion process. Project-based learning which is expected in vocational education learning is carried out by dividing students into working on projects within a certain period of time. Projects are real problems that exist in industry and society. Formulate project problems in questions that are led to be answered, create work plans with a collaboration model, carry out projects, and prepare presentations with constructive feedback. The projects carried out are directed at forming critical and creative thinking skills as well as in the concept of collaborating.

Despite the enormous benefits of PjBL for the vocational higher education, many challenges are reducing its effectiveness as high expectations of the industry partner can't meet by the practical educational environment capabilities. This problem was also encountered in the implementation of PBL at the Politeknik Negeri Batam. Kartikaningdyah (2013) analyzed the abilities of Batam State Polytechnic alumni. The results state that the courses that support students' ability to work readiness are Internships. The results of the analysis show that the practice through the work laboratory carried out during lectures does not significantly affect the work readiness of graduates. This means that although project-based learning has been attempted, graduates do not have the work readiness as desired by the industry. Therefore, involving industry in learning is considered necessary. Industry involvement is done by providing opportunities to decide what projects and activities are appropriate for students to do according to industry needs. This can bring together the gap between industry expectations of the quality and competence of graduates and learning activities in educational institutions that prepare graduates.

Industry recommendations will provide changes to the curriculum paradigm and input to the campus on the learning process and indicators of learning objectives carried out. In the evaluation of education, recommendations are stated as a consideration in determining a value for the achievement of the measurements made. Measurement is in the form of a decision whether an activity is stopped, continued or improved based on an assessment of how effectively it has been implemented (Ambiyar and Muharika, 2019).

Referring to the meaning of recommendations, we developed a project-based learning model with industry recommendations as a strengthening consideration for projects carried out by students in the PjBL process. This is to realize the success of achieving the main indicators of vocational colleges, namely the work readiness of graduates with success in getting jobs that are in accordance with science and competence with a short waiting period and decent income by working in various industries. The development of this learning model also refers to the target criteria for the main work indicators of universities on the target of improving the quality of higher education lecturers. The quality in question is that in the

learning process, lecturers are able to carry out innovative and quality learning using case-based, project-based learning methods and train collaboration skills in projects, increasing student participation in the learning process with projects based on the real needs of problems that occur in the community.

Based on the description of the IKU, this industry-recommended project-based learning model is designed using motion graphic-assisted learning media as a supplement to make it easier for students to understand the concept of learning materials. This is done with the intention of shortening the implementation time of learning in presenting the material in class. The motion graphic media used has been previously developed and has been used in the Graphic Design course for Politeknik Negeri Batam students which has been registered in Directorate General of Intellectual Property under the name Mentori. The use of motion graphic mentoring media is used for learning needs with the aim of shortening the theoretical understanding time so that students can focus more on understanding the project learning that will be implemented.

## 2 LITERATURE REVIEW

There are several previous studies that discuss project based learning in vocational education. (Lizunkov et al., 2020) proposed an architecture of the integrated model of traditional and project-based learning in the supplementary vocational education system. The main idea of implementing practice of project-based learning in supplementary vocational education is in a special organization form of independent, individual or group work of students. A survey of Priority Development Area (PDA) employers on the quality of training for supplementary vocational programme students and graduates revealed an increase in satisfaction with such indicators as: willingness to practice, the formation of basic skills, the ability to work in a team, the ability to professional communications.

(Sugiyanto et al., 2020) developed an instructional model of integration of mobile learning and project-based learning to improve the competency of Vocational High School students on computer assembly and basic network subject. The study used a Research and Development method and the experimental method at the stage of realizing the design. The result of the assessment by comparing the competence of learning outcomes with N-gain in the high category, as well as the results of the test of the effect size on the increase competence in the cognitive realm of 77%, 94% psychomotor and 84% more effective compared with the results of limited trials. The integration model shows an increase in student competence caused by effective learning, indicated by positive responses from students.

(Samsudin et al., 2020) implemented STEM project-based learning as an update in the learning process that can be applied in vocational learning. This research adopts quasi-experimental research methods. Bandura's theory of social cognition was used to evaluate and compare the effects of STEM PjBL and traditional teaching methods on the level of self-efficacy of more than 100 high school students in learning physics. Results show that STEM PjBL enhances students' sense of self-efficacy in solving physics problems.

(Ganefri et al., 2017) designed a valid learning stage for production-based entrepreneurial learning in technology and vocational education. The research phase is limited to the design

of the production-based entrepreneurship learning phase in technology and vocational education. The steps begin with a needs analysis. The stages of needs analysis are: 1) identifying problems, 2) analyzing curriculum, and 3) analyzing student characteristics. In addition to conducting a needs analysis, this research also studies the literature and analyzes relevant research and study materials that underlie the research.

