



## Developing Prjoect Based Learning Case Studie Model To Improving Learner Skill On Industry Revolution 4.0

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### ABSTRACT

This research aims to develop a valid, effective and practical web programming learning model. Based on preliminary studies and needs analysis carried out in web programming courses, it was found that learning was not optimal. The needs analysis also found that there are priorities/needs for lecturers and students who have high expectations for the learning process which can improve 4th century competencies, namely critical thinking, communication, collaboration and creativity. This type of research is Research and Development which refers to the ADDIE model. The analysis technique uses the Aiken'V test, and validity uses expert tests and Focus Group Discussion (FGD). The research findings are a Case Study-based Project Based Learning Model which is equipped with model books, teaching material books, lecturer manuals and student manuals. The model and supporting system meet the validity criteria, are prepared based on research and development models and are suitable for use according to experts. The resulting model meets the practicality criteria with an average reliability value of 88.67 according to lecturers and 87.02 according to students. The results of the effectiveness test show that the results of research on the development of case study-based project based learning models produce seven model syntaxes, namely, determining case studies, identifying problems, making project proposals, designing project designs, creating projects, product trials, presenting project reports.

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## 1. INTRODUCTION

The development of technology in the 4th century requires humans to enter a transition era, changes in human abilities will leave manual skills towards brain skills. Whatever type of work and profession one undertakes, all of them require thinking skills (Laal, Laal, & Kermanshahi, 2012). 21st century jobs require the ability to gather information, use information, and analyze information. Work will be involved with various problems and requires the ability to solve the problems themselves, creative abilities and a critical attitude to carry out various innovations and changes, as a challenge from high competitiveness in the world of business and industry (Association, 2010). The 21st century requires people who have the ability to dare to make decisions, so that the functions and results of the work carried out will be better, more effective and efficient (Bell, 2010).

Technology and Vocational Education (Technical Vocational Education) plays an important role in preparing the workforce to face the flow of globalization and technological changes which have an impact on the social, political and economic life of society (Jalinus, 2014). The Central Statistics Agency (BPS) noted that in 2018 the highest number of unemployed came from Vocational High Schools (SMK), occupying the top rank at 8.92%. Next are high school (SMA) graduates at 7.19%, Diploma III (D3) at 7.92%, and universities at 6.31.98% (Central Statistics Agency, 2018). The results of identifying the causes of the high contribution of vocational education to the number of unemployed in Indonesia, one of which is caused by the low competency (competitiveness) and soft skills of Indonesian workers.\

The problem of unemployment and the competitiveness of human resources is a real challenge for all countries, including Indonesia. The challenges faced by Indonesia are also added to by the very high demands of the development of the industrial revolution 4.0. The World Bank reports that the job market requires multi-skills graduates who are forged by educational units and systems, both secondary and higher education (World Bank, 2018). Each country must respond to these changes in an integrated and comprehensive manner so that the challenges of Industry 4.0 can be managed into opportunities. All of this must be responded to by improving the quality of learning and curriculum in existing universities and schools, bearing in mind that the need for each graduate is not only to be proficient in the field they are involved in, but also to have the character or soft skills to respond to the challenges posed by progress and needs in the field. digital era (21st Century).

The development of technology in the 4th century requires every individual to have adequate skills or skills, both hard skills and soft skills, so that they can enter the world of work and be ready to compete with the resources of other countries. According to Bernie Trilling and Charles Fadel (Trilling & Fadel, 2009) the core skills that must be possessed in the 21st century are learning and innovation skills, information, media and technology skills, as well as life and career skills, in line with the opinion of the National Education Association states that there are 18 types of 21st century skills that need to be provided to every individual, one of which is Learning and Innovation Skills which consists of 4 aspects, namely critical thinking, communication, collaboration, and creativity (creativity) (Association, 2010; Efendi, Yulastri, & Yusran, 2019).

Competency in mastering Web programming languages is still highly regarded in the world (Ouahbi, Kaddari, Darhmaoui, Elachqar, & Lahmine, 2015). The need for programmers in the World is very helpful in the world of IT so that graduates must have which illustrates that there is quite a large opportunity among professional computer skills, especially the need for programmers, although a survey conducted in 3500 organizations in North America and Europe and Asia is dominated by the need for IT security professionals occupying the top ranking becomes a reference point that requires professionals who are far from available needs (Sáez-López, Román-González, & Vázquez-Cano, 2016; Tsai, 2019). The above is very important for programmers to close the gap by meeting the needs of the professional IT field so that they get reliable resources, currently the problem of programmers and IT has become a trend (Kordaki, 2010). Based on the opinion above, it can be concluded that in general, learning computer programming is not easy to understand and learn so that students do not meet the expected competencies.

