

Comparative of face-to-face and online learning in project-based learning for students' scientific article writing skills.

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Abstract: Online and face-to-face learning represent distinct educational contexts. Online learning refers to education or instruction conducted over the internet, whereas face-to-face learning occurs in a shared physical space and time. Nowadays, teachers have various options for conducting these learning processes. Each mode of learning possesses its own strengths and limitations. Consequently, this research aims to compare face-to-face and online learning in terms of students' skills in reproducing scientific article using Project-Based Learning (PjBL). This research method is quantitative research with a quasi-experimental design. Two classes were selected as samples of this study using purposive sampling techniques. With the provision that one class is experimental class 1 by treating students in face-to-face learning mode using the PjBL model, while experimental class 2 learning is carried out online using the PjBL model. The research instrument used was a performance test, namely students making scientific papers. Analysis of research data using SPSS with the stages of normality test, homogeneity test, and t-test. The results of the study showed that there was a difference in the average learning outcomes of students, namely scientific writing skills using Project Based Learning between face-to-face learning and online learning. The results of this study can be concluded that learning with face-to-face classes obtains better learning outcomes compared to the Project Based Learning model which is better than online classes.

Keywords: Face to face learning; online learning; scientific article; project-based learning; writing.

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INTRODUCTION

In the 21st century, higher education focuses on teaching students to process information so that they can create their own works (Nejmoui, 2019). One of the most important skills for achieving academic success is writing. It is very important for students to learn to communicate well and convey information accurately (Hong & Choi, 2022). Developing writing skills allows students to organize thoughts and arguments, share information with readers, and communicate feelings, ideas, and knowledge (Alova & Alova, 2023; Oktafikrani, 2020). Writing is the process of compiling and conveying these ideas in written form using language symbols as representations. Academic writing is one type of academic writing (Sumarno et al., 2022).

Most people believe that academic writing is essential for success in higher education (Jiang et al., 2022). Critical thinking, organizing ideas, transforming information, structuring arguments, and developing language are all results of using academic writing (Bacha, 2012, 2020). The ability to access, evaluate, organize, and develop concepts from relevant information and explain it in one's own words is known as academic writing skills (Dehkordi & Allami, 2012). This paper is conventional, based on factual evidence, and follows specific standards for full development (Derakhshan & Karimian Shirejini, 2020;

Esfandiari et al., 2022). Academic writing in college requires many special skills. One of them is conveying ideas and arguments about certain topics in a clear, concise, meaningful, and logical way (Irgin & Zeynep, 2022).

Academic writing is a thought-driven activity (Al Fadda, 2012). It is very important that academic discourses composed by students engage readers to convey their thoughts in the context of their disciplinary knowledge (Giridharan, 2012). Conceptually, academic writing is defined as a form of interactive communication between writer and reader in which the writer provides reliable information to the reader by discussing issues thoroughly and scientifically (Çandarlı et al., 2015; Djatmika et al., 2022). Researchers can use academic writing as a communication tool to talk about their research results, convince readers, and express their opinions (Işık Kirişçi & Duruk, 2022). Writers must convey this knowledge in a systematic way while building persuasive arguments, demonstrating the author's position, or building relationships with readers (Hyland, 2010).

Writing and thinking influence each other and are related to each other recursively. Writing improves thinking skills because, in order to convey messages that are easily understood, clear, coherent, and neat, one must be able to transform abstract ideas into concrete concepts that can be explained plainly (Sumarno et al., 2022). Numerous studies demonstrate that writing helps students consider (Naber & Wyatt, 2014; Stephenson & Sadler-McKnight, 2016). However, writing is considered difficult for many students because it is an active and productive skill (Erkan & Saban, 2011). It also requires rhetorical organization, proper use of language, and some background vocabulary (Taskiran & Goksel, 2022). The reason is because writing is one of the most important ways of demonstrating knowledge and understanding in universities, where written assignments are one of the main ways of assessing students (Therova, 2022). Students often face difficulties because they do not understand academic writing style and composition which is not effective in the organization of ideas and language structure (Zaki & Yunus, 2015).

