



Gender differences in college students' achievement in teaching English as a foreign language using inquiry-based learning

Adieli Laoli¹

Ellyunus Waruwu²

Ayler Berniah Ndraha³

Dedi Irawan Zebua⁴



(✉ Corresponding Author)

¹Department of English Education, University of Nias, Indonesia.

¹Email: laoliadieli65@gmail.com

^{2,3,4}Department of Management, University of Nias, Indonesia.

²Email: ellyunuswaruwu@umas.ac.id

³Email: aylerbebiahndraha@umas.ac.id

⁴Email: dedizebua@gmail.com

Abstract

Gender becomes one of the essential factors that are always considered in the various relationships among variables in the educational field. The purpose of this study is to examine the involvement of gender differences in the enhancement of college students' English achievement using inquiry-based learning. A quasi-experimental two-way factorial design among groups was applied to carry out this study. 300 Indonesian EFL (English for Foreign Language) college students were randomly allocated to one of two groups. The experimental group (N = 150) consisted of 85 females and 65 males who were given inquiry-based learning. Meanwhile, the control group (N = 150) contained 75 males and 75 females who were given direct learning. An achievement English test containing 50 multiple choice problems was administered to them before and after their involvement. The data was analyzed using some tests such as the independent sample t-test, paired sample t-test and factorial between two groups ANCOVA (Analysis of Covariance) and SPSS v.29 was used to promote these analyses. The results of this recent study showed that the intervention of inquiry-based learning has a significant and positive effect on enhancing college students' EFL achievement. Moreover, there is significant evidence that gender differences are involved in the enhancement of college students' English achievement in inquiry-based learning. There is a statistically significant relationship between gender and inquiry-based learning. This study implies that inquiry-based learning can be applied to enhance students' achievement in Indonesian EFL colleges.

Keywords: College students, EFL learners, English achievement, Gender differences, Indonesia context, Inquiry-based learning.

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Contribution of this paper to the literature

This research examines the effectiveness of inquiry-based learning on college students' English achievement in the department of English education. It also investigates the involvement of gender differences in the relationship between inquiry-based learning and English achievement which has not been conducted previously.

1. Introduction

Students' activities can be maximized by involving them in the teaching and learning process. Opportunities given to students may result in their ability to achieve a high level of understanding of the content being taught to them. According to Zeng (2023), if classroom instruction does not involve active processes, students are predicted to be unable to develop their capacity to reason, think critically and solve issues in effective ways. When they participate in classroom instruction, students may become more motivated to understand the content being studied. The quality of the teaching process can be managed by the effective teacher in choosing the appropriate strategy so the students will be motivated to work hard to get a high achievement. Teachers of high quality consistently struggle to maximize student performance while demonstrating a wide range of skills (Al-Ahdal & Aljafen, 2023; Nuankaew, Sittiwong, Bussaman, Nasa-Ngium, & Nuankaew, 2023). Several research shows that effective teachers use a variety of teaching methods to assess and support student growth (Amukune & Józsa, 2023; Hooli, Corral-Robles, Ortega-Martín, Baena-Extremera, & Ruiz-Montero, 2023). According to Kao (2023), teachers have a fundamental role in the success of students' academics and their outcomes. Yeung and Xia (2023) discovered that effective teachers can have a 50% greater impact on students' academic progress than those who are ineffective. Therefore, it is essential to identify effective teachers in order to provide high-quality instruction and give children their constitutional right to a high-quality education.