The results of observations carried out by researchers found that there was an inaccuracy in the use of the current learning model, lecturer-centered learning was considered inappropriate to be practiced in current Web Programming courses, to improve learning outcomes (Delisle, 1997; Mossuto, 2008). Lecture methods or pulpit methods that emphasize understanding concepts or theories cause boredom and are less interesting, so that students' creativity is not visible and the experience they gain from the learning process is not able to develop critical thinking skills (Noll & Wilkins, 2002).

The development of a Case Study-based Project Based Learning model is important to use to overcome the problem of students' critical thinking skills, as well as showing a positive influence on students from the aspects of student learning achievement and thinking skills. Case Study-based Project Based Learning is not only useful in increasing students' knowledge and critical thinking skills, but is also able to support the development of problem solving skills, group working skills and communication skills. The Case Study-based Project Based Learning model must be in line with the method to be used, namely:

This case study method will really help students understand the Web Programming course because it is conditioned by a learning atmosphere that is attractive by providing interesting cases that match their interests. Developing a Web Programming learning model is an effort to solve learning problems. Meanwhile, based on the results of observations in the field, there is no alternative learning media designed specifically for the needs of the learning process in the Web Programming course in the graphic design department. Therefore, it is necessary to design and develop a case study-based Project Based Learning learning model in the Web Programming course, which is a lesson that presents teaching materials, practice questions, and correspondence facilities. This development aims to develop a new learning model and alternative learning sources.

## 2. RESEARCH METHOD

Developing a Case Study Based Project Based Learning Model refers to the ADDIE model learning design which consists of 5 (five stages), namely Analysis, Design, Development, Implementation and evaluation (Branch, 2009; Morrison, Ross, Kalman, & Kemp, 2012). Tables and Figures are presented center, as shown in Table 1 and Figure 1, and cited in the manuscript before appeared.

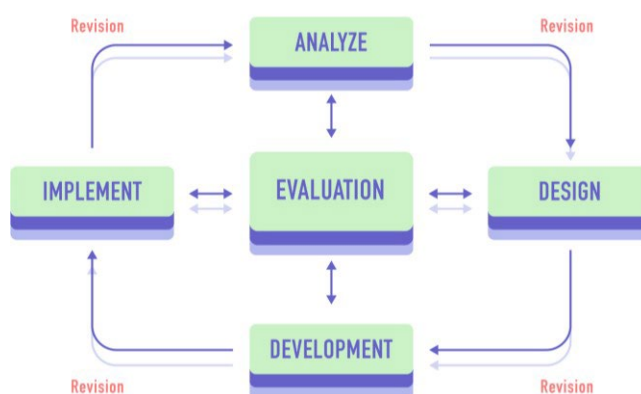
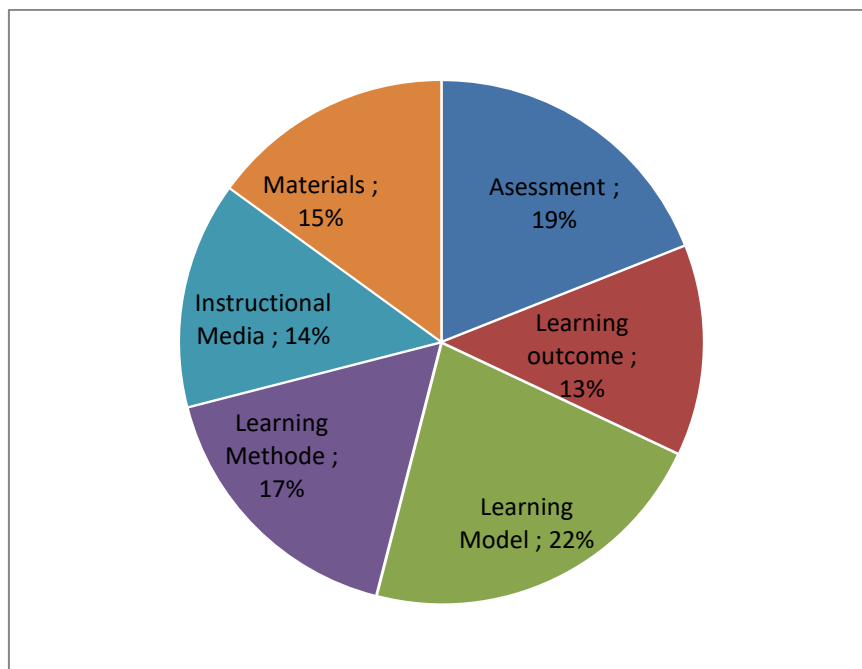


