Impact of Work-Based Learning Models in Industry on Student Learning in the Application of Twood Construction

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ABSTRACT
The learning that occurs in class must be relevant to industry needs, because graduates must have competencies that suit the needs of the world of work and industry. So, efforts are needed to implement a learning model that is in sync with the world of work in industry, one of which is the work-based learning (WBL) model. It was found that there were still gaps in the one-way work-based learning (WBL) model there was no concept model that integrated Merdeka Belajar (MBKM - Merdeka Campus). To overcome these problems, research has been carried out by applying the MBKM model, with the concept of workplace learning (WBL) and in accordance with independent campus government policies and the industrial concept. This research uses a quasi-experimental method. The research sample consisted of students from the wood construction application program who were divided into two groups, namely the Control Group with 13 samples and the Treatment Group with 13 samples, so that the total sample was 26 consisting of students and lecturers from the Faculty of Engineering. The research instrument to measure the implementation of the MBKM-based WBL model in the control group uses the Project Based Learning (PJBL) model using cognitive ability tests and skills tests, as well as observation sheets to measure students’ work attitudes. The findings show that when compared with the PJBL model, the learning outcomes of students who use the MBKM WBL model which is relevant to industrial concepts, skills, and attitudes, are much higher.

KEYWORDS: Impact Model WBL in industry; PJBL; Independent Campus; MBKM.

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1. INTRODUCTION
The quality and relevance of vocational education and training is still a challenge. In fact, the success of vocational education and training can overcome unemployment and incoherence or mismatch between the world of work and industry. Learning in vocational education must be relevant to the needs of the world of work and industry.

Vocational education must be able to keep up with the advancement of science and technology as well as industry needs, and it aims to prepare graduates with the necessary knowledge, skills, and attitudes. In this case, teachers must accompany students in learning activities as they master competencies based on the needs of the industries (Haruna et al., 2019; Krismadinata et al., 2020; Jalinus et al., 2021). It is necessary to have a relevant learning model in order to establish a learning process that is in accordance with the requirements of the industrial world. The Work-Based Learning (WBL) model is an appropriate learning model for this situation because it provides students with real-life work experiences where they can apply academic and technical skills and develop their employability (Becker, 2007), and it has a positive impact on the development of Technical and Vocational Education and Training (TVET) (Anderson & Krathwohl, 2001; Thomas & Thorne, 2009; Uur et al., 2011; Fahad & Irfan, 2016; Kamin et al., 2018). In Indonesia, an educational program known as the Merdeka Belajar Kampus Merdeka (MBKM - Independent Campus, Freedom of Learning) has been launched by Minister of Education and Culture to meet the challenges of the industrial revolution (Yamin & Syahir, 2020). According to Anjelina et al. (2021), the “Freedom of Learning” policy aims to improve education quality in Indonesia. Independent learning allows lecturers and students to be innovative, independent, and creative (Yohanes, 2020; Sudirtha et al., 2021). One of them is the independent campus program, which is supplemented by the independent project program, which allows students to create projects (Kemdikbud, 2020). The poor quality of graduates is a significant issue in the field of vocational education (Kokom et al., 2020). The current vocational education process is still not integrated with stakeholders from industries and other organizations (Syahyadi, 2020), and practices in vocational education institutions with industries that are not yet relevant (Permana & Sukoco, 2017). The WBL model that is being used is still quite repetitive, and there...
Learning using the Project Based Learning model is a learning model that involves active students in the learning process (Nurul’Azizah & Wardani, 2019). The goal of Project Based Learning is to provide students with meaningful experiences. Project Based Learning also emphasizes student-entered learning, in the form of investigations, involving decision-making processes based on data analysis, collaboration (Saenab & Virninda, 2017). In project-based learning, it is supported by collaboration and communication (Huysken, 2019).