Most experts believe that improving the quality of instruction with an emphasis on instructors' abilities to motivate students and facilitate learning is the most effective way to improve student learning outcomes. It has been demonstrated by some researchers that a good school's practice depends on having good teachers (e.g., (Abid, Aslam, Alghamdi, & Kumar, 2023; Alzaanin, 2023; Giles & Yazan, 2023)). According to Zhu, Mofreh, and Salem (2023), teaching is difficult because it requires a deep understanding of how pedagogy and context are intertwined and careful decision-making. As a result, the majority of classroom instruction is still provided by traditional institutions which deters students from asking too many questions. Students are unable to improve their ability to think critically (Wang, Yuizono, Wang, Kim, & Lu, 2023). This paper discusses the resources that help aspiring English teachers be ready to teach students English as a foreign language which is required by the Indonesian curriculum. There are three parts to the material: focusing on language, skills and supporting the learning process (Katsarou, Wild, Sougari, & Chatzipanagiotou, 2023).

Students have difficulty deciding on a strategy that will help them more easily acquire the competences that are presented in the content in order to understand it. Selecting the appropriate method may be benefit for the students to maximize to acquire the content they study. Theoretically justified and empirically proven modes of action by which subjects of learning processes achieve their goals are referred to as teaching methods (Betaubun, Madya, & Margana, 2018; De La Cruz et al., 2023). That's why mastering the material requires the appropriate method. Several literatures propose inquiry-based learning as an appropriate learning model to enhance students' academic achievement (Aidoo, Anthony-Krueger, Gyampoh, Tsyawo, & Quansah, 2022; Azizoglu, Pekdag, Sarioglan, & Kuzucu, 2022; David & Nsengimana, 2022). According to Wang and Guo (2021), inquiry-based learning is a strong tool for learning regarding a subject domain and how to study because it encourages individuals to enhance their ability to independently learn. Various empirical research have studied the efficiency of inquiry-based learning on students' English achievement in primary school (Amaral, Garrison, & Klentschy, 2002), secondary school (Isra' & Asrobi, 2018), high school (Hariyanto, Triyono, & Köhler, 2020; Mutammimah, Rochsantiningasih, & Asib, 2019) and science learning (David & Nsengimana, 2022; Song, Higgins, & Harding-DeKam, 2014). However, the current study focuses on examining the impact of inquiry-based learning on college students' English achievement in the English education department as well as the role that gender differences play in the relationship between inquiry-based learning and English achievement.

The purpose of this current study is to test the effect of inquiry-based learning in enhancing college students' English achievement and the involvement of gender differences in college students' English achievement treated by the intervention of inquiry-based learning. The subsequent research questions are directed at the purpose of this existing study.

1. Is there a statistically significant enhancement of students' English achievement in the control and experimental group?
2. Is there a statistically significant difference in pre-and post-test mean scores among the experimental group and the control group?
3. Is there a statistically significant indirect effect of gender differences on the enhancement of students' English achievement through inquiry-based learning?
4. Is there a statistically significant interaction effect between gender and two-teaching models?

2. Literature Review

2.1. Inquiry-based Learning

Teachers try their best to make learning and teaching in the classroom enjoyable for the students. For instance, teachers should participate in ongoing professional development in order to meet the pedagogical needs of their students. Teachers must develop their reflective and instructional abilities to identify classroom difficulties that promote creativity. One of the teacher's efforts in this situation is to select a strategy that will serve student needs. The method should open the students' minds to solve the problems they find in their learning. The atmosphere of teaching in the classroom should inspire students to think critically.

Education is used to further mobilise this innate intellectual competency with students serving as learners (Norley, 2023). The researcher use inquiry-based learning to teach the subject by actualizing the students as

inquirers. Active participation and the learner's responsibility for discovering new information are emphasized in inquiry-based instruction (Wang & Guo, 2021). According to different perspectives, a learning environment aims to involve students in the process of genuine scientific discovery and give them the opportunity to experience the processes by which knowledge is created. The inquiry involves active learning (David & Nsengimana, 2022) which involves students answering research questions using data (Aidoo et al., 2022). David and Nsengimana (2022) contend that the investigation of a worthy question, issue, problem or concept is called inquiry-based learning. It is the kind of work in different fields actually creates or builds knowledge. Furthermore, Kao (2023) suggested that the five main inquiry-based learning phases are engagement, exploration, explanation, expansion and evaluation while Azizoglu et al. (2022) suggested five distinct general inquiry phases after reviewing 26 articles on inquiry-based learning: orientation, conceptualization, research, evaluation, discussion and conclusion.