(Putra et al., 2017) conducts research with a research and development approach with a development model using ADDIE. This study aims to implement E-module Development in the Database Administration course. The results showed that the problem of lack of sources and media supporting the teaching and learning process and students were fixated on the teacher's explanation, so that students were limited to self-development with their potential according to their field of expertise, which could be overcome.

We present a study of developing a project-based learning in vocational higher education. Our approach differs from previous studies since we consider to include industry's recommendation directly on the PjBL process and evaluation.

## 2.1 Conceptual Framework

The development of community needs led to the need for improvements and adjustments in the learning curriculum. Vocational education has a goal to improve the welfare of the community through the placement of graduates in accordance with the needs and expectations of the industry. However, there are still many graduates of vocational higher education who find it difficult to find work. Furthermore, there are vocational college graduates facing problems which indicate that the IKU of the vocational higher education have not been achieved.

Implementation of project-based learning and case study-based learning are the main methods that must be mastered by lecturers in the IKU. This is the background for developing a project-based learning model based on industry recommendations. Industry should be involved in advising students on what projects are best for students based on real problems in the industry. Students get advice on what the industry has recommended to do in project learning. It is important for lecturers to provide learning media that can help students learn more quickly and effectively. A motion graphic named Mentori is used as a project-based learning tool. The use of motion graphics is based on the need for time efficiency. Mentori are expected to help lecturers provide material through motion graphic media so that students can repeat the learning content that has been developed.

Development in the field of education is anticipatory in nature, carried out to anticipate conditions that may become problems in the future. It is necessary to develop a project-based learning model based on industry recommendations to overcome problems in graphic design learning at the Politeknik Negeri Batam. Figure 1 describes the conceptual framework in this study. This study aims to produce a valid, practical and effective learning model that can be applied to help optimize the learning objectives of vocational education, namely the competency perception of graduates and the ability to be independent for entrepreneurship.

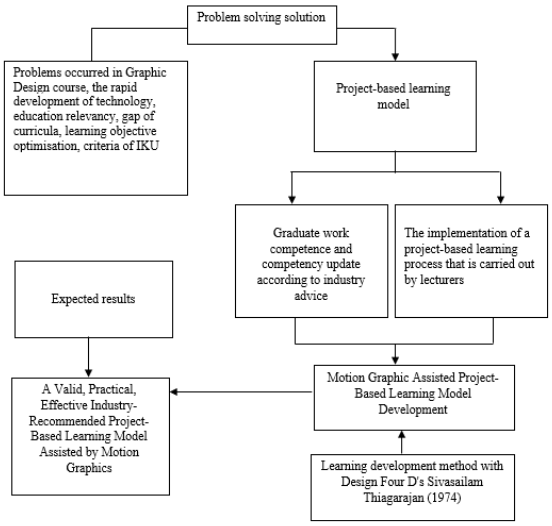


Figure 1: Conceptual Framework

## 2.2 Research Questions

This study intends to examine the research questions posed in measuring the effectiveness of the learning model that has been developed. The research questions posed in this study are as follows "How to produce the results of developing a project-based learning model based on industry recommendations assisted by motion graphic mentoring in graphic design courses".

# 3 METHODOLOGY

We use Research and Development method in this study. The development product produced in this study is an industrial recommendation project-based learning model assisted by motion graphics in the Graphic Design course for vocational higher education. This study uses the Four D's development design proposed by Thiagarajan (1974). This model states that the development procedure with the Four D's framework is a modelling system developed based on actual experience. This model consists of the stages of designing, developing, evaluating, and distributing instructional products in education and training.

This study was conducted at the Politeknik Negeri Batam. The population used in this study were students of the D4 Multimedia and Network Engineering Study Program as a trial sample with a total of 2 class groups. Students are considered to have the same characteristics because they both have expertise and scientific competence in the field of Computer Informatics Engineering. Each group consists of 30 samples.

Data analysis was carried out using descriptive statistics.

## 4 RESULTS AND DISCUSSION

### 4.1. Define

Analyzing the need to develop a project-based learning model based on industry recommendations assisted by motion graphic mentoring in the Graphic Design course. Based on the analysis that has been carried out through a needs analysis questionnaire, the following research results can be summarized figure 2:

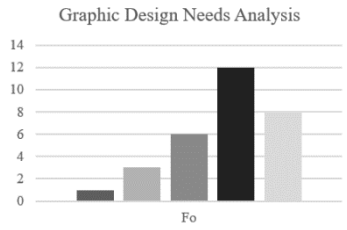


Figure 2. Histogram Graphic Design Needs Analysis

The percentage of the respondent's level of achievement described above, the percentage obtained is 82%. The percentage is in the range of values of 89%-80% in the high category.

The assessment description above shows that there is a gap between the competencies possessed by learner outcomes and the competency needs of graphic designers. The rapid development of information technology from year to year is not comparable with the availability of qualified human resources. The growing need for graphic designers in all areas of life and work also demands that graphic designers must also be fast in creating and completing all the work assigned to them.

