



Project-Based-Learning and Flipped Classroom Method on Students' Reading Comprehension

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ARTICLE INFO

Article history:

Received May 02, 2024

Accepted August 04, 2024

Available online August 25, 2024

Kata Kunci:

kombinasi; flipped classroom; pembelajaran berbasis proyek; pemahaman membaca; teknologi

Keywords:

combination; flipped classroom; project-based learning; reading comprehension; technology.

DOI:

<https://doi.org/10.23887/jpbi.v12i.2.77925>

ABSTRAK

Pembelajaran telah dituntut untuk mampu bersifat inovatif dan berbasis digital dengan pembelajaran yang berpusat pada siswa yang pada akhirnya dengan profil siswa Pancasila mereka mampu menuangkan ide dan gagasannya dalam sebuah proyek yang akan dipamerkan untuk saling bertukar informasi dengan siswa lainnya. Penelitian ini bertujuan untuk menganalisis efektivitas kombinasi metode pembelajaran berbasis proyek (PjBL) dan flipped class (FC) terhadap pemahaman membaca siswa di sekolah menengah atas. Penelitian ini merupakan penelitian kuantitatif quasi eksperimen dengan nonequivalent untuk melakukan analisis yang terdiri dari kelas eksperimen dan kelas kontrol. Peneliti menggunakan metode pengumpulan data dengan mengikuti tes dan melakukan uji coba pre-test dan post-test. Nilai try out siswa dihitung dengan menggunakan rumus statistik. Penelitian ini mengungkap aspek pemahaman membaca, menentukan gagasan utama (1), menemukan referensi (2), membuat kesimpulan (3), informasi rinci (4), dan memahami kosa kata (5). Penelitian ini melibatkan 68 siswa dari dua kelas dan menggunakan desain eksperimen semu dengan desain kontrol post-test only. Data dikumpulkan dengan menggunakan tes pengetahuan latar belakang dan post-test. Hasil penelitian menunjukkan bahwa kelas eksperimen mempunyai nilai rata-rata yang lebih tinggi (81,03) dibandingkan kelas kontrol (63,53). Penelitian ini mengungkapkan bahwa kombinasi metode PjBL dan FC efektif digunakan sebagai media pembelajaran. Implikasi dari penelitian ini adalah Mengintegrasikan PjBL dan FC dalam pengajaran membaca EFL yang mana hasil yang didapatkan mampu meningkatkan pembelajaran aktif, sikap siswa yang positif, dan penggunaan sumber belajar online yang efektif, serta mendorong partisipasi dan nilai siswa.

ABSTRACT

Learning has been required to be innovative and digital-based with student-centered learning which ultimately with the Pancasila student profile they are able to express their ideas and thoughts in a project that will be exhibited to exchange information with other students. This study aims to analyze the effectiveness of the combination of project-based learning (PjBL) and flipped class (FC) methods on students' reading comprehension in high school. This study is a quantitative quasi-experimental study with nonequivalent to conduct an analysis consisting of an experimental class and a control class. The researcher used a data collection method by taking tests and conducting pre-test and post-test trials. Students' tryout scores were calculated using statistical formulas. This study reveals aspects of reading comprehension, determining the main idea (1), finding references (2), making conclusions (3), detailed information (4), and understanding vocabulary (5). This study involved 68 students from two classes and used a quasi-experimental design with a post-test only control design. Data were collected using a background knowledge test and a post-test. The results showed that the experimental class had a higher average score (81.03) than the control class (63.53). This study revealed that the combination of PjBL and FC methods is effective to be used as a learning media. The implication of this study is Integrating PjBL and FC in EFL reading teaching where the results obtained are able to improve active learning, positive student attitudes, and effective use of online learning resources, as well as encourage student participation and grades.

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1. INTRODUCTION

The Industrial Revolution 4.0 and 5.0 have ushered in transformative advancements in information and communication technology, reshaping the landscape of modern life. These technological revolutions have had a profound influence across numerous sectors, including education, where they continue to drive innovation and reform (Fatimah & Santiana, 2017; Purwanto et al., 2020). In Indonesia, this global wave of digital transformation has found its expression in the evolution of the national educational curriculum. The most notable example is the Merdeka Curriculum, a forward-thinking initiative designed to meet the demands of the digital age (Fatimah & Santiana, 2017; Nurvrita, 2020). This curriculum prioritizes a student-centered and flexible approach to teaching

and learning, integrating digital tools and methodologies to enhance educational outcomes. By fostering creativity, critical thinking, and technological literacy, the *Merdeka* Curriculum seeks to prepare students to navigate and thrive in a rapidly changing, tech-driven world, ensuring that education remains relevant and impactful in the 21st century (Muarifin, 2022; Shaleh Assingkily, 2020).

