Effect of Project-Based Learning Through Blended Learning on Website Design Skills

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Abstract. This study aims to determine the website design skills of Information Technology and Computer Education Program (P.TIK) at IKIP PGRI Pontianak students and to determine the differences in website design skills of P.TIK students using Blended Learning (BL) and face-to-face learning (F2F) in website design project. The research method used in this study is an experimental method with a quasi-experimental form. The sample in this study amounted to 63 students who were divided into two groups namely classes that apply BL and classes that apply F2F in implementing website design projects. Data collection techniques in the form of measurement techniques using tools in the form of a portfolio. Data analysis techniques using descriptive statistics and inferential statistics. The results showed that the website design skills of students after working on a website design project were in the good category, and there were significant differences in website design skills between the groups applying BL and the groups applying F2F. The website design project encourages students to carry out planning and website development activities followed by website evaluation, while BL encourages students to study independently or collaboratively in completing website projects.

Keywords: Website Design Skills; Blended Learning; Project-Based Learning

INTRODUCTION:

The purpose of the Information Technology and Computer Education Program (P.TIK) at IKIP PGRI Pontianak in addition to producing teachers in the field of Information and Computer Technology (ICT) is to produce graduates who can bridge or implement ICT in the world of education. One technology that is widely used today and needs to be developed and implemented in education is the website. Website is a collection of documents that are interconnected and can be accessed through a domain or Uniform Resource Locator (URL) (Connolly & Hoar, 2015). Websites in the world of education can be used as a means of teaching and learning or administrative activities (Majid, Ridwan, Setiadi, & Nurdiyanto, 2018). This is supported by a survey conducted by the Indonesian Internet Service Providers Association (APJII) in 2018 which shows that the use of the internet for activities related to education or schooling is one of the main reasons for using the internet (APJII, 2019).
To produce graduates who have competence in developing or building websites, especially in the education sector, students of P.TIK IKIP PGRI Pontianak need to be equipped with various skills related to website development. One of the skills that need to be mastered in building a website is the skill in designing websites or the skills in designing the interface of the website. Skills in designing websites consist of skills in understanding and using HTML, CSS, and Javascript (Dorn & Guzdial, 2010) which are supported by the ability to design / prototyping, graphic design, and use various frameworks for website display design (Ferdiana, 2017).

The project-based learning model is one of the learning models that can be applied to achieve student skills in designing websites (Dorn & Guzdial, 2010). This is because through project-based learning will make the learning process meaningful for students. In project-based learning, students will play an active role in constructing new knowledge and skills from the knowledge and skills they already have in solving real problems. In addition, website design activities are activities that produce a product, so a project-based learning model is perfect for achieving these skills (Sabrin & Sulistiyarini, 2020). Through learning activities like this, the knowledge and skills achieved by students will become long-term knowledge and skills because students will construct their knowledge and skills in their own way.

Project-based learning is a systematic teaching method by integrating knowledge and skills through the research process in planning and producing a product (Buck Institute for Education, 2014). The process in project learning consists of identifying problems; looking for information or data; exchange ideas; and applying knowledge to projects (Hadgraft, 2017). Through a website design project, students will be motivated to learn, improve student attitudes in learning, and improve student soft-skills and hard-skills (Sumarni, 2015).

Website design projects are projects with high complexity. High complexity can be seen from the activities of making website designs, where students are required to carry out direct research at school to obtain real problems that exist in school, obtain the information needed in website development, then students need to apply the knowledge obtained from lectures in building websites. The resulting website needs to meet the aspects of website design skills which consist of the use of HTML, CSS, and Javascript.

Projects with high complexity require sufficient processing time so that the resulting product meets the targeted criteria. In order for the project to be implemented properly, the lecturer as the facilitator needs to monitor the projects undertaken by students to stay on the right track. The project monitoring process can be done by providing input or feedback on website design projects undertaken by students. Generally, the monitoring process is carried out face-to-face (F2F). However, this method has limitations, especially related to the availability of time to review student projects. In addition, with the F2F approach, input or feedback from lecturers is difficult to complete immediately considering that website design activities are experimental activities that require time to work (Guicai, Zhengbing, & Yanfeng, 2015).