Figure 1 PjBL-CS Model Development Stage

## 3. RESULTS AND DISCUSSIONS

Need analysis is carried out to obtain data in the form of information regarding needs and expectations in learning web programming. Based on the needs analysis, there are several things that

must be developed in learning Web Programming. Development in the assessment aspect 19%, in the learning outcome aspect 13%, in the learning model aspect 22%, in the learning method aspect 17%, in the instructional media aspect 14% Materials 15%. This can be seen in figure 2.



**Figure 2 Web Programming Learning Components that need to be developed**

#### A. Need analysis

Need Analysis also found that there are priorities/needs for lecturers and students who have high expectations for the learning process which can improve 21st century competencies, namely critical thinking, communication, collaboration and creativity. The needs analysis stage aims to look at the current conditions and needs of students and lecturers in learning computer networks, so that at this stage it can describe the description between the current situation and students' priorities/needs regarding 21st century competencies and the expected learning process in learning computer networks. in higher education.

At the needs analysis stage, an analysis of the current state of learning and skill competency is also carried out and then compared with the expected state. The gap between current conditions and expected conditions is used as a learning problem for which a solution will be found. Data collection will be carried out from diploma program students and lecturers. To collect information from various sources, a data collection method in the form of a questionnaire was used. Quantitative data was analyzed using descriptive statistics and inferential statistics. Inferential statistics using a difference test with a t-test to see the difference between expectations and current achievement conditions.

Based on the results of data analysis, research findings show that the Teaching and Learning Process (PBM) of vocational students at the Panca Budi Development University in Medan in the Computer Engineering Study Program. Based on the opinion of the lecturers, the current condition has only reached an average of 73.40 or is still in the sufficient category. The conclusion of the needs analysis results is that students and lecturers really need a case study-based Project Based Learning model development model in the Web Programming course. The results of these findings and

analysis are very rational and essential, thereby strengthening the motivation of researchers to carry out research and development of the Case Study-based PjBL model.

#### B. Model validity

Validation is a measurement process for the accuracy or accuracy of an instrument in measuring the variable or indicator that you want to measure. After conducting a Focus Group Discussion (FGD), research and data search (data collecting) was carried out to test whether the product-based Case Study-based Project Based Learning model was valid or invalid. This research was carried out to measure the validity of the model product, including the validity of the syntax of the model being developed, as well as the validity of the content of the model product being developed. These two things are measured using measurement instruments carried out by a team of experts/experts in their respective fields including: experts in the field of learning models, experts in the project field, experts in the language field, experts in the technology and vocational fields as well as experts in the field of research and development.

The construct validity test of the case study-based Project Based Learning model syntax is carried out by experts who have the capacity based on predetermined requirements. The construct validity value of the model syntax is not measured directly, therefore the measurement model uses LISREL version 8.80 software, or also known as Confirmatory Factor Analysis (CFA), which shows the operationalization of research variables or constructs into measurable indicators formulated in the form of equations. or a particular path diagram (Kusnendi, 2008;98).

Based on the results of statistical data processing using the CFA concept with LISREL version 8.80 software, guided by the concept put forward by Stevens (2009: 357), that a model is declared valid or fit (goodness-of-fit model) if it fulfills several assessment aspects, including ; a) the Chi-Square value is not significant, it is close to zero, b) the P-value must be greater than 0.05 ( $>0.05$ ), and the RSMEA (Root Mean Square Error of Approximation) value has a value smaller than 0.05 ( $<0.05$ ).

