



Project-based Learning (PjBL) based on the Digital Module to Improve Conceptual Understanding in Aviation English

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Abstract: This research is triggered by the lack of students' conceptual understanding of Aviation English. A digital module assists in delivering engaging lessons. This research aims to examine the effectiveness of the Project-based Learning (PjBL) model based on the Digital Module to improve students' conceptual understanding of Aviation English. This research applied the research and development (R&D) model proposed by Borg and Gall (1982). The method was modified into three research and development steps, including (1) preliminary study, (2) development, and (3) evaluation. The research was conducted at Politeknik Penerbangan Palembang. The research subjects were 47 students of the Aviation Rescue and Firefighting Department. The data collection method used a questionnaire and test. Based on the data analysis, most students strongly agreed to use the digital module to improve students' conceptual understanding of Aviation English. The use of the PjBL model based on the digital module affects significantly students' conceptual understanding of Aviation English. This is demonstrated by the average scores of post-test results for the control and experimental classes are 70.57 and 80.03 respectively.

Keywords: project-based learning, digital module, conceptual understanding< aviation english

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INTRODUCTION

Education plays an important role in shaping students into talented human beings, having the ability to think in learning and applying it in life (Bernard et al., 2018). Optimal learning provides the means and opportunities for learners to succeed while meeting the unique needs and goals of each individual. Moreover, the world has entered the globalization era that is characterized by increasing digital systems and technology (Lase, 2019). This is a challenge for teachers to carry out learning supported by technology to achieve the expected learning objectives, one of which is concept understanding in each subject. Concept understanding is essential because students need to comprehend the importance of the material they are studying. Students not only meet learning objectives but also have multiple options to tackle problems (Pitaloka, 2012; Stovner & Klette, 2022).

Teachers should employ an approach that helps build concepts from the abstract to be more understandable for students. This approach will determine the success of learning. One that requires a certain approach is Aviation English. In the field of aviation, English has been accepted and established as a medium of communication. This is mainly applied to airports and international airlines. Cadets who learn English as a foreign language, particularly English for specific purposes, are extremely driven by professional purposes. They understand that learning English for Aviation will really help their career. The majority of the world's prospective pilots do not speak English as a first language, and on the other, much of the world's flight training capacity exists in the English-speaking world. Even in areas where English is not spoken as a first language, English is frequently used for flight instruction. Thus, teachers in Aviation institutions must provide English learning to improve students' skills, especially in conceptual understanding of Aviation English.

However, there are some challenges faced by teachers and students in learning Aviation English. The difficulty of English content for the cadets is exposed to reflect the level and focus of their English learning (Sukma, 2019). Although cadets study English for general purposes, they still need to learn English for university-level content which must be specified to the field and their future goals and needs. This means that English for Specific Purposes instructors must be not only fluent in English but also conversant with aircraft technology or the content of a relevant text. Furthermore, they also need to apply a suitable approach to deliver the Aviation English material well in order to make students comprehend it. Project-based Learning is considered an appropriate approach for teaching Aviation English to improve students' conceptual understanding.

Many scholars have investigated project-based learning (PjBL) in various teaching and learning contexts. Hekmah (2022) states that PjBL is an innovative learning activity centered on students and they work autonomously. The PjBL model is an effort that can be applied by educators to increase students' creativity. In line with this, Prajoko (2023) also presents that the PjBL model effects significantly students' conceptual understanding and creativity. PjBL is a project or activity-based learning in order to achieve attitude, knowledge, and skill competencies. This learning, besides improving students' understanding, produces a product that is meaningful and useful (Fathurrohman, 2016).

Furthermore, using the PjBL model combined with technology will increase students' learning outcomes. Teachers who are innovative in incorporating technological advancements into classroom activities have a significant impact on student learning performance. The integration of technology into learning activities will make it easier for teachers to deliver the offered material (Novianti et al., 2020; Perdana et al., 2017). The use of technological developments in the form of electronic or digital modules for learning media can facilitate teachers and students in the learning process (Sugianto et al., 2013; Puspitasari, 2019). The application of electronic modules can boost understanding of the learning concepts delivered because they can display videos, texts, images, and animations (Imansari & Sunaryantiningsih, 2017; Suyatna et al., 2018).

Based on the initial research, the teachers faced difficulty integrating the material in Aviation English with the technology into the learning process. Thus, there is a need for development in learning by employing technologies such as digital modules to provide new things for teachers in delivering materials related to Aviation English. This digital module will help students boost their conceptual understanding and create joyful learning. Therefore, the researchers intend to develop learning media in the form of the digital module to improve students' conceptual understanding.