In this process, students face a series of challenges such as those related to their proficiency in the language, lack of knowledge in writing such as choosing topics that suit their majors, choosing the right sources for their projects, and writing proposals (Altikriti, 2022). For academic writing, the tone is usually formal and serious, so writers must be careful about using serious and formal vocabulary or style (Sumarno et al., 2022). The importance of language in acquiring academic writing skills is similar to that of writing tests (Wardhana & Hindarto, 2022). This causes most novice writers to consider this activity to be a daunting task and one of the toughest challenges for students (Zaki & Yunus, 2015).

Based on this explanation, whatever field of study students study, language skills are an important aspect of academic writing. These aspects are related to developing sentences, and editing writing, including punctuation (Ahmed & Alamin, 2012). In addition, writers are expected not only to convey their thoughts and feelings effectively, but also to logically connect and arrange their writing in a coherent manner (Setyowati, 2016). Thus, writing scientific article is an important topic discussed in language learning in universities. In this study, the Project Based Learning (PjBL) learning model is one of the popular learning models for the topic of writing scientific article. This is based on this learning will produce a product both individually and in groups. (Indriyani, Jasmienti, et al., 2023; Indriyani, Ningsih, et al., 2023). This is consistent with the nature of PjBL as an instructional method that regulates student activities based on projects rather than examinations (Farrow et al., 2022). The purpose of projects is to engage students in meaningful activities that result in the creation of authentic work that is shared as a public product with real

audiences (Parker et al., 2013). This methodology is used in many disciplines at all levels of learning, from primary to higher education worldwide (Brundiers & Wiek, 2013; Wiek et al., 2014). This learning model is not a substitute for other teaching methods, but rather as a complementary tool that can be used with almost all levels, ages and abilities of students (Gencer, 2022).

PjBL is used as an active learning methodology that prioritizes the development of technical skills and transverse competencies (Alves et al., 2016; Crespi et al., 2022; Mohedo & Bújez, 2014). Working on projects in high-quality project-based learning necessitates meaningful disciplinary or interdisciplinary inquiry, through which students acquire skills and knowledge (Farrow et al., 2022). Moreover, PjBL skills correlate with so-called "21st century competencies" such as creativity, critical thinking, and collaboration (Duke, 2016). This learning increases the likelihood of students being prepared for the environment of the 21st century and is believed to be an essential component of the language instruction pedagogy for this learning (Farouck, 2016; Zheng, 2022).

Researchers have been interested in project-based language learning and its effects on language learners over the past several decades (Pinphet & Wasanasomsithi, 2022). PjBL in this sense offers a comprehensive student-centred approach in language classes where teachers act as guides, coordinators and facilitators and learners participate in the process as active agents in ways of taking advantage of multivariate self-improvement opportunities (Stoller & Myers, 2020). PjBL focuses on the syllabus and curriculum of language programs, uses questions to be solved during project work assignments, and critically demands students' thinking in completing project work (Asfihana et al., 2022). Project-based language learning organizes instructional activities around projects and is regarded as an effective strategy for promoting integrated learning, skill development, language learning, and content learning (Xu et al., 2017).

The use of technology is one way to integrate learning with PjBL (Ravitz et al., 2012). Institutions are increasingly adopting e-learning technologies to interactively deliver instructions, exchange materials, and increase engagement (Banihashem et al., 2022; Elaish et al., 2019). In this activity the teacher is involved in learning activities by combining technology in a meaningful way. Because digital platforms provide students with ample resources and powerful ways to coordinate, interpret and exchange information (Mubaraki & Magid, 2022).

Online-based distance education has shown significant growth after the pandemic. Almost most countries around the world are turning to this education soon (Sarıkaya & Aydeniz, 2022). Currently in the midst of a major revolution in learning that has emerged in the humanities, social and natural sciences, arts, professional fields, and other fields, especially in higher education (Hatcher et al., 2022). The use of technology in higher education institutions generates new and interactive teaching-learning methods. The use of this technology also substitutes blended or online learning for traditional or face-to-face learning (Hafeez et al., 2022; Paudel, 2021). In contrast to face-to-face learning, internet-based distance education enables students to study from anywhere in the globe with an internet connection (Cano, 2022). This form of learning employs synchronous and asynchronous technology for course planning, assessment, instruction, and content (Saleh & Meccawy, 2022). Accessibility and flexibility in terms of time, place, tempo, learning styles, materials, assessments, and student learning paths are among the benefits of this form of education (Müller et al., 2018; Sukiman, 2022).

