Development of Learning Guide with Project-based Blended Learning in Vocational High Schools during the Covid-19 pandemic

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Abstract: The main objective of Project-based Blended Learning (PjBL) is to integrate the theory and practice learned by students. Students are given the task of designing, solving problems, and making decisions in completing a project. Students are based on guided learning, then they share work and work together starting from data collection, reading, analysis, and discussion to producing innovative products. The PjBL learning model is very relevant by utilizing a mixed teaching system between online (online) and offline (outside the network), another term called blended learning. Blended learning means a combination of face-to-face learning systems with e-learning that can be used by anyone. This study uses a Design-Based Research (DBR) approach. The result of this research is guided learning based on PjBL through google classroom. Learning media using google classroom is an alternative practical learning media that can be used during the current pandemic. The google classroom media is open to students thus the next researcher can make online learning media more attractive and accessible to anyone. This research implies that productive teachers can use digital media as a teaching aid. Using a PjBL model where students become more active and more creative.

Keywords: blended learning, google classroom, guided learning, project-based learning

1. Introduction

Education is a process of activity in forming skilled humans. Education is needed as a provision to prepare quality human resources (Maryanti et al., 2021).

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A person with an education affects the opportunity to be able to work in various fields. Vocational school education is education that prepares students to be able to work in certain fields (Kasnar & Santoso, 2009). Vocational School is one of the national education sub-systems that prepares its graduates to enter the world of work

Human Resources (HR) pedagogical competence must be improved to be ready to adjust and be able to compete on a global scale. The pedagogical ability of a teacher must be able to develop competencies and actualize the potential of students. A teacher must also be able to try to find strategies to explore and develop the potential of students (Jumairi, 2016). Some of the competencies that teachers in the 21st century must have can change students to be able to think critically and solve problems, be creative and innovative as well as communication and collaboration skills.

Vocational school is an education where part of the learning process contains theoretical and practical material (Rosina et al., 2021; Handayani et al., 2020; Sangsawang, 2020; Ana, 2020; Al-Najar & Hamarneh, 2019). Vocational school has the aim of preparing graduates who have knowledge and skills (Fahmi, 2016). The job prospects for vocational school graduates are relatively broad compared to senior high school (SMA) graduates. Vocational school graduates can also be self-employed which can reduce unemployment. Vocational school must pay attention to the aspects of facilities and infrastructure, educators, and learning systems to produce graduates who are following the world of work.

Facts in the field show that the lack of productive teachers at vocational school and the lack of teacher innovation is one of the obstacles to increasing graduate competence. The teacher does not have the urge to innovate the learning resources used in learning. In addition, based on observations and interviews at vocational school, the lack of facilities and infrastructure and the availability of practice space and practical tools that are not up to date with the

world of work can be an obstacle to increasing the competence of students. Another problem that occurs in practical learning at vocational school is that students find it difficult to understand guided learning in the form of a job sheet given by the teacher.

One way to improve the competence of vocational school graduates is to improve learning strategies. The learning strategy is a learning concept that will be carried out by teachers to students thus learning objectives can be achieved effectively. The learning strategy is conceptual and must be balanced with the right learning model for maximum learning outcomes. The learning model is a learning tool to assist teachers and students in carrying out the teaching and learning process which consists of lesson planning, learning process, and learning assessment. Teachers must pay attention to the circumstances or conditions of students, learning materials, and existing learning resources in choosing learning models,

The teacher must choose the right learning model thus it becomes meaningful learning (Nuhu & Onojah, 2022; Mohamad & Masek, 2021; Estrellan et al., 2021; Handayani et al., 2020). One learning model that can be applied to improve graduate competence is the Project-based Learning (PjBL) learning model. The PjBL learning model can make students active and independent in learning in the era of the industrial revolution 4.0

The PjBL model can be applied in the 21st century by combining technology that can be used to support the teaching and learning process. Teachers must be able to collaborate between lesson plans, pedagogical teaching, and mastery of the material by utilizing technology to produce creative learning that can meet the needs of students today (Wahyudi, 2018). One of the uses of digital technology is a distance learning system or in a network (online). Blended learning is defined as a learning system that combines face-to-face teaching with computer-assisted teaching both offline and online to form an integrated learning approach (Klentien & Wannasawade, 2016).