METHODS

This research applied the research and development (R&D) model proposed by Borg and Gall (1989). The ten steps by Sugiono (2014) were modified into three research and development steps, including (1) preliminary study, (2) development stage, and (3) evaluation stage. This research was conducted at the preliminary stage using a case study to create a digital module in order to improve students' conceptual understanding in learning Aviation English. Data collection used triangulation techniques to obtain reliable and accurate data, through data from questionnaires, interviews, observation, and documentation. The research was conducted at Politeknik Penerbangan Palembang. Inductive reasoning was employed to analyze the data. This method was utilized to define the problems discussed in this investigation using existing data that were then evaluated to address the problem and broad conclusions were reached. In this scenario, the researchers observed the situation under study systematically, looked for patterns, and formed a generalization based on the analysis of these patterns.

The location determination was carried out purposively. The research subjects were 47 students of the Aviation Rescue and Firefighting Department. The instrument used in this research was a questionnaire and test. The questionnaire was carried out to gather information related to the need for the digital module to improve students' conceptual understanding. In this research, the researchers also conducted the test for the control and experimental classes to examine the effectiveness of the PjBL model integrated with the digital module to improve students' conceptual understanding. The control class consisted of 23 students who used the conventional learning. Meanwhile, the experimental class consisted of 22 students who used the PjBL model with the digital module. All students took the Aviation English course.

RESULT AND DISCUSSION

The results of the analysis and discussion are presented based on the modified procedural research by Sugiyono (2014). The initial research was conducted as a preliminary study to know the case study trying to solve. This step was carried out by giving a questionnaire to students to know whether they needed the digital model. The questionnaire data were calculated using a modified Likert scale to obtain the percentages. The indicators of the Likert scale can be seen in Table 1.

Table 1. The Modified Likert Scale

Indicator	Value
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

Of 22 students who were given the questionnaire, 80% of students stated that they strongly agreed to use the digital module to improve students' conceptual understanding of Aviation English. Meanwhile, 20% of

them stated that they agreed to use the digital module to improve students' conceptual understanding of Aviation English. None of them stated they disagreed with using the digital module. These results mean that both teachers and students of the Aviation Rescue and Firefighting Department need the digital module to help improve students' conceptual understanding.

They also stated that the content of the digital module is relevant to them. This is because the teachers have adjusted the Aviation English material to students' needs and goals. The Aviation English material is divided into three sub-materials, namely Aviation Job, Weather, and Aircraft. This eases students to learn deeply about each sub-material. This also indicates that the English content they study is tailored to the areas of work and their future needs. This means that the English instructors must not only have English skills but also be familiar with the specific content of aircraft technology or relevant text. The teachers can explain and translate the terms in this field, considering the cadets are familiar with the concepts.

Furthermore, in this research, the researchers also examined the approach used for the teaching and learning process, namely project-based learning. The researchers used a quantitative approach to investigate the effectiveness of Project-based Learning with the digital model to improve students' conceptual understanding. Based on observations of the implementation of the learning syntax, the researcher has carried out a series of learning in general. Figure 1 shows that the average score of post-test results in the control class is 70.57, with a minimum of 67.33 and a maximum of 78.40. The average score of post-test results in the experimental class is 82.03, with a minimum of 82.47 and a maximum of 89.67. The average difference in conceptual understanding between the experimental and control classes indicates the effect of applying the PjBL model based on the digital module on students' conceptual understanding.