This curriculum requires learning to be innovative and digital-based, shifting from traditional teacher-centered methods to student-centered approaches. Through this framework, students are encouraged to actively engage in their learning process, develop critical thinking, and foster creativity (Kolesnikov et al., 2019; Pavlidou et al., 2021). One of the core objectives is to shape students with the *Pancasila* student profile—individuals who embody the nation's values and are equipped to express their ideas and creativity. These ideas are further translated into projects that can be exhibited, facilitating the exchange of information and collaboration among peers. Student-centered learning not only fosters personal growth but also enables students to build their concepts independently and pursue deeper investigations. These explorations culminate in meaningful projects that integrate real-world applications, enhancing their understanding and skills (Wahyuni et al., 2023; Yatim et al., 2023). The combination of Problem-Based Learning (PBL) and Flipped Classroom (FC) methodologies plays a crucial role in this process. By integrating these approaches, educators can effectively boost student motivation, academic achievement, and skill development, particularly at key educational levels (Adifta et al., 2022; Zarouk et al., 2020).

Through the integration of these diverse and progressive methods, coupled with a strong emphasis on innovative learning approaches, Indonesia's education system is undergoing a significant transformation to equip students with the skills and mindset necessary for tackling the challenges of the modern world. The introduction of the *Merdeka* Curriculum represents a pivotal step in this evolution, offering students a flexible and student-centered platform to develop not only academic knowledge but also critical thinking, creativity, and the ability to work collaboratively in solving complex problems (Nabella et al., 2023; Sakman et al., 2024). This curriculum empowers learners to become independent thinkers who are capable of adapting to rapidly changing technological and social landscapes, aligning seamlessly with the demands of the Industrial Revolution 4.0, characterized by automation and digitization, and the emerging paradigm of Industrial Revolution 5.0, which emphasizes human-centric innovation and sustainable development (Darmaji et al., 2019; Fatimah & Santiana, 2017). By fostering these essential competencies, Indonesia is positioning its students to thrive in a globalized, interconnected future while contributing meaningfully to their communities and beyond.

There are studies argue that by using project-based learning, students are able to express their understanding, and are encouraged to develop their ideas by completing authentic activities in the form of projects (Ramadhan et al., 2020; Wuryantari Winasih et al., 2019). Previous study argue that syntax of project-based learning is basic question determination, project determination, project planning, schedule arrangement, project implementation, presentation, and evaluation (Sari & Prasetyo, 2021). Other study found that project-based learning meets 21st-century learning goals, emphasizing student-centered and self-regulation (Alrwele, 2017). With learning outcomes in the form of products, it does not rule out the fact that technology also plays a role in the learning process to obtain information and communicate as well as an unlimited space for discussion either face-to-face or online.

Previous study argues that a flipped classroom is a hybrid approach combining online learning with face-to-face classroom activities (Sari & Prasetyo, 2021). This allows the classroom to be used as a place where students can study their cases in a practical and complex way while still being able to discuss with the teacher/instructor. The flipped classroom emphasizes the implementation of new technologies and requires students to be ready for learning outside of the classroom by studying an online video that the lecturer has developed. Syntax of flipped classroom determine learning topics with flipped classroom, analyze topic based on (knowledge, skills, concepts, facts, and problem-solving) acquired by students, determine the description of the learning material including (video, ppt and document), send learning material to the students, do learning at home (students learn using the video) and evaluate students' progress with formative assessment (Roy, 2019; Silalahi et al., 2022). In this way, students assume that was once thought of as homework would be shifted into the classroom. So they can improve their literacy.

Based on a case study conducted under previous research, a review of 398 research articles describing language skills focuses on different language skills such as writing, vocabulary, speaking, listening, grammar, phasing and reading (Shadiev & Yang, 2020). Researchers pay more attention on language learner vocabulary, improving writing and speaking skills. Meanwhile reading showed few results. From there information, the interest in increasing the comprehend of reading is still lacking. Previous study stated without comprehension, reading would be empty and meaningless (Handayani et al., 2021). People can obtain information on aspects of a particular field based on reading activities and the goal of reading is to comprehend the ideas in the material. According to previous study there are five aspects of reading comprehension such as determining the main idea, locating inferences, making inferences, detailed information and understanding vocabulary (Sari & Prasetyo, 2021). Previous study in their comparative analysis of flipped learning and other learning methods (Azeta et al., 2018).