PjBL is a learning approach that provides students with practical problems through learning stimuli. The role of the teacher is very important in providing a stimulus thus students can carry out independent learning, find their understanding, and develop collaborative creativity. The PjBL learning strategy has many advantages. PjBL includes inquiries, investigations, and collaborative teamwork. Learners must develop plans to solve authentic problems taking into account the available resources. PjBL can improve students' critical thinking (Wu & Wu, 2020). PjBL can create active, interesting, and meaningful learning (See et al., 2015). PjBL requires modeling situations as in real life, PjBL learning can apply knowledge and skills during learning activities. The PjBL method can be practiced by teachers in the vocational field as well as being used as a pedagogical practice.

The main objective of PjBL is to integrate theory and practice learned by students (Lou et al., 2012). In PjBL students face the task of designing, solving problems, making decisions in completing a project. Students are based on guided learning, then they share work and work together starting from data collection, reading, analysis, and discussion to producing innovative products.

The PjBL learning model is very relevant by utilizing a mixed teaching system between online (online) and offline (outside the network), another term called blended learning. Blended learning means a combination of face-to-face learning systems with e-learning that can be used by anyone, anywhere, and anytime (Soler et al., 2017). The term blended learning means a harmonious and ideal mixture or combination of learning from face-to-face and online learning elements. In the blended learning strategy, traditional education will be adopted together with online learning technologies, for example, learning management systems, video broadcasting, desktop video conferencing, and interactive communication tools to increase learner participation and knowledge exchange. Time in-class learning will be used to develop the thinking skills and attitudes needed for student learning. According to the strategy, 30-79% of the course content will be delivered online and 21-70% will be delivered face-to-face in class. Integral elements for a successful mix of virtual and traditional classrooms are class context, content format, course activities, and evaluation methods (Klentien, 2016). Online learning makes students early in accessing knowledge. Face-to-face learning is also important to support the practical learning process. Mixed learning is an effective strategy that combines the best methods of the real world and the virtual world.

The purpose of blended learning is to create instructional strategies, learning environments, and tools most suitable for practical learning. Thus, students can engage in the efficient learning (Lou et al., 2012). The learning process of the PjBL model using blended learning can be done by combining various learning platforms. One implementation of blended learning-based learning uses the flipped classroom model that combines online learning at home and face-to-face in class. With the internet that provides various learning management systems such as google classrooms, teachers can create virtual classes to carry out online learning at home thus students are trained to act actively and independently in learning. The presence of a PjBL model is very relevant to utilizing an online learning system. Online learning supports the activities and interactions of students and teachers (Chanpet et al., 2018). But in learning, not all students are active in online discussions, some students prefer to discuss in-person in class (offline) (Candra et al., 2019).

The findings from previous studies show results that have a positive impact on students such as creating active, interesting, and meaningful learning. Through the PjBL model, it can be practiced by teachers in the field of technical and vocational education and used as a pedagogical practice in addition to traditional teaching in increasing the knowledge of students (See et al., 2015).

2. Method

2.1. Experiments

This research is in the form of a design to produce a tested assessment product. Qualitative methods are used in the needs analysis and design stages, while quantitative methods are used when testing product designs or development. The choice of mixed-method with the design process was assumed because basically, the main objective of this study was to develop a guided learning design and feasibility test that can measure the competency of the student's bread dough, namely sweet bread, which can be used as a valid and reliable instrument.

This study uses a Design-Based Research (DBR) approach. DBR namely "a series of approaches, with the intent of producing new theories, The action model used in preparing guided learning is shown in Fig. 1.
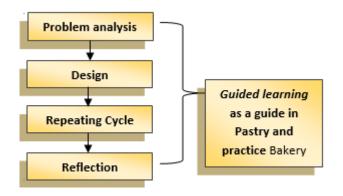

Fig. 1 DBR method procedure (Amiel & Reeves, 2008)

Figure 1 illustrates the procedure for the DBR method. The stages of research that have been carried out (Amiel & Reeves, 2008):

a. Problem analysis

    Problem analysis was carried out at the beginning of the study, to answer the formulation of the problem being studied, namely designing guided learning based on PjBL in increasing the competence of students in practical learning on the type of bread dough material, namely sweet bread.

b. Design

    Making a guided learning design in the form of a job sheet that fits the curriculum and the needs of students. Materials in the form of tools and materials as well as the stages of making sweet bread using the Google Classroom application media in making PjBL-based guided learning based on blended learning.

c. The cycle repeats itself

    At this stage, the researchers began with the introduction and use of guided learning to students. Students will be introduced to guided learning, what is PjBL-based guided learning, what is interesting about PjBL-based guided learning, how is an example of PjBL-based guided learning. Researchers provide opportunities for students to explore PjBL-based guided learning. Judging from the interest of students in using the guided learning that has been made. Measuring students' understanding is by giving questions in the

form of quizzes through the google classroom application.

d. Reflection

    This stage is the stage where the teacher provides an assessment of the results of the sweet breading practice that has been carried out by students based on indicators of the authenticity of form, conformity of form, neatness of form, change of form, modification of form, form skills, the readiness of students and student self-confidence.