The learning cycle model and a proactive approach are the foundations of inquiry-based learning which is appropriate for all educational levels (Wang & Guo, 2021). An instructional strategy known as inquiry-based learning places students in control of their own learning by allowing them to ask, investigate and respond to questions (David & Nsengimana, 2022). Moreover, the stages of inquiry-based learning consist of questioning, assimilation, inference, and reflection (Cabellos, Sánchez, & Pozo, 2023). Inquiry-based learning gives a chance for the students to have the autonomy to develop their thinking to decide what they need, how they acquire it, why they do it and how they apply the knowledge to develop their competence to face their life problems and teachers as facilitators usually call for continuous monitoring of students.

2.2. Teacher Beliefs

Beliefs are fundamental mental representations created from information that is irrational, difficult to conceptualise and difficult to identify. According to Guler and Celik (2023), beliefs are conceptions about the world that people hold mentally and that they believe to be true. Additionally, belief is frequently portrayed as an inspiration that inspires teachers in the classroom and has an impact on the informal curriculum (Şentürk & Baş, 2023). Beliefs contain images, schools, classrooms and occasionally even the entire society. Next, teachers' instructional decision-making is guided by beliefs which are ideal scenarios (Cabellos et al., 2023). Teachers' passions, knowledge and understanding of how and what students ought to learn and consequently, what achievement ought to entail are brought together in a belief. Beliefs of course are needed by the teacher as a source of imagination to increase students' achievement because beliefs influence teacher decision in the classroom. In other word, teachers' instructional methods are influenced by their knowledge and beliefs (Trang, Truong, & Ha, 2023). Additionally, one may assert that the opinions of the instructors have a significant impact on what happens in their classrooms (Wang et al., 2023).

Teaching methods and the beliefs of teachers engage in a dialectical relationship (Guler & Celik, 2023; Wang et al., 2023). They may have several interrelated views about discipline, instruction and learning (Trang et al., 2023). On the other hand, beliefs have an influence on education through procedures including the selection of subject matter and focus, teaching style, and learning techniques (Cabellos et al., 2023). The cognitive and emotional outcomes of students are influenced by teachers' enacted beliefs (Şentürk & Baş, 2023; Trang et al., 2023). In recognition of the fact that beliefs influence both how teachers learn and what teachers do, the teachers' instructional behaviors are a powerful influence on student learning and intensify the students' achievement (Li & Xu, 2023).

2.3. Students' Achievement

Students' achievement is the status of subject-matter knowledge, understandings, and skills that are owned by students as proof of acquiring the material they study. Students' achievement is the ultimate TEFL goal. It is impossible to separate teachers' views from students' achievements. A key factor in whether or not an educational system succeeds or fails is how well-trained its teachers are. On the ground, they put into action the educational system's policies. Therefore, the effectiveness of the educational system increases with teacher ability. If the teachers are competent, they will have an impact on the students' performance. Alzaanin (2023) show a significant relationship between academic achievement and self-efficacy. Effective teachers have a favourable influence on their students learning, development and success.

Numerous studies have examined the factors that influence student achievement. Various studies highlight teacher effectiveness as a substantial influence on performance (Trang et al., 2023; Wang et al., 2023). Numerous research have been conducted on many aspects such as teaching experience, teaching practices, teaching knowledge, and academic ability (Nuankaew et al., 2023). Furthermore, various studies show that self-efficacy promotes student success, performance and academic accomplishment in educational outcomes (Al-Ahdal & Aljafen, 2023). In this context, previous studies have special emphasis on teachers' responsibilities. Amukune and Józsa (2023) stated that poverty has a greater impact on academic performance than even cocaine use during pregnancy. Other external factors include school and environmental, characteristics, socioeconomic status (Kao, 2023), parental involvement (Hooli et al., 2023), principal leadership style (Amukune & Józsa, 2023), teacher and student engagement (Giles & Yazan, 2023) and method of instruction (Zhu et al., 2023). Inequalities in learning achievement may arise for a variety of reasons, including inequalities in cognitive capacity, socioeconomic status, teacher efforts, school atmosphere and student motivation.