To overcome the obstacles faced in a website design project through the F2F approach, a different one can be used, namely Blended Learning (BL). BL is a learning approach that combines F2F learning and online learning in solving a problem. F2F activities in BL can be in the form of exercises / workshops, discussions, and presentations, while online learning activities can be focused on training activities, deepening of material, discussion, or discussion of exercises (Ferdiana, 2017). This means that through the BL approach, lecturers can provide input and feedback on website design projects undertaken by students with flexible time. Through BL, lecturers can rearrange the deadline for project revisions, so that the results of revisions made by students can be monitored by the lecturer. In addition, the use of the Learning Management System (LMS) at BL provides facilities for uploading project files/documents, so that lecturers can see directly the documents produced from student projects.

The application of BL in website design projects can be a new way that replaces the conventional method of face-to-face learning for website programming courses, especially in the P.TIK Study Program of IKIP PGRI Pontianak. The implementation of BL for website design projects is not only supported by existing features in the LMS such as file / file management, discussion rooms, monitoring student work and is also supported by the
availability of websites that provide live editors such as www.tutorialspoint.com or www.codeply.com which can be used for website design development. The live website editor also supports collaborative work so that website design projects can be done in groups and can be easily shared with lecturers/facilitators.

Although project-based learning for making website designs by BL promises advantages, research is needed to prove the effect of BL in making website designs. This aims to determine whether there are differences in students' website design skills in working on website design projects through the BL and F2F approaches. In addition, research is expected to provide an overview of students' website design skills after implementing a website design project.

**METHOD**

This research is an experimental research with a quasi-experimental research form. Experimental research is research that is used to determine the causes and effects of an independent variable on the dependent variable (Creswell, 2014) while quasi-experimental is a form of experiment that uses a control group but does not fully control external variables in the implementation of experiments (Sugiyono, 2017). The design used was nonequivalent post-test only control group design. Nonequivalent post-test only control group design is a research design that tests differences only after the treatment is carried out on the research object (Jackson, 2014). The pretest was not carried out on the nonequivalent posttest-only control group design because it is not possible to do so (Privitera, 2017) and in this research, it was felt that it was impossible to measure the initial ability of website design considering that the research object had never made a website before.

In this study consisted of two variables, namely the independent variable and the dependent variable. The independent variable in this study is the form of learning approach used, namely BL and F2F in the website design project, while the dependent variable is the student's website design skills.

The sample in this study amounted to 63 students who chose to use purposive sampling technique. The research sample was divided into two groups, namely groups working on website design projects using F2F and groups working on website design projects using BL. Because the research design used in this research is a post-test only control group design, to avoid bias in the assessment of website design skills because of differences in initial abilities, a test will be carried out to see whether or not there are differences in basic abilities in designing interfaces in general before being given treatment. The test results on basic design knowledge can be seen in table 1.

**Table 1 Independent T-Test Basic Design Knowledge**

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>df</th>
<th>Sig</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Design Knowledge</td>
<td>0.617</td>
<td>61</td>
<td>0.540</td>
<td>1.27</td>
</tr>
</tbody>
</table>

Based on table 1, it is known that the significance value of basic design knowledge is 0.540 or greater than the significance level of 0.05 (0.540 > 0.05). This shows that there is no significant difference in basic design knowledge between the classes that will implement BL and F2F. Because it is known that there is no difference in basic design knowledge, testing to measure differences in website design skills can be done with the assumption that the two experimental classes have the same initial website design skills.

In this research, the website design project applies five stages of project-based learning, namely 1) Get an Idea; 2) Design the Project; 3) Tune the Project; 4) Do the Project; and 5) Exhibit the Project (Patton, 2012). In the first stage, the lecturer/project facilitator needs to compile project ideas that will be worked on by students. The result of the first stage is an essential question or a guided question. There are three criteria in compiling essential questions, namely the questions that are generated are questions that may be asked in the real world (real world problems), questions that require high-order thinking skills, and arouse students' creativity or imagination in completing projects (Sabirin, 2016). In this research, the essential question is "How to produce an educational website using HTML, Java Script,
The second stage in a website design project is project design, design has an important role in the success of a project (Naeem, Khanzada, Mubashir, & Sohail, 2018). At the designing stage, it is necessary to prepare implementation methods and procedures, time estimation, resource requirements (Sari & Suranata, 2018). The process of designing a website design project consists of estimating the lesson plan (including the estimated time for the project), compiling an assessment rubric, tools and materials needed to build a website, and a sample website as an illustration of the final project result. In this research, the website design project will be carried out by students for 6 (six) weeks.

After the project design is compiled, the lecturer/facilitator needs to convey the need to convey the draft that has been prepared to students which is the third stage. The purpose of submitting the design is so that students can understand the steps of the project, the duration of the project, the aspects that are assessed, the limitations that must be worked on, to get an overview of the website that will be built based on the sample website that has been prepared. At this stage it is important for the facilitator to carry out various discussions with students to equalize perceptions so that the learning objectives do not come out of the learning outcomes that are to be achieved from the website design project.