The result of their study state that flipped classroom method performs better among other learning method and found on their research that flipped classroom nearly matches project-based learning method.

The several studies have said that there are many advantages of project-based learning only and flipped classroom only and investigations on the combination of project-based learning and flipped classroom have not been given depth attention, especially on reading comprehension. Previous studies tend to discuss the effectiveness of PBL or Flipped Classroom separately. This study is a pioneer in exploring the synergy between the two approaches to improve reading skills, which require cognitive, analytical, and practical engagement. This study aims to analyze the students taught by a combination of PjBL and Flipped Classroom get the better achievement on reading comprehension than those taught by the conventional method. The researcher suggested that future researchers conduct qualitative or quantitative descriptive data to implement the effect of combination of PjBL and FC as the process of learning activities in another different skill.

2. METHOD

In this research in order to reach accurate, systematic, and complete data to make the process easier the researcher used to collect the data by following test and trying out the test. The student's score of try out was calculated by using a statistical formula. Therefore, the researcher knows whether the test is valid and reliable or not. If the test is valid and reliable, the test could be used in pre-test and post-test. If the test is full the requirements of a good test, it did not need to be changed. Data reliability can be determined if Cronbach's Alpha > 0.6. Based on the results of the reliability of the pre-test question, it shows $0.857 > 0.6$ and the reliability of the post-test question shows $0.876 > 0.6$, which means that both types of questions show that they are valid and reliable. Study was conducted at SMAN 1 Jombang tenth grade with a total population of 312 students consisting of 9 classes. This study used 128 students consisting of 30 pretest try-out students and 30 posttest try-out students. As for the control and experimental classes consisted of 34 control class students and 34 experiment class students. The method in this study used quantitative quasi-experimental with nonequivalent to conduct an analysis. The sample consisted of experiment and control classes. Both the experiment and control classes were given a prior background knowledge test to find out that they are homogeneous classes and posttest to test the effectiveness of from a combination of project-based learning and flipped classroom methods. But specifically, the experiment class was given treatment from a combination of project-based learning and flipped classroom methods. This aims to find out whether teaching students using the combination of project-based learning method gets better achievement on reading comprehension than those who use conventional methods.

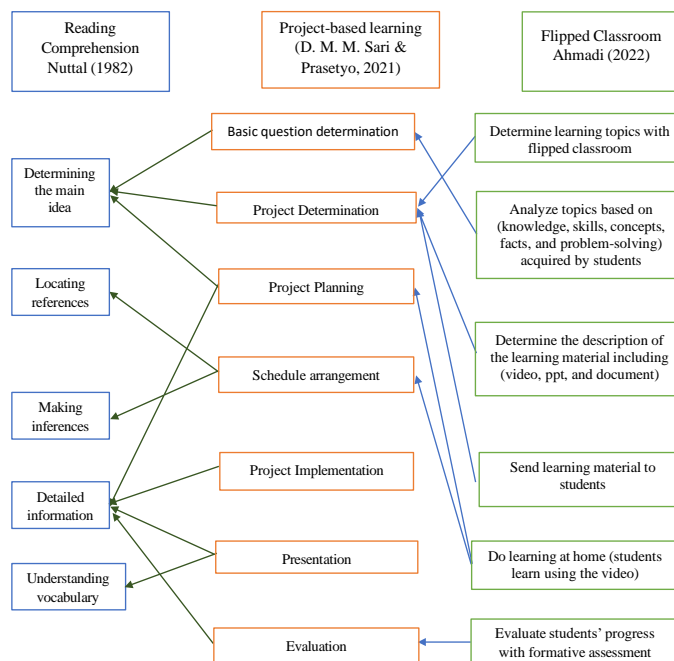


Figure 1. Table of Combination Project Based Learning and Flipped Classroom Method on Students Reading

Based on Figure 1, a combination of Project-Based Learning and Flipped Classroom in the reading comprehension process such as: (1) Determine the main idea through the combined method of Project-Based Learning (PjBL) and Flipped Classroom by allocating basic questions that will be used in analyzing topics regarding assignments in the form of projects that include detailed information and develop plans through the distribution of materials to students to study at home. (2) Scheduling is used for locating references and making inferences for students to learn from home. (3) Project implementation with detailed information will be presented in order to find out students' understanding of vocabulary and the teacher will provide a detailed evaluation to students.