### 4.2. Design

The rationale for the development carried out refers to the IKU targets of State Universities and Higher Education Service Institutions within the Ministry of Education and Culture which were formulated in support of the concept of independent learning by the Minister of Education of the Republic of Indonesia in August 2020, with the aim of improving the quality of education in readiness. graduate work and improving the quality of lecturers as educators, especially in carrying out the learning process. In this model, the emphasis is on IKU 7, which is a collaborative and participatory class where the criteria for case-solving learning methods and team-based projects are

**Table 1. Syntax Industry Recommendation Project-Based Learning Model**

| Phase | Sub Phase |
|---|---|
| **Phase 1: Industry Needs Analysis** | **1.Industry investigation** Students develop an investigation plan and develop some problems that are worth |

| | |
|---|---|
| | investigating.<br>**2.Confirm Industry**<br>Activities that involve the industry's affirmation of the existence of problems and are like problems to be used as projects as a step in developing students' abilities in overcoming problems in the field. Confirmation, validation and justification from the industry on the results of case investigations obtained by students from industry becomes the basis for determining the formulation of essential questions.<br>**3.Formulation of essential questions**<br>The questions asked not only have one answer, the questions stimulate students' curiosity to be involved in completing them in the form of project work, build higher thinking and predictive abilities, refer to new ideas, stimulate further inquiry experiences. |
| **Phase 2: Project Work** | **1.Competency provision through Motion graphic**<br>Study the material well and thoroughly through the Mentori motion graphic media and modules that can be accessed through Android media on the You Tube channel.<br>**2.Project Planning**<br>Students develop a |

| | |
|---|---|
| | thought to solve problems that have been formulated into essential questions that must be answered through a project. In project planning, the project design is described in the form of the design of the stages in the project, establishing a project master plan in the form of a project description, project work organization, project engineering, tools and materials needed to carry out the project, the methods used in completing the project and the time required to carry out the project. project<br>**3.Project Work**<br>Students carry out activities that have been arranged in project planning. Project work carried out by students is oriented towards problem solving and targets that are expected to be answered in the formulation of essential questions. |
| **Phase 3: Project Assessment** | **1.Project assignment assessment**<br>Project appraisal is focused on assessing the activities of the project undertaken. Project appraisal is group, while performance appraisal is personal. One of the project assessment indicators is the assessment of the results (products) of the projects carried out, objects |

| | |
|---|---|
| | (products) that are assessed as a result of project work are carried out with reference indicators to product characteristics according to the lecturer's instructions.<br>**2.Performance Assessment**<br>Assessing the ability of students to carry out project work in accordance with the abilities expected by the industry for graduates who adapt to the human character of the 21st century. |
| **Phase 4: Recommendation Of Project Results** | Industry provides feedback on projects that have been carried out by students who provide opinions and suggestions about project activities that have been carried out by students. Recommendations from the project work carried out are categorized into three assessments, namely: a) Project results are good and need to be maintained, b) project results are acceptable with a note of improvement and return to phase 2 if needed |

4.3. Develop

The summary of the validation results on the project-based learning model of industry recommendations is presented in the following table:

| No. | Indicator | Score | Category |
|---|---|---|---|
| 1. | Graphics standard | 0,902 | Valid |
| 2. | Standard | 0,902 | Valid |

| | | | |
|---|---|---|---|
| | language | | |
| 3. | Rationalization | 0,900 | Valid |
| 4. | Supporting theory | 0,899 | Valid |
| 5. | Syntax | 0,906 | Valid |
| 6. | Social system | 0,897 | Valid |
| 7. | Reaction principle | 0,940 | Valid |
| 8. | Support system | 0,951 | Valid |
| 9. | Impact of learning and accompaniment | 0,914 | Valid |
| | Average | 0,913 | Valid |

The results of V Aiken's analysis of the industrial recommendation project-based learning model in the Graphic Design course showed an average score of 0.913 > 0.677 which stated that the model was categorized as valid and suitable for use in testing research products.

4.4. Disseminate

Disseminate in the 4D procedure is part of the develop stage aimed at testing Practicality and Effectiveness through posttest evaluation. In the Disseminate stage, Packaging and Diffusion are also carried out. Packaging and Diffusion in this research and development was not carried out on the grounds that the development process was limited to the test group in the experimental class, not to a wider group with the same population characteristics.

## 5 CONCLUSIONS

This research has produced a project-based learning model syntax consisting of Phase 1 Industry Needs Analysis, Phase 2 Project Work, Phase 3 Project Assessment and Phase 4 Recommendation Of Project Results and is declared valid in all aspects of assessment that can be applied to Vocational Higher Education with characteristics and suitable conditions that require real industry experience

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