The fourth stage is the implementation of a website design project, at this stage students will work on a website design project using the implementation of BL and F2F for 6 weeks. At the first week, students will make a website design plan which consists of determining the project title and objectives, division of tasks, and a site map plan for the website. At the second, fourth, and sixth week students will implement the plans that have been prepared, while at the third week students will present the progress of the project they are working on. The sixth meeting is used to present the results of projects that have been worked on, this stage is also the fifth stage of implementing a website design project. The lecturer as the facilitator conducts a question and answer session to find out the students' understanding of the projects that have been implemented by the students.

The tool used to collect data on website design skills is a portfolio. Portfolio assessment is carried out by two lecturers by assessing the products (websites) produced by students based on the compiled rubrics. The assessment rubric consists of three aspects, namely planning, designing, and developing on a scale from 0 (Not Performed), 1 (Under Performed), 2 (Performed), and 3 (Outstanding). The planning aspect consists of the ability to determine the title, purpose, and division of group tasks. The design aspect consists of designing a sitemap, screen design, and storyboard. The development aspect consists of simplicity, consistency, appearance, navigation, and content of website.

Data analysis techniques used inferential and descriptive statistics. Inferential statistics use independent t-test to determine whether there is no difference in website design skills, while descriptive statistics are used to find out an overview of website design skills.

**RESULTS AND DISCUSSION**

**Result**

The description of the website design skills of P.TIK IKIP PGRI students after implementing the website project can be seen in table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website Design Skills</td>
<td>BL</td>
<td>76.56</td>
<td>4.82</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>F2F</td>
<td>73.82</td>
<td>4.66</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>75.21</td>
<td>4.90</td>
<td>63</td>
</tr>
</tbody>
</table>

Based on table 2, it is known that in general, the average student website design skills are 75.21 on a scale of 100 or in the good category. The average website design skills for BL class is 76.56 and for F2F class is 73.82 on a scale of 100 or both classes are in either category. The research results are presented in full and in accordance with the scope of the study. The results of the research can be completed with tables, graphs (images), and / or charts. Tables and figures are numbered and titled. The results of the data analysis were interpreted correctly.
To measure whether there are differences in students' website design skills in a class that applies BL and F2F, it will be done using the Independent T-Test. Before the Independent T-Test is carried out, a normality test is carried out, while the results of the normality test can be seen in table 3.

**Table 3. Normality Test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website Design</td>
<td>0.435</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Based on table 3, it is known that the significance value of website design skills is 0.435 or greater than the significance level of 0.05 (0.435 > 0.05), which means that the data for website design skills are normally distributed and can be tested parametrically. Furthermore, homogeneity testing will be carried out to determine the variants of the website design skills data. The homogeneity test results can be seen in table 4.

**Table 4. Homogeneity Test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td>Design</td>
<td>0.774</td>
</tr>
</tbody>
</table>

Based on table 4, it is known that the significance value of the homogeneous test is 0.774 or greater than the significance level of 0.05 (0.774 > 0.05) which means that the variance in this study is homogeneous. Therefore, the Independent T-Test will be based on the assumption that the data is homogeneous. The results of the Independent T-Test can be seen in table 5.

**Table 5. Independent T-Test Basic Design Knowledge**

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>dk</th>
<th>Sig</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website Design</td>
<td>2.296</td>
<td>61</td>
<td>0.025</td>
<td>2.74</td>
</tr>
</tbody>
</table>

Based on table 5, it is known that the significance value of website design skills is 0.025 or less than the significance level of 0.05 (0.025 < 0.05). This shows that there is a significant difference in website design skills between classes implementing BL and classes implementing F2F. The magnitude of the difference between BL class and F2F class is 2.74 where the BL class website design skills are better than the F2F class.

**Discussion**

Based on the research that has been done, it is known that students' website design skills after implementing a website design project are in the good category. The results of this study are in accordance with several other studies which state that learning that emphasizes projects will help students to have good skills (Fajarwati, Susilo, & Indriwati, 2017; Sumarni, Wardani, Sudarmin, & Gupitasari, 2016). Skills in website design include the ability to do programming so that the results of this study are also in line with several previous studies in the field of programming which state that project-based learning improves skills in programming. (Akbar, Putro, & Prasetya, 2018; Wang, Hwang, & Huang, 2016).