2.4. Teaching English as a Foreign Language

TEFL is one of the subjects that the students in the department of English education have to study. This subject is important for students to learn TEFL skills. A person's life can be made better and their opportunities for education, business, networking and relationships can all be expanded by knowing English. In addition, it contributes to the study of various cultures which aids in the growth of intercultural communication and cooperation skills. The English language has special significance because it is used worldwide. However, students who have favourable views towards individuals who speak the target language recognize and appreciate their culture and want to be incorporated into their community have the best chances of learning a foreign language

(Amukune & Józsa, 2023). According to Alzaanin (2023), practical English language instruction comprises of methodology, listening, speaking, reading, and writing. Additionally, language consists of pronunciation, vocabulary, grammar and discourse. Subsequently, supporting the language process consists of classroom-based assessment, course books, learner autonomy in the classroom, learning styles and strategies, computer-assisted language learning and content-based instruction.

3. Method

3.1. Design

A quasi-experimental two-way factorial design 2×2 between groups was employed whereby two intact groups were selected to receive the intervention. This design was chosen because those groups were randomly selected but could not be randomly distributed into the research group mainly in schools (Creswell & Creswell, 2018). The quantitative approach required pre- and post-tests at the beginning and end of intervention. This study examined the effect of interventions on gender and the interaction between interventions and gender.

3.2. Participants

The participants were fourth semester college students in the department of English education. 300 respondents were involved in this study in which 150 students (85 females and 65 males) were distributed in the intervention group and 150 students (75 males and 75 females) distributed in the control group. They were distributed in the intervention group and treated by inquiry-based learning, whereas they distributed in the control group were treated by direct learning. The respondents, aged between 19 and 20 years were taught English by EFL Indonesian lecturers. Moreover, the intervention involves two qualified instructors with more than ten years of teaching experience. Six months were spent conducting 16 experiments.

3.3. Instrument

The English achievement test consisted of 50 multiple-choice items and it had been theoretically and experimentally verified. A college student could get a minimum of zero points and a maximum of two points. This instrument was administered to the participants at the end and beginning of the intervention as pre- and post-tests. The pre-test was to determine whether the groups were homogenous at the beginning of the intervention and to decide a baseline for students' achievement. Meanwhile, the post-test was carried out after 16 meetings during six months in which it was used to compare students' English achievement between the control and experimental groups.

This study involved three EFL experts to comment on and verify the test in terms of appropriateness, relevance, complexity, punctuation and grammatical errors to ensure the constructive validity of the instrument. Subsequently, the instrument was administered to another group of 60 college students at another institution but the group had the same characteristics as the population. The Pearson correlation was applied to examine the empirical validity of each item and the coefficient of the Pearson correlation was $r = 0.95$ which shows that the instrument has been valid (Sedgwick, 2012). Moreover, the value of Cronbach's alpha was applied to examine the instrument's reliability whereby the coefficient of Cronbach's alpha was $\alpha = 0.75$ indicating that the instrument has been reliable (Bonett & Wright, 2015).

3.4. Procedures

The pilot study was started after getting the official allowance from the Indonesian Educational Ministry, the college administrations, college students and EFL lecturers. Additionally, the researchers provided socialization regarding the intervention of inquiry-based learning and direct learning for some sessions. The pre-test was given to the respondents before these interventions were carried out. The comparator group was treated by the direct learning model but the intervention group was treated by inquiry-based learning over the 16 meetings of the treatment. Then, the post-test was carried out once the intervention was completed. Both pre- and post-tests data were used to answer the research questions of this study.