Validate the content of the model book related to factors including model rationale, supporting theory, and model characteristics. There are 9 indicators validated by 5 expert validators according to their respective fields. The results of the assessment from each validator (team of experts) regarding the contents of the product-based Case Study Project Based Learning model book can be seen in Figure 4 below:

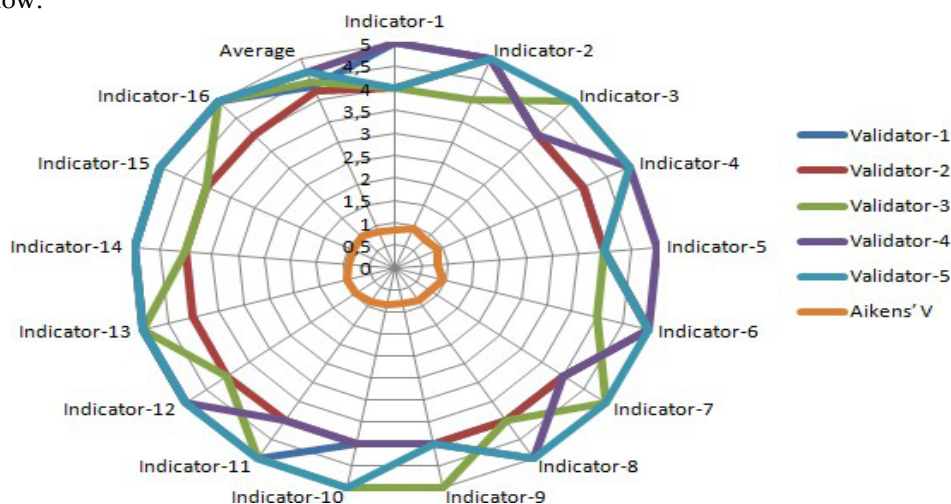


Figure 4 Expert Validation Results on Product Content

Based on Figure 4, it shows that the validation of the contents of the Product Based Case Study-based Project Based Learning model book based on statistical processing with an Aikens'V value, was

obtained on average at 0.87 with an Aikens'V assessment range between  $\geq 0.60 \leq 1.00$  (Azwar, 2013). Therefore, the validation results from the expert team are categorized as valid

Construct validity of the model developed is assessed from 5 (five) indicators including; model syntax, social system, reaction principles, supporting impacts, and instructional and accompanying impacts. Analysis of the construct validation of this model syntax was carried out using the LISREL 9.3 software program. Overall model assessment can be obtained based on the model fit index (Goodness of fit statistics) produced by LISREL. The most common model accuracy index is the Chi-Square value (Jöreskog & Sörbom, 1993). To assess model fit, it is hoped that the Chi-Square value is not significant ( $p\text{-value} > 0.05$ ) because this result indicates that there is no difference between the model and (Jöreskog & Sorbom, 1993). Apart from that, from these results we also find an interpretation of the loading factor. By definition, a loading factor is the magnitude of the correlation between an indicator and its latent construct. A reference factor weight of 0.50 or more is considered to have validation that is strong enough to explain the latent construct (Ghozali, 2008; Hair et.al, 2013). Validation of the construct syntax of the case study project based learning model in Figure 4.4 is as follows:

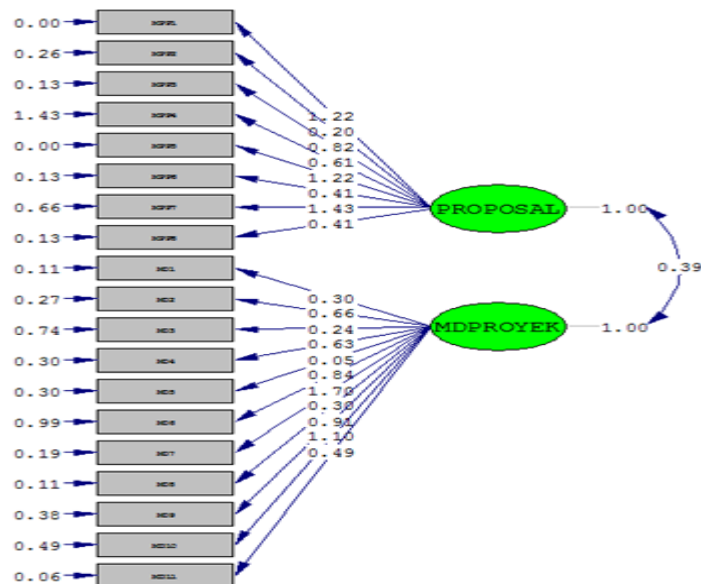


Figure 5 Confirmatory Factor Analysis Model syntax

Figure 5 results of CPA syntax 3 and 4 Chi-Square value = 130.62 with P-Value = 0.88327, while the RSMEA value = 0.000. Based on the data analysis above, it shows that the syntax construct validation of the Case Study-based Project Based Learning model which consists of 5 validator elements with 5 indicators meets the goodness-of-fit model criteria, so that the syntax construct validity values can be grouped or classified as valid or fit.