The advantages of the Project Based Learning model are: (1) fostering student independence, (2) having great responsibility for their own learning, (3) developing skills in problem solving, (4) expanding access to learning. The hypothesis in this study is that the application of the Project Based Learning model can improve students’ mathematics learning outcomes in the cognitive and psychomotor domains (Nurul’Azizah & Wardani, 2019). In conclusion, it is important for students to implement the PJBL model because it places more emphasis on students producing products in learning activities.

The implementation of the Project-based learning model provides students with the opportunity to improve their learning outcomes through the use of four learning pillars. This is due to the fact that a collaborative scientific work process can enhance students’ comprehension, leading to independent learning. Project-based learning is one of the most significant contributions (Blumenfeld et al., 1991; Krajcik & Blumenfeld, 2006) of the Project based learning model gives hope to students to be able to improve student learning outcomes with four pillars of learning. This is because students’ understanding can increase through a collaborative scientific work process so that independent learning in students will be achieved. One of the most influential contributions is project-based learning (Blumenfeld et al., 1991; Krajcik & Blumenfeld, 2006).

In terms of implementation, the PJBL model has the following syntax (Lucas, 2005): 1). Determining basic questions, the teacher gives questions in the form of assignments. 2). Designing project plans, teachers and students perform collaborative learning planning. 3). Arrange schedules, during schedule preparation, teachers and students collaborate to create project schedules 4). Monitoring students and project progress, the teacher as a mentor is responsible for monitoring students during project completion activities. 5). Assessment of results, assessments performed by teachers to measure the achievement of assessments based on competency standards. 6). Evaluate experience, in the final process, the teacher reflects on the outcomes of the students’ projects. The purpose of the study is to evaluate how effective the work-based learning model is used in vocational education to help students improve their hard skills in accordance with the independent campus policy. The significance of
this study comes from the fact that WBL learning has not been implemented in a way that best fits the idea of an independent campus and industry needs. In order to ensure the WBL model in industry is more effective, the outcomes of applying this model will be contrasted with those of applying the Project Based Learning (PJBL) model.

2. METHODOLOGY

The study uses experimental research with a quasi-experimental design, which can be seen in Table 1. In the quasi-experimental design, there are two groups, a treatment group, and a control group. In both groups, the learning treatment was applied. The treatment group learning with the MBKM-based WBL model in industry was applied and in the control group learning was applied using the PJBL model. Then he was given a post-test (Sugiyono, 2018).

3. RESULTS AND DISCUSSION

3.1 Students’ Learning Achievement between WBL and PJBL

This study aims to implement the WBL model based on MBKM according to industry needs and compare it to PJBL model. The achievement of student learning outcomes is measured by the value of skills, cognitive values, and attitude values as a result of the application of the two models. The results of these calculations are calculated using descriptive quantitative analysis through the average. Figure 1 and Table 2 depicts the results of students’ learning achievement scores in the treatment group and control group using the WBL model based on MBKM according to industry needs.

According to Figure 1 and Table 2 the results obtained from the treatment group learning scores for a skill learning outcomes are 84.07, and control group class using the PJBL model students’ learning achievement scores for the cognitive average with each value are 81.54. According to the comparison above, it can be concluded that the class employing the WBL model based on MBKM according to industry needs during the learning process achieves higher test scores than the class that employs the PJBL model.

Meanwhile, the cognitive results can be seen in Figure 2 and Table 3.
### 3.2 Homogeneity Test

The homogeneity test aims to find out whether the sample variance is homogeneous. The homogeneity test results can be seen in Table 4. Based on Table 4, the results of the homogeneity test in the experimental group for the Levens statistic are 0.302, and p-value/sig = 0.608 > 0.05. Meanwhile, in the control group, the Levens statistic was 0.157 and p-value/sig = 0.501 > 0.05. It was concluded that the average parameter results of the two groups had the same or homogeneous variance. (Rizal et al, 2022)

<table>
<thead>
<tr>
<th>Table 4: Test of Homogeneity of Variances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group</td>
</tr>
<tr>
<td>Treatment group</td>
</tr>
<tr>
<td>Control group</td>
</tr>
</tbody>
</table>

### 3.3 Normality Test

The normality test aims to determine whether the data is normally distributed or not. These results can be seen in Table 5. Based on Table 5, the results of the normality test showed that the experimental group was 0.150 and the control group was 0.180 > 0.05. Based on these results, it was concluded that the two data were normally distributed.