In this study, we took the topic of discussion, namely at the stage of problem analysis, designing, and reflecting on PjB2L-based guided learning in pastry and bakery practice learning.

3. Results and Discussion

The results of research that have been carried out through data collection are disseminated through google classroom to measure students' understanding. There are 10 multiple choice questions given covering the ingredients, equipment, and the process of making sweet bread. Student creativity in sweet bread practicum that has been practiced by 31 students. Before implementing the sweet bread practice, students carry out theoretical learning online through google classroom, in this learning, there are test questions through quizzes prepared by the teacher to be able to find out students' abilities and understanding of materials, tools, and the process of making sweet bread.

First, students open the link that the teacher has shared through the google classroom application. Then students open each icon image that is directly connected to the available link. The following is a display of learning through Google Classroom which is shown in Fig. 2.

Fig. 2 The main view of google classroom based on PjBL (research results)

After learning through google classroom is used, the teacher distributes a link to students to be able to answer the quizzes that have been provided through the Whatsapp group. Then students open the linkhttps://docs.google.com/presentation. Students can click on each image in the display menu consisting of quizzes, lesson plans, materials, and practicum assignments (Fig. 3).

Fig. 3 Display quiz menu (research results)

The quiz distribution was carried out one day before carrying out the practice. The questions are in the form of multiple choices with the materials for the tools, materials, and the stages in making sweet bread. Students who have not done the quiz can be done after practicing. The response of students is very active in doing quizzes. After working on the quiz, students can see the scores obtained when they finish working on the questions. Furthermore, students can see the Learning Implementation Plan (RPP) (Fig. 4).

Fig. 4 RPP menu display (research results)

Students can find out the objectives of the learning to be achieved, learning activities, and the allocation of time needed through the Learning Implementation Plan (RPP). Students can see the learning process that will be carried out for sweet bread (Fig. 5).

Fig. 5 Material menu display (research results)

Students can increase their knowledge about sweet bread through the material menu. This sweet bread material is more effective and efficient in learning because it can access the material anytime and anywhere. After studying the sweet bread material, students can access group assignments through the assignments menu (Fig. 6).

Fig. 6 Display of the task menu (research results)

The task given is in the form of searching for information on various forms of sweet bread that will be practiced. Thus at the time of practice, students already have an overview of the form of sweet bread to be made.

Google classroom used in PjBL sweet bread is designed for four users, namely teachers, students, guardians, and administrators. Teachers can use it to create and manage classes, assignments, grades and provide direct feedback. Students can access class materials and assignments, share material and interact in class or via email, send assignments and get direct input and grades. Guardians can use it to get email summaries related to student assignments. This summary includes information about missed assignments, subsequent assignments, and class activities. However, the guardian cannot log into the class directly. Guardians receive email summaries via other accounts. Administrators can create, view, or delete classes in their domain.

In addition, the limitations of this study need to be considered because this research was conducted when the COVID-19 outbreak occurred online or from home studies that need additional strategies for enhancing students' comprehension (Mulyanti et al., 2020; Hashim et al., 2020; Sangsawang, 2020; Hernawati & Nandiyanto, 2021; Nasution & Nandiyanto, 2021; Huwaidi et al., 2021; Maryanti, 2021; Ganesha et al., 2021; Ramdhani & Nandiyanto, 2021; Maryanti & Nandiyanto, 2023).

4. Conclusion

The result of this research is the guided learning model based on the PjBL using google classroom learning media. The results of the students' quiz showed positive results. Google classroom media is one of the alternative practical learning media that can be used during the current pandemic. The google classroom media is open to students thus the next researcher can make online learning media more attractive and accessible to anyone. The guided learning model based on PjBL using google classroom learning media is an attractive and easy-to-use learning medium for students, especially in bakery and pastry practical lessons thus students can develop their skills in carrying out the practice.

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