The improvement of students' website design skills through project-based learning is obtained from activities carried out by students when designing, developing, and evaluating the website that is built. In designing the website, students are required to carry out a needs analysis so that a website is produced according to user needs, when developing students will be required to apply the knowledge gained in theory and practice to the website to be built, while student evaluation activities evaluate the website product already made. This is in line with research that has been conducted which states that project-based learning will encourage students to think at a higher level (Jagantara, Adnyana, & Widiyanti, 2014), carry out research and solve real-world problems (Deta, Suparmi, & Widha, 2013; Sumarni et al., 2016).

Website design is an activity carried out by students as an initial activity in building a website. In designing a website, students need to make observations to schools or educational institutions to get the data needed for the website. Designing activities require students to carry out investigative activities, find and solve problems that exist in schools or educational institutions, to design websites based on data to solve problems faced at school or educational
institutions. This is in accordance with the research that has been conducted which states that project-based learning encourages students to solve problems, make decisions based on data, and conduct research (Anwar, Yusri, Angreany, Syaputra, & Hasmawati, 2020).

Website development and evaluation activities are the next step in building a website based on the design results that have been made previously. Development activities are a way of implementing the theory that has been obtained in the website programming course. The Website Programming course is a practicum course where there are two activities, namely learning (theoretical) in class and doing practice in the laboratory or independently (Amelia & Ulumu, 2019). The theories obtained in the website programming course are the foundations for creating a website, and students are required to develop knowledge in their own way to create a website that is in accordance with the design that has been made. In developing knowledge, students hold discussions with group members, other groups, lecturers / facilitators or through other learning resources such as YouTube and discussion forums such as stackoverflow. This situation is in accordance with previous research which states that increasing skills in project-based learning is obtained through the implementation of material that has been taught in various ways in an effort to complete projects independently (Lee, Lai, Yu, & Lin, 2012; Sumarni et al., 2016).

Based on the results of the research that has been conducted, it is known that there are differences in website design skills between the class implementing BL and the class implementing F2F, where the BL class gets a better score than the F2F class. The results of this study are in accordance with several other studies which state that the BL approach is better than F2F (Bibi, 2015; Khidzir, Daud, & Ibrahim, 2016; Priono, Purnawan, & Komaro, 2018). In this study, classes that apply BL get better website skills because they have advantages that cannot be obtained in F2F learning, namely in the form of space and time flexibility. Through BL learning, lecturers can provide reviews / input on projects undertaken by students through Edmodo e-learning with flexible time, while in F2F learning, the review process can only be done in class with a limited time. This means that through BL, students get sufficient time to be given a review, so that the resulting website design products are better (Sabirin & Sulistiyarini, 2020).

The application of BL also makes it possible to use various technologies that can support learning activities, and in this study to assist students in building websites. In this study, students in the BL class used live editors who could easily share assignments with group members and could be used as a means of discussion if they had problems with fellow group members and lecturers who taught courses. This situation is in accordance with the research that has been carried out which states that BL is learning that combines the advantages of face-to-face learning and online learning (Lalima & Dangwal 2017; Vernandakis: 2012), besides that the BL approach also encourages students to study more independently and trains students to use various learning facilities (Rais, Fadillah, & Rivai, 2019).

Even though BL has a good impact on the learning process, learning with this approach requires full support from lecturers, understanding from students, adequate facilities, and structured activities (Ferdiana, 2017; Morton et al., 2016). In contrast to F2F learning, where the lecturer / facilitator and students are in the class or laboratory at the specified time, the online learning process in BL cannot be determined in a definite time. Even so, in order for learning activities at BL to run well, lecturers need to arrange activities that must be carried out by students, such as deadlines for submitting assignments or content of assignments, time for reviewing assignments, to time for assignment repairs. In BL, both students and lecturers need to actively participate in learning activities, students need to actively ask questions and do the assignments given, and lecturers are obliged to check and provide feedback on work results or student questions. Without structured activities, support from lecturers, and the active role of students, BL will not take place effectively.

**CONCLUSIONS AND SUGGESTIONS**

Students' website design skills in classes that apply BL or F2F after working on a website project are in a good category. Students' website design skills are in a good category through project-based learning because project-based learning encourages students to carry out planning and website development activities followed by evaluating the resulting website.
There is a significant difference in website design skills between classes implementing BL and F2F, where the class that applies BL is better than the class that applies F2F. Learning through BL on website design projects provides students the opportunity to study independently or collaborate using a live editor. In implementing BL, it is necessary to arrange structured activities, active student roles, and full support from lecturers to make teaching and learning activities a success.

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