3. RESULT AND DISCUSSION

Result

The researcher used nonprobability sampling by using the purposive sampling technique. Researchers did not take randomly to select the subject to be carried out. In this study in order to reach accurate, systematic and complete data, researchers used tests in the form of essay questions, trying out the test, pretest, treatment, and post-test. Questions in the form of 5 essays refer to aspects of reading comprehension promoted namely determining the main idea, locating inferences, making inferences, detailed information, and understanding vocabulary. Application of combination project-based-learning and flipped classroom method is show in Figure 2.

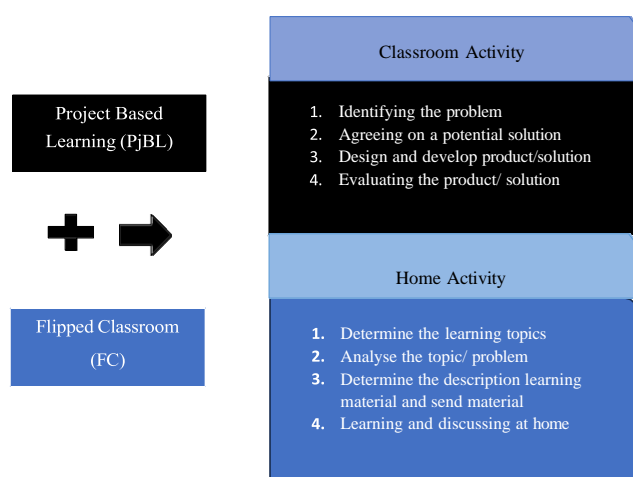


Figure 2. Application of Combination Project-Based-Learning and Flipped Classroom Method

Students are given questions in the form of essays with narrative text material where these questions can be searched for information, given material and discussed in the whatsapp room before being made into a project in story map format. Before the essay question was distributed in the experimental class and control class, the question was looked for validity and reliability in class X8 and X9 at SMAN 1 Jombang and then distributed in the experiment class (x4) and control (x5). Of the five test questions in the form of essays referring to aspects of reading comprehension, the validity of each question was <0.05 and showed an Alpha Crobach correlation value of 0.876, so that the instrument was declared valid and reliable criteria. By fulfilling the validity and reliability, this instrument can be used to answer the research question. The function of the prior background knowledge test is to measure students' ability to measure the students' comprehension EFL reading through score before being given treatment. While the post-test value is used to measure students' ability to understand reading through score after they get treatment. The duration of the pre-test students is given 10 minutes to prepare themselves and find answers to questions for 60 minutes after which students are asked to present their answers in front of the class. This is almost the same when implementing the post-test. Between the implementation of the pre-test and post-test there are several treatments.

It took 4 times meeting to carry out this study , as the following, the first meeting all students took a pre-test and asked students to enter the online class group via WhatsApp, then the second meeting the teacher gave a video material about narrative text to be identified together and gave an essay assignment in the form of a project then explained how to do it, then the third meeting the teacher conducts discussions through the WhatsApp group and provides further material in the form of ppt and documents to study and provides opportunities for students to find information related to assignments until the collection deadline for 5 days and the fourth meeting students

presented the project results in turn and then collected. Then the teacher evaluates the project that has been presented and collected.

The assignments were conducted from pre-test to post-test activities. The assignments were carried out by the English teacher who accompanied the researcher by using an assignment rubric adapted from Brown, (2003) cited in (“Flipped Classroom and Digitization: An Inductive Study on the Learning Framework for 21st Century Skill Acquisition,” 2020). The researcher assessed all of the students X4 and X5 by some categories such as determining main idea, locating references, making inferences, detailed information, and understanding vocabulary. After getting the students' pretest score, the researcher used calculation with statistical description whether the students of class X4 and X5 came from homogeneous class or not. Comparison of reading comprehension score between the experimental and control in the pre-test is show in [Table 1](#).

Table 1. Comparison of Reading Comprehension Score Between the Experimental and Control in the Pre-Test

Levene Statistic	df1	df2	Sig.
3.845	1	66	0.054

Based on [Table 1](#) show the calculation of the comparison of reading comprehension score between the experimental and control class in the pre-test ([Table 2](#)), it can be seen that the significance in the homogeneity test is obtained at 0.54 which means $>$ from 0.05. So based on that the data can be said to be homogeneous. The result of normality test is show in [Table 2](#).