### C. Practicality

The practicality test of the model involved lecturers in the Web Programming course in the Program diploma III Teknik komputer universitas pembangunan panca budi Medan, totaling 5 lecturers. Practicality testing is an activity used to measure the level of practicality of each element or product that has been declared valid or goodness-fit-models.

This research tested several products based on responses from lecturers and students, these practicalities include the Practicality Test of the Project Based Learning Model Book based on Case Study, the Practicality Test of the Lecturer's Manual and the Project Based Learning Model Teaching Module Book based on Case Study in the Student Decision Programming Web Course.

Test the practicality of the Case Study-based Project Based Learning learning model based on lecturers' assessments on the aspects of attractiveness, development process, ease of use, functionality and usability and reliability with an average score of 91.3. conversion of quantitative data to qualitative data, then it is included in the Very Practical category. The practicality test is based on the lecturer's assessment of aspects of material organization, writing format, language use, content aspects and evaluation system with an average score of 92.0. conversion of quantitative data to qualitative data, then it is included in the Very Practical category. The results of the practicality test are based on the lecturer's assessment of aspects of writing format, language use, introduction, content aspects and evaluation system with an average score of 89.7. conversion of quantitative data to qualitative data, then it is included in the Very Practical category.

Practicality Test of the Student Handbook. Student assessments in measuring the practicality of student handbooks are the same as in testing the practicality of lecturer decisions, namely in terms of writing format, language use, introduction, content aspects and evaluation systems, with a total of 17 indicators. Based on practicality tests by students regarding the Case Study-based Project Based Learning Student Guidebook with an average score of 85.2, it is declared Practical.

#### D. Effectiveness

The expanded trial process is a process carried out after the limited trial process is declared effective. The expanded trial was carried out at POLIMEDIA Medan and took place from April to August 2019. Respondents in the effectiveness test were taken from students who took the Web Programming course, apart from students who took part in the limited test group B. Meanwhile, students for the expanded test were group A, B, C and D with a total of 110 respondents from the fourth semester graphic design program students. The number of students was taken randomly to form a homogeneous group by conducting a pre-test. The results were then reduced to 1 homogeneous group randomly randomized, namely the experimental group. Then practice data is collected for the group. This data will be used as a basis for determining the effectiveness of the Case Study-based Project Based Learning model for experimental classes. Before testing the effectiveness of the experimental class, a pre-test and post-test were also carried out in the control class.

Based on the results of the data analysis carried out, it was concluded that there was an increase in the results of student learning scores, the impact of implementing the Case Study-based Project Based Learning model. Increasing the value of student learning outcomes. This can be seen from the average score (mean) at the start of the lecture when the pre-test is carried out when compared with the average score (mean) of students at the end of the post-test. The difference from the test results of the analysis data above, below is a histogram of the difference between the average initial and final values in the experimental class, namely:

Based on the description of the data presented in the form of tables and also histograms related to student learning outcomes, it can be stated that the Case Study Based Project Based Learning model is "effective" for improving student learning outcomes, especially in Web Programming courses and is declared very worthy of being a new learning model in regarding the revitalization of education in the vocational sector.

## 4. CONCLUSION

Based on the results of the research carried out, it can be concluded that the Case Study-based Project Based Learning Model which was developed based on the results of the data analysis carried out, shows suitability and accuracy to be used as a model in practical learning of Web Programming and also in other courses that have the same characteristics. So the Case Study-based Project Based Learning model is suitable to be implemented.

The model development produces the syntax of the Project Based Learning Model based on Case Study in Vocational Education Diploma III Graphic Design Department which is valid, practical and effective. The results of testing carried out on the validity of the Case Study-based Project Based Learning model were declared valid based on the validity aspect and were also declared effective in

learning Web Programming practices, and had an effect on increasing students' abilities in learning to create Web Programming.

The application of the Case Study-based Project Based Learning model in the Web Programming course involves interaction in the model components, namely syntax, social systems, reaction principles, support systems, and instructional and accompanying impacts. The evaluation carried out reflects the fulfillment of competency aspects between the control class and the experimental class, namely the knowledge (cognitive) aspect increased by 10.56%, the skills (psychomotor) aspect increased by 16.03%, and the behavioral/attitude (affective) aspect. there was an increase of 19.35%.

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