E-learning is another term for online learning (Saira, Ajmal & Hafeez, 2021). E-learning courses that are well-designed can accomplish learning and comprehension levels comparable to traditional classroom settings (Nassoura, 2020; Wells et al., 2022). Hundreds of comparative studies have found no difference between e-learning and traditional classroom settings (Magalhães et al., 2020). However, not all researchers concur (Sarıkaya & Aydeniz, 2022). Yanuschik et al. (2015) disagree that online education will replace face-to-face education due to the lack of teacher-student interaction in online education.

Classroom-based education, also known as traditional, conventional, or face-to-face education, has been the norm for centuries. The teaching and learning process occurs in the same location and at the same time (Koran & Sarnou, 2022). This learning modality is characterized by the direct presence of students and instructors in the classroom. This permits active engagement, immediate feedback, and socio-emotional development and permits more flexible instructional delivery (Cano, 2022). It has been demonstrated that face-to-face instruction is the most effective means of disseminating knowledge and skills, making it the most practical method for delivering applied courses. Principal characteristics of this learning include more engaged and motivated students, easier classroom administration, and more active student participation. In addition, it facilitates improved communication between students and teachers (Sarıkaya & Aydeniz, 2022).

Face-to-face educators who wish to increase student retention can modify the structure and delivery of their classes. Moreover, face-to-face instruction is necessary to establish a sufficiently dynamic sense of commonality and enables direct interaction between educators to serve as a motivator (Koran & Sarnou, 2022). Traditional learning environments are dependent on the physical location and physical presence of instructors and students, as opposed to online learning environments. Traditional learning environments are real-time, instructor-led, and linear in their instructional approach (Wells et al., 2022). Therefore, each learning mode, both online and face-to-face, has its own advantages and disadvantages. Based on that, the purpose of this study was to compare face-to-face learning and online learning on students' skills in reproducing scientific essays using Project Based Learning (PjBL).

METHOD

This research is quantitative research with a quasi-experimental method. The focus of this study is to compare the treatment between two groups that are both given the same treatment, namely using the PjBL model with the first class carried out face-to-face and the second class carried out online. So, the design of this study uses the two group post-tests method. The subjects of the study were 2nd semester students who took Indonesian language courses with the material of writing scientific papers in the form of articles. Two classes were selected as the sample for this study using a purposive sampling technique. So that for the two classes there is one MKU class at Universitas Negeri Padang and one MKU class at Universitas Baiturrahmah, Padang. The research instrument is to use a performance test. Data analysis uses statistics with the help of the SPSS application. Following are the steps for making the statistical analysis method used to process research data using the SPSS application. Do the data normality test first. Second, assessing the homogeneity of the data. Third, the Independent Sample T Test.

Table 1. Research Design

Class	Treatment	Post-test
Experiment 1	X	O1
Experiment 2	X	O2

This study is an experimental study without a control class involving a comparison between two experimental groups to assess the effects of the intervention given. In this design, the two groups receive different treatments, allowing researchers to observe and analyze the results of each intervention. The first class uses a project-based learning model carried out in face-to-face learning, while the other group uses a project-based learning model carried out in online learning. By comparing the results of these two experimental groups, researchers can determine the relative effectiveness of each method without the need for a control group that does not receive treatment.

Project-based learning is used in both classes. There are seven steps in the learning process, including defining basic questions, defining projects, developing project plans, developing project schedules, carrying out projects with teacher assistance and supervision, preparing reports and presentations, and evaluating project processes and outcomes (Ramadhan et al., 2018, 2020). In the first experimental class, students are taught face-to-face or in conventional classes. However, in the second experimental class, students were taught online via the e-learning.unp application. The research in both classes was conducted for six weeks.

RESULT AND DISCUSSION

The results of this study were obtained in the form of student performance tests from the results of the post-test trial in both groups. The results of the study obtained can be described as follows. First, describe the descriptive statistics of the data processed with SPSS. The following is a descriptive statistical analysis of the data in this study in table 2.