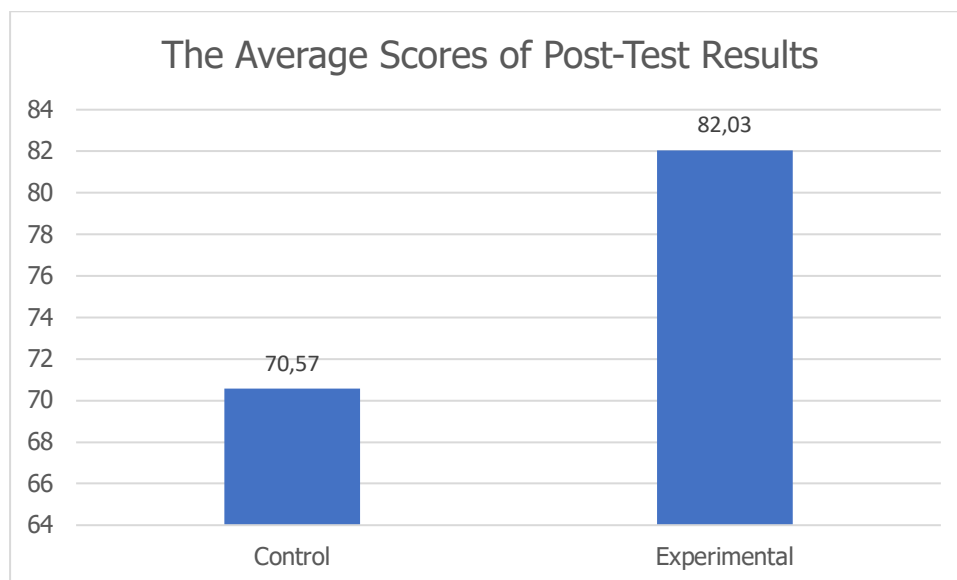


Figure 1. Post-test Results

After conducting the post-test, the researchers also conducted a survey to obtain information on whether the module fulfilled students' needs in learning Aviation English. The survey calculation presents that the minimum value is 3.1, the maximum value is 3.7, the mean is 3.39, and the standard deviation is 0.14743. The minimum and maximum values indicate that the module has fulfilled students' needs in the experimental class. The descriptive data of the post-test in the experimental class can be seen in Table 2.

Table 2. Descriptive data of Post-test

	N	Minimum	Maximum	Mean	Std. Deviation
Class	22	3,1	3,7	3,3909	0,14743

Utilizing the PjBL model with the digital module provides advantages and improves students' conceptual understanding of the material they study (Aprilia et al., 2023; Fitriyah & Ramadani, 2021). According to the PjBL syntax with the digital module, the learning implementation stages in the research implementation are characterized as very good. PjBL with the digital module is implemented as follows: (1) starting with essential questions, (2) designing project plans, (3) compiling project timelines, (4) monitoring, (5) testing results, and (6) evaluating experiences (Maryati, 2018; Muyassaroh et al., 2022). The first step in learning begins with essential questions, or fundamental questions, which will later serve as the foundation for assigning project assignments to students (Sari et al., 2019). In implementing the PjBL model, teachers need to ask students

essential questions to trigger their knowledge of the material to be studied. Essential questions can pique students' interest and help them grasp their challenges. This question can also help and guide students in coming up with new and original answers (Nagarajan & Overton, 2020). The second step is designing project plans. In this step, the teacher assigns students to several groups. They will work together with their own group and start to do the project based on the theme divided for each group. Designing a project design is important. This will help students conduct their projects, and the teacher will also monitor each step of students' projects.

The third step is compiling project timelines. In this step, the teacher and students discuss the time of the project from the start until its completion. This timeline should be made clear. The teacher will monitor each step according to the timeline made. Research activities in the third step include calculating the project completion timetable, developing project completion deadlines, and collecting products. The fourth step involves researchers monitoring the product creation procedure and students' progress. During the monitoring step, the teacher must keep track of all student activities while working on projects (Izzati, 2014). This is done to ensure that students are directed, focused, and exact throughout the project process. The teacher is entirely responsible for monitoring student actions while the project is being completed (Hartono & Asiyah, 2019). Students learn the technology and the applications that can be used to create their products. Monitoring students' work is important to minimize mistakes, to know the progress of students' work, and to give suggestions and feedback before completing the projects. This will boost students' understanding and creativity in designing their projects.

The fifth step is testing and evaluating the findings, which involves representatives from each group expressing the results of their project in front of other groups (Umi, 2015). This is done to help students understand the information they are studying. According to Noviyanti (2011), students can obtain a better comprehension of the learning material when they communicate, such as expressing opinions, discussing, and understanding problems in people's lives. The final step is evaluating experiences. This step is implemented in the last meeting of the material. Teachers give evaluations to students regarding the projects they have worked on. They should add some constructive feedback and comments to boost students' confidence. Teachers also ask how students feel about conducting their projects, review what they have learned from their projects, check and ask students to tell their stories of doing the projects, what challenges they have experienced, and soon. Moreover, the teacher should help students find the importance of learning the material for daily life. After presenting their projects, students also make some reflection on their learning process. They can write or tell their experiences and challenges in doing the projects and decide or plan what they will learn for the next.

The PjBL allows students to apply their knowledge to create products that are subsequently presented (Almulla, 2020; Kang & Zhang, 2023). This is the first step in gathering and integrating new knowledge based on students' real-world experiences (Avivi et al., 2023). Thus, students need to deepen their conceptual knowledge before creating a project. The digital module can help students strengthen their conceptual understanding because it allows students to access all the information, they need to complete the task. With the digital module, the implementation of the PjBL can be maximized. Since digital modules assist in delivering engaging lessons, the PjBL model creates a collaborative environment so it will boost students' conceptual understanding and help achieve successful learning outcomes.

CONCLUSION

According to the research results, applying the PjBL model based on the digital module affects significantly students' conceptual understanding of Aviation English. This is demonstrated by the average scores of post-test results for the control and experimental classes are 70.57 and 80.03 respectively. Since the investigation of the PjBL model based on the digital module in the Aviation field is limited, this study contributes to increasing the reference for further research related to teaching and learning in Aviation English.

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