3.5. Data Analysis

Inferential statistics were used to evaluate the data. The data was normally distributed after a preliminary examination of the data normality. Consequently, a parametric analysis was performed such as independent t-test, paired t-test, ANCOVA and two-way factorial ANCOVA (Fuad & Suyanto, 2022; Helsa, Juandi, Turmudi, & Ghazali, 2023; Sulistiawati et al., 2023; Suparman & Juandi, 2022; Suyanto, Fuad, Antrakusuma, Suparman, & Shidiq, 2023). Independent t-test was used to examine differences between groups while paired t-test was performed to examine differences within groups. ANCOVA was used to examine the indirect effect of gender difference while two-way factorial ANCOVA was performed to examine the interaction effect between intervention groups and gender (Schneider, Avivi-Reich, & Mozuraitis, 2015). All of analysis processes were promoted by SPSS v.25.

4. Results

4.1. First and Second Hypotheses

The following descriptive statistics in Table 1 were used to compare mean scores and standard deviations.

Table 1. Descriptive statistics based on groups

Test	Group	N	Mean	Std. deviation	Std. error mean
Pre-test	Experimental	150	71.74	1.08	13.33
	Control	150	72.00	0.53	6.50
Post-test	Experimental	150	90.97	0.27	3.31
	Control	150	82.00	0.18	2.30

Table 1 shows that there were descriptive variations in mean scores within and across groups. The independent t-test was used to demonstrate that the two interventions in each group at the start of the trial were homogeneous (see Table 2).

Table 2. Independent sample t-test among groups on the pre-test

Group	Mean	t-value	Df	Sig.	Effect size in g unit
Experimental	71.74	-0.215	298	0.830	0.305
Control	72.00				

Table 2 reveals that there was no statistically significant difference in the mean scores between groups on the pre-test. It means that two interventions in each group at the beginning of the study were homogenous. Furthermore, it implies that prior to receiving the intervention, English achievement between students in the intervention group and students in the comparison group was homogeneous.

To present differences in the mean scores within the experimental group pre- and post-tests and the control group pre-and post-tests, a paired sample t-test was conducted (see Table 3).

Table 3. Paired sample t-test within groups

Pairs	Mean	Std. deviation	t-value	Df	Sig.	Effect size
Experimental post-test and pre-tests	1.92	13.16	21.71	149	0.000	1.764
Control post- and pre-tests	1.00	5.64	17.89	149	0.000	1.461

The paired sample t-test was used to show changes in mean scores between the experimental and control groups (pre- and post-tests). It interprets that both inquiry-based learning and direct learning significantly enhance students' English achievement. Moreover, these interventions have a positive effect on the enhancement of students' English achievement (Cohen, Manion, & Morrison, 2018). Nevertheless, the effect of inquiry-based learning on enhancing students' English achievement is higher than the effect of direct learning on enhancing students' English achievement. This indicates that the use of inquiry-based learning is more effective in enhancing students' English achievement than the use of direct learning.

The independent t-test was carried out to show that the two interventions in each group at the end of the treatment were different (see Table 4).

Table 4. Independent sample t-test between groups on the post-test

Group	Mean	t-value	Df	Sig.	Effect size in g unit
Experimental	90.97	27.23	298	0.000	3.899
Control	80.00				

Table 4 reveals that there was a statistically significant difference in the mean scores between groups on the post-test. It means that two interventions in each group at the beginning of the study were different. In addition, the intervention of inquiry-based learning has a positive effect on students' English achievement (Cohen et al., 2018). It indicates that inquiry-based learning is an effective treatment to enhance students' English achievement.