Table 2. Descriptive Statistic

	N	Minimum	Maximum	Mean	Std. Deviasi
Post-test (Face to Face Learning)	48	70	91	79.58	0.689
Post-test (Online Learning)	50	65	85	74.70	0.814

Based on table 2, it can be seen that there is a difference between the average learning outcomes in face-to-face learning and online learning. To ensure that there is a significant difference, it is necessary to carry out statistical tests on student learning outcomes with the help of SPSS. Second, testing the normality of the trial data. The normality test in this study used the Shapiro Wilk test with a significance level of 0.05. After the data is processed using the SPSS program, there are output display results which can be seen in Figure 3 below.

Table 3. Data Normality Test

Aspect	Group	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Face to Face Learning	.105	48	.200*	.954	48	.058
	Online Learning	.117	50	.082	.956	50	.059

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Based on the results of calculations using the Shapiro Wilk test in table 3, it can be concluded that the significance of the score data for both data is the post-test data for experimental class 1 (0.058) and post-test for experimental class 2 (0.059). Based on these data it can be concluded that the data is a normally distributed sample with sig. more than 0.05. By presenting the results of the significance data, it can be concluded that in both classes the post-test data are normally distributed samples. Third, test the homogeneity of

the trial data. Homogeneity test was carried out to find out whether the two populations come from the same variance. The homogeneity test in this study used the Levene test with the rock SPSS program. The results of the homogeneity test can be seen in table 4.

Table 4. Data Homogeneity Test

Learning Outcomes			
Levene Statistic	df1	df2	Sig.
.030	1	96	.863

Based on table 4 the data shows that the significance value in the Levene test data with a sig. is 0.863 provided that the level of significance or probability value is more than 0.05, it can be said that the population has the same or homogeneous variance. Based on the data normality and homogeneity tests, the next step is to test the difference in the mean of two unpaired samples (face to face learning class and online learning class on post-test results) using parametric statistics, namely the t test. Based on calculations using the SPSS application, the following results are obtained.

Table 5. Independent Sample Test

		t-test for Equality of Means					
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Learning Outcomes	Equal variances assumed	4.141	96	.000	4.86250	1.17435	2.531 7.193
	Equal variances not assumed	4.137	95.33	.000	4.86250	1.17538	2.529 7.195

Based on the test results, the value is .sig. (2-tailed) of 0.000 <0.05, it can be concluded that there is a difference in the average student learning outcomes, namely the skills of writing scientific article using Project Based Learning between face-to-face learning and online learning. Based on the findings of the study, there was a difference between face-to-face and online learning in terms of the average student learning outcomes, namely the ability to write scientific essays using Project-Based Learning. According to the findings of this study, face-to-face learning has a more significant impact than online learning. Comparative studies between online and face-to-face learning have been conducted previously. Some students may feel more at ease with face-to-face classroom instruction, while others may prefer online instruction (Chaw & Tang, 2023; Kauffman, 2015). (Kemp & Grieve, 2014) observed that students preferred face-to-face discussions but favored the online mode when completing written assignments. In this regard, (Kemp & Grieve, 2014) discovered that students tend to prefer face-to-face classes over online classes due to the promptness of feedback in comparison to the relative delay in online classes. According to the research conducted, scientific essay material necessitates feedback from lecturers. With face-to-face learning, feedback can be given verbally, whereas with e-learning, feedback is provided in writing.

Based on the research conducted, it was found that for writing skills it is difficult for lecturers to convey material and design active learning, in contrast to learning that is knowledge acquisition which may be effective if students can read the material available on the online platform. Although there are many benefits associated with the low cost, security, and adaptability of this learning paradigm, many universities and schools have adopted online education (Almahasees et al., 2021), several barriers arise in the context of higher education. Tratnik et al. (2019) state the difference between the two learning modes is that while students interact with instructors more orally in face-to-face classes, online groups receive more written feedback or engage more with written language practice. While students may be able to interact more physically with their classmates in face-to-face classes, those who take face-to-face courses are more satisfied with their learning experience (Moqadam-Tabrizi, 2018; Sriwichai, 2020). In addition, the participants believed that the quality of content learning and concentration levels in class were stronger with face-to-face classes (Huh et al., 2022). One of the four skills—writing, reading, speaking, and listening—must be mastered before learning a language, according to some studies. These skills can all be taught successfully through face-to-face classroom interaction (Ismail et al., 2022; Karuppannan & Mohammed, 2020). This is supported by the statement of (Shahzad et al., 2020) who argue that learning is not able to fully develop and convey all language talents to learners.