Table 2. The Result of the Normality Test Using (SPSS 20)

Class	Kolmogorof-Smirnov ^a			Shapiro-Wilk			
	Statistic	df.	Sig.	Statistic	Df	Sig.	
Result of Reading Comprehension	Pre-Test Experimental (Combination)	0.205	34	0.001	0.879	34	0.001
	Post-Test Experimental (Combination)	0.143	34	0.076	0.894	34	0.003
	Pre-Test Control	0.177	34	0.008	0.923	34	0.020
	Post-Test Control	0.120	34	0.200*	0.930	34	0.030

*This is a lower bound of the true of significance.;^a. Lilliefors significance correction

Base on [Table 2](#), the basis for decision-making is if the significance value $>$ 0.05 then the residual value is normally distributed, otherwise if the significance value $<$ 0.05 then the residual value is not normally distributed. Based on the data above, it can be seen that the post-test value in the control class is 0.076 $>$ 0.05 and the experimental class is 0.200 $>$ 0.05, which means that both distribution values can be said to be normal. Comparison of post-test scores between the experiment and control groups using t-test is show in [Table 3](#).

Table 3. Comparison Of Post-Test Scores Between The Experiment and Control Groups Using T-Test

Class	Group Statistics		Std. Deviation	Std. Error Mean	
	N	Mean			
The result of Reading Comprehension	Class X5	34	81.03	12.234	2.098
	Class X4	34	63.53	10.337	1.773

Base on [Table 3](#), the researcher carried out a posttest to all students after the treatment. Posttest was used to know the student's reading comprehension after being taught by using a combination PjBL and Flipped classroom method. The researcher wants to know how far the students understand when the process was done. Apparently, students' reading comprehension has improved significantly following the results of the test. The analysis has been conducted to determine whether there is any difference between the student's scores when using a combination of PjBL and Flipped Classroom methods before or after teaching. The purpose is then to find out if the combination of PjBL and flipped classroom method can lead to a positive impact on increasing reading comprehension among students, as well as to determine whether or not it would have been able to do so by combining both methods. According to the table above, the mean score of the experiment class (81.03) was much higher than the control class (63.53). After that, the researcher compared between post-test of the experimental class and control class by using the t- test SPSS 20. Thus, descriptive statistics can be concluded that there is a difference in student learning outcomes between the control class and the experimental class. Furthermore, to prove whether the difference is

significant or not between the control class and the experimental class, it is necessary to interpret the output of the 'independent sample test'. Based on the output above, it is known that the Sig. Levene's Test for equality of variance is $0.266 > 0.05$, which means that the data variance between the control and experimental groups is homogeneous or the same. So that the interpretation of the independent sample test output table above is guided by the value contained in the "equal variances assumed" table. Based on this, it can be seen that the Sig. (2-tailed) value is $0.00 < 0.05$, so as the basis for decision-making in the independent sample t-test, it can be concluded that H_0 is rejected and H_a is accepted. Then the students who are taught by a combination of PjBL and Flipped Classroom at ten grade students of SMA Negeri 1 Jombang get better achievement on reading comprehension than those taught by the Conventional method

Discussion

Project-based learning and flipped classroom methods can improve English as a Foreign Language (EFL) reading achievement by involving students in hands-on projects and providing access to online content. This approach promotes collaboration, and interdisciplinary skills. It was proved by the results of the analysis data in this study. There is a difference in student learning outcomes between the control class and the experimental class. By doing treatment by using a combination of project-based learning methods and flipped classrooms that combine in-class and online activities through the creation of a project (Elshami et al., 2021; Suparman, 2016). There is a difference in creativity in each individual. In the first meeting in the treatment class in the classroom they were stimulated to remember the narrative text material and watch videos about the material, and then they were explained about the assignment and the formation of an online class through the WhatsApp group, in the second and third meetings there were still activities to exchange information in the online class group, regarding the process of project completion activities and in the fourth meeting they individually presented and the teacher evaluated their results (Damyanov & Tsankov, 2018; Zarouk et al., 2020). By combining these two methods, it can help students easily find information and ask for assignments both directly and indirectly. Students are also more confident because they get information to implement in creativity that they make in the form of a project. Some previous studies have also confirmed this finding. Previous study stated that flipped classroom method has match with project-based learning and they also conclude that flipped classroom and project-based learning became the most usable learning outcomes (Azeta et al., 2018). It is proven in this study that combining both of them can have good effect as learning method for both students and teachers This statement is supported by who stated in their research that combining the Flipped Classroom and Project Based Learning Model has an influence on students' critical thinking skills with a significant value (Ahmad, 2020; Cahyono et al., 2016).