<table>
<thead>
<tr>
<th>Table 5: Results of the Normality Test in the treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
</tr>
<tr>
<td>Treatment group</td>
</tr>
<tr>
<td>Control group</td>
</tr>
</tbody>
</table>

### 3.4 T-Test

Testing the t-test to find out differences in student learning outcomes in the experimental group with the WBL model based on MBKM according to industry needs and the control group with the PJBL model. The results of the t-test on experimental and control data can be seen in Table 6.

<table>
<thead>
<tr>
<th>Table 6: T-test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levene’s Test for Equality of Variances</td>
</tr>
<tr>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student learning outcomes</th>
<th>Equal variances assumed</th>
<th>Equal variances not assumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>.343</td>
<td>.4712</td>
</tr>
<tr>
<td>Sig.</td>
<td>.701</td>
<td>.501</td>
</tr>
</tbody>
</table>
3.6 Result of Students’ Attitude Achievement Scores

The results of students’ learning attitudes in the treatment group using the WBL model can be seen in the following Figure 3 and Table 8.

![Figure 3: The students’ learning attitudes in the experiment class using WBL model](image)

<table>
<thead>
<tr>
<th>Attitudes of The Treatment Group</th>
<th>The Achievement Scores</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibility</td>
<td>83.93</td>
<td>Very Good</td>
</tr>
<tr>
<td>Work Attitude</td>
<td>82.86</td>
<td>Very Good</td>
</tr>
<tr>
<td>Discipline</td>
<td>87.14</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Based on Table 9, the value of student work attitudes, the results obtained from the observation sheet during the learning process took place in the control group using the PJBL model, the results obtained for the responsibility aspect obtained an average of 74.23 in the good category, for an average work attitude of 78.08, in the good category, and in the average discipline of 74.62 in the good category. A concise summary of all the findings from the study that compared the attitudes of students in the treatment group with those of students in the control group is presented in Table 10.

![Table 9: The students’ learning attitudes in the control group using PJBL model](image)

<table>
<thead>
<tr>
<th>Attitudes of The Control Group</th>
<th>The Achievement Scores</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibility</td>
<td>74.23</td>
<td>Good</td>
</tr>
<tr>
<td>Work Attitude</td>
<td>78.08</td>
<td>Good</td>
</tr>
<tr>
<td>Discipline</td>
<td>74.64</td>
<td>Good</td>
</tr>
</tbody>
</table>

![Table 10: The students’ attitudes achievement scores from the treatment group and the control group](image)

<table>
<thead>
<tr>
<th>Students’ learning attitudes scores in the treatment group</th>
<th>Students’ learning attitudes scores in the control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibility</td>
<td>83.93</td>
</tr>
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<td>Work Attitude</td>
<td>82.86</td>
</tr>
<tr>
<td>Discipline</td>
<td>87.14</td>
</tr>
</tbody>
</table>

![Figure 5: The comparisons of students’ learning attitude scores between the treatment group and control group](image)

Based on Table 10 and Figure 5, it shows the results of the comparison of students’ work attitude scores, the results obtained from the observation sheet during the learning process in the experimental group using the WBL model and in the control group using the PJBL model. The results show that the attitude scores in the experimental group are better than those in the control group.

3.7 Analysis of Cognitive and Skill

According to the comparison above, it can be concluded that the class employing the WBL model based on MBKM according to industry needs during the learning process achieves higher test scores than
The class that employs the PJBL model. These results can be seen in Table 11.