Online learning reduces interactions between students and instructors and students, according to the findings of the study. The project learning process, which should be conducted in groups, is dominated by individual learning. Some studies indicate that online learning enhances students' knowledge, but not their social skills and abilities (Morales-Martínez et al., 2022). Moreover, face-to-face learning is superior to online learning (Deepika, 2020), and online learning cannot produce the desired outcomes (Bestiantono et al., 2020). According to a study, online learning can supplement the educational process but cannot supplant an established system. Due to online classes, (Otter et al., 2013) found that students have a greater sense of disconnection from their classmates and teachers. This can have an effect on students' motivation to pursue their education.

Similarly, some students decline to adapt and have negative opinions about distance learning (Cano, 2022) due to technological limitations. Others may prefer one-on-one interactions, pre- and post-class discussions, collaborative learning, and spontaneous interactions because they view the Internet as an impediment to learning (Rovai & Jordan, 2004). Online students work independently and rely heavily on their own self-motivation and initiative. If they do not see immediate results, they may be more inclined to opt out of class (Cano, 2022). In addition, the study revealed that some students, particularly first-year students, lacked adequate technological learning aids. As a consequence, they are unable to fully benefit from learning.

Mohammadi et al. (2011) compared face-to-face and online language learning and concluded that the main advantages of e-learning are increased student engagement, attendance and motivation. Even though it has drawbacks, such as decreased social relations and interaction between students and teachers as well as technical limitations, (Ozer & Badem, 2022) stated that distance education can reduce costs and time. According to (Sun & Chen, 2016), online teaching needs to foster a sense of community; However, this is a very challenging task. They emphasize that student participation, interaction, and collaboration can play an important role in teaching. Hence, (Khreisat, 2022) stated that

both students and teachers should make a concerted effort and establish an interactive and collaborative environment for effective online learning.

Several additional studies have demonstrated the significance of online learning in higher education. Keeping in mind the value of online learning, the purpose of this study is to compare the academic achievement of students in online versus face-to-face learning modes in online colleges (Dumford & Miller, 2018; Hibbi et al., 2021). According to (Prihastiwi et al., 2021), online learning has shifted the focus from the teacher to the student. Active students will be able to expand their knowledge through synchronous or asynchronous courses with this method of instruction. Therefore, in order to actively partake in their language learning process, students must be psychologically and physically prepared to adopt online learning (Ismail et al., 2022).

Tallent-Runnels et al. (2006) discovered that online learning can be just as effective as traditional classroom learning. However, they discovered that online student learning was heavily influenced by the quality of online instruction (Wells et al., 2022). Students who report higher self-efficacy in their ability to use online platforms and self-regulate will experience a more effective course and be more content with their learning experience (Landrum, 2020). Based on this, online learning can be conducted effectively contingent on the design and implementation of classroom learning by the teacher. Online learning could be effective in attaining learning objectives if online media such as e-learning are utilized to their fullest capacity.

CONCLUSION

This research is based on the learning process in tertiary institutions, which is mostly done online. Several tertiary institutions, one of which is Padang State University, have long developed e-learning applications to make it easier for lecturers and students to use the application for online lectures. Online learning is mandatory in lectures for general subjects, one of which is Indonesian for students. This course is mandatory for university students. In Indonesian language course material, one of the materials studied is writing scientific article. Based on this, the results of the study show that there is a difference in the average student learning outcomes, namely the skills of writing scientific article using Project Based Learning between face-to-face learning and online learning. The results of this study can be concluded that learning with face-to-face classes using the Project Based Learning model is better than online classes. The recommendation for subject lecturers is to be able to use other learning alternatives for scientific essay writing materials. In addition, lecturers can develop more interactive online learning so that the online learning process can be carried out optimally. Recommendations for future researchers, so that they can develop online learning models or face-to-face learning by utilizing various kinds of media that can help the learning process both online and face-to-face.

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