Table 5. Descriptive statistics for group and gender

Dependent variable: Post-test				
Group	Gender	Mean	Std. deviation	N
Experimental	Male	91.54	2.86	65
	Female	90.53	3.57	85
	Total	90.97	3.31	150
Control	Male	81.60	2.26	75
	Female	82.40	2.28	75
	Total	82.00	2.30	150
Total	Male	86.21	5.59	140
	Female	86.72	5.07	160
	Total	86.48	5.32	300

4.2. Third and Fourth Hypotheses

The following descriptive statistics in Table 5 were used to describe students' English achievement based on gender differences.

According to Table 5, male students' English achievement in the experimental group is higher than female students' English achievement. In contrast, male students' English achievement is lower than female students' English achievement in the control group. So, female students' English achievement is higher than male students' English achievement.

A factorial two-way between-group ANCOVA was carried out to highlight the differences between the intervention groups and gender (see Table 6).

According to Table 6, there is a statistically significant indirect effect of gender differences on improving students' English achievement through inquiry-based or direct learning. Moreover, gender differences have positive effect on the enhancement of college students' English achievement (Cohen et al., 2018). Additionally, this result is strengthened by another result: a statistically significant interaction effect between the treatment groups and gender is discovered. However, the interaction effect between the intervention groups and gender is extremely weak (Cohen et al., 2018).

Table 6. ANCOVA results between group and gender

Source	Sum of squares	Degree of Freedom (Df)	Mean square	F	Sig.	Partial eta squared
Corrected model	6,241.68 ^a	4	1,560.42	207.98	0.000	0.738
Intercept	41,004.01	1	41,004.01	5.46	0.000	0.949
Pre-test	150.10	1	150.10	20.07	0.000	0.064
Group	1.69	1	1.69	0.23	0.635	0.001
Gender	6,082.19	1	6,082.19	810.69	0.000	0.733
Group * Gender	44.74	1	44.74	5.96	0.015	0.020
Error	2,213.23	295	7.50			
Total	2,252,265.00	300				
Corrected total	8,454.92	299				

Note: a. R squared = 0.738 (Adjusted R squared = 0.735).
 (*) indicates the interaction between variable of group and variable of gender.

5. Discussion

This study reveals that the intervention of inquiry-based learning has a positive effect on the enhancement of students' English achievement. Moreover, this intervention significantly enhances college students' academic achievement in teaching English as a foreign language. This indicates that inquiry-based learning as a learning model is one of the effective and alternative ways in enhancing students' English achievement. According to [Isra' and Asrobi \(2018\)](#), the implementation of inquiry-based learning significantly promoted the enhancement of secondary students' English academic achievement. In addition, a few empirical studies also found that the intervention of inquiry-based learning has a positive effect on enhancing high school students' academic achievement when teaching English as a foreign language ([Hariyanto et al., 2020](#); [Mutammimah et al., 2019](#)). [David and Nsengimana \(2022\)](#) also revealed that the treatment of inquiry-based learning significantly improves college students' English achievement in science leaning. [Song et al. \(2014\)](#) showed that the intervention of inquiry-based learning has positive effect on the enhancement of college students' English achievement in biology lectures. These reports provide strong evidence that the treatment of inquiry-based learning is one of the most effective ways to enhance college students' English achievement.

Furthermore, according to a recent study, gender indirectly differentiates college students' academic success in teaching English as a foreign language through inquiry-based learning. Gender difference has a positive and indirect effect on the enhancement of college students' English achievement. Moreover, this study finds that there is a relationship between treatment groups and gender. This shows that the involvement of gender has to be considered as an important factor in implementing inquiry-based learning to enhance college students' English achievement. [Wirthwein et al. \(2020\)](#) found that sex differences play an essential role in achieving goals. Moreover, some empirical studies also revealed that the factor of gender differentiates academic achievement in teaching English as a foreign language among college students ([Chen, Wang, Zou, Lin, & Xie, 2019](#); [Sadiqa, 2020](#); [