Table 11: The students’ learning scores in the treatment group and the control group

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group/WBL</th>
<th>Control Group/PJBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Values</td>
<td>87.14</td>
<td>75</td>
</tr>
<tr>
<td>Skill Values</td>
<td>84.07</td>
<td>81.54</td>
</tr>
</tbody>
</table>

The comparison between the treatment group using the WBL model based on MBKM according to industry needs and the control group using PJBL model is shown in Table 2. The average skill score and average cognitive score for the treatment group are 84.07 and 87.14, respectively. In contrast, the average skill score and average cognitive value in the control group are 81.54 and 75, respectively. The research results clearly demonstrate the effectiveness of implementing the WBL model based on MBKM according to industry needs in the experimental group. It leads to a substantial improvement in students’ skill learning outcomes. The average skill test scores for students in the experimental group were notably higher, with an average of 84.07, compared to the control group, which used the PJBL model and had an average skill score of 81.54. These results fall within the “Very good” criteria, indicating the significant enhancement in students’ skill acquisition (Nurhidayah et al., 2021). Moreover, when considering skill values, the utilization of the WBL model based on MBKM according to industry needs consistently produced higher scores when contrasted with the PJBL model. This highlights the substantial contribution of the WBL model based on MBKM according to industry needs to elevating students’ skill values (Sholihah et al., 2023).

The research findings also highlight the impact on cognitive values. The experimental group, which embraced the WBL model based on MBKM according to industry needs, achieved an average cognitive value of 87.14, in stark contrast to the control group using the PJBL model, which only obtained an average cognitive value of 75. This disparity underscores the substantial influence of the WBL model in enhancing students’ cognitive values. These results meet the “Very good” criteria as the scores lie within the range of 80-100 (Nurhidayah et al., 2021).

Concerning student attitudes, the implementation of the WBL model based on MBKM according to industry needs also yielded a positive impact. The research results reveal that students in the experimental group displayed a more favorable attitude toward learning. Observations within the experimental group resulted in an average score of 86 for students’ work attitudes, categorizing them as “Very good.” In contrast, the control group utilizing the PJBL model achieved an average score of 74.23 for students’ work attitudes, placing them in the “Good” category. The control group’s results align with the “Good” category criteria as the scores fall within the range of 70-79 (Nurhidayah et al., 2021).

In summary, the research findings conclusively indicate that the adoption of the WBL model based on MBKM according to industry needs has a favorable influence on students’ learning outcomes, encompassing skills, skill values, cognitive values, and attitudes. These results corroborate the efficacy of the WBL model based on MBKM according to industry needs implementation within an educational context, in line with previous findings (Ali, & Marwan, 2019; Sugiyarto, & Sulistyowati, 2022) which also support the effectiveness of the WBL model. These results are relevant to previous research which is able to improve student learning outcomes in terms of knowledge. The findings are in line with research findings. The WBL model uses workplace learning as a means of transferring knowledge. Ismail (2015) and Haruna (2019) requires cooperation between organizations, workplaces, and curriculum designers (Okon, 2011), While the findings from the implementation of the PJBL model where students are able to produce products (Ravitz, 2010; Kuswandi et al., 2018). It was concluded that students who were implemented using the WBL model based on MBKM according to industry needs with MBKM model had more knowledge and attitudes than students who were implemented with the PJBL model. Based on these results, the WBL model based on MBKM according to industry needs is more effective than the PJBL model.

4. CONCLUSION

It has been demonstrated that the student learning outcomes achieved with the deployment of the WBL model based on MBKM according to industry needs are superior than those achieved with the PJBL model. The ramifications of this discovery may involve putting students in learning environments where they can directly study in the workplace and adhere to the freedom of learning with the MBKM idea. The findings of this study provide recommendations that can add creativity to learning activities in the workplace, particularly for vocational education, as well as student attitudes in the workplace that are also observed and add other components of attitude. Based on these results, the WBL model based on MBKM according to industry needs is more effective than the PJBL model.

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