From what they successfully stated, it can be concluded in this research that the combination of the Flipped Classroom Model and Project Based Learning especially in reading comprehension has an influence on students' critical thinking skills with a significant value. In the reading comprehension class (Anggraini et al., 2018; Shadiev & Yang, 2020). The reading classes the interest in increasing the understanding of reading is still lacking. By using this method, they get demands to read and understand the reading and in research that has been done (Hasna Salsabila & Hindun Hindun, 2023; Markula & Aksela, 2022). Previous study stated based on the characteristics of Project-Based Learning itself the results of the study also show that students and teachers can pay attention to various aspects of learning that occur through the form of assignments (Umar & Ko, 2022). It is the same stated that the effect of project-based learning models on student competence is in a large category. In their study E-Learning However, flipped learning showed increased positive direct effects on student learning effectiveness (Agustini et al., 2021; Chowdhury, 2020). Other study recommends that flipped learning be implemented in the learning activities (Chen et al., 2018; Usmeldi, 2019). In this study by a combination of both methods, students have no excuse for not learning what they will be working on and this method emphasizes to students that they must read and discuss the assignment either online or in person according to the space that has been provided using the combination method of Project Based Learning and Flipped Classroom.

In this case, students can provide more information from the website and questions to be discussed. While before starting the class face-to-face, students can refer to online discussions to find answers to their questions. In this case, it greatly influences students when meeting directly in the classroom. Students become active in asking questions and really pay attention to the material they are learning. This is in accordance with research conducted state that Project-based learning not only improved literacy skills but also made them inquisitive and independent learners (Jdaitawi, 2019). Flipped Classroom strategy also can be used to promote self-regulated learning and enhance students' social connectedness. Not only that, it is known from this study that their understanding has increased and obtained an increased value compared to using conventional methods, this can be seen from the comparison of grades in the control and experimental classes which are taken from the same population but have different value results (Heldisari, 2023; Rahayu et al., 2024). Previous study stated that project-based learning focuses on mastering content rather than beauty or speed, allowing students to express their thoughts and evaluate each other's experiences (Okta et al., 2020). This approach fosters interaction and interaction among students.

Project-based learning (PjBL) enhances student collaboration in solving complex problems using real products, according to previous research (Darmisih et al., 2023; Dian & Novianti, 2021; Sukiman et al., 2023).

Based on the previous study above the results of this study indicate that H_a is accepted and H_0 is rejected and it can be concluded that the students who are taught by a combination of PjBL and Flipped Classroom at ten grade students of SMA Negeri 1 Jombang get better achievement in reading comprehension than those taught by the Conventional method. Both PjBL and Flipped classroom contribute to enhanced reading comprehension and academic achievement. Their combined use can provide a holistic approach to student learning through real-world projects and outside-class engagement. The research implications of combining Project-Based Learning (PBL) and the Flipped Classroom Model (FC) on students' reading comprehension significantly improved students' reading comprehension and motivation on students' EFL reading in every level of education. The combination also equipped students with 21st-century skills for success in complex environments.

This study has some limitations involving use only the quantitative data so the finding will be deeper if it is combined by qualitative data use sample only from one school and the number of the sample is not large. PBL and Flipped classroom can enhance academic achievement, but their impact on reading comprehension may vary. It's essential to consider context, student needs, and instructional design when implementing these approaches. Project-based learning is a dynamic teaching method that focuses on active exploration of real-world challenges and problems, contrasting with paper-based, rote memorization, or teacher-led instruction that presents established facts or a smooth path to knowledge. In summary, integrating PBL and FC methods can positively impact students' reading comprehension and motivation. Further research is needed to understand the effects at every level of education setting.

4. CONCLUSION

The result was there the students who are taught by a combination of PjBL and Flipped Classroom at ten grade students of SMA Negeri 1 Jombang get better achievement in reading comprehension than those taught by the Conventional method. The post-test between the experimental class and control classes was significant. Because in the control class, the teacher used the conventional method. The students are not interested to allow the learning process. But, in the experimental class, the used combination of Project Based Learning and Flipped Classroom in teaching reading comprehension on narrative text, the students more active and interested in the learning process. Because in this method besides students get a lot of time to study and discuss they are given the freedom to express creativity and are not limited by place and time to obtain information. So, they can implement their reading comprehension in the essay project assignments in the form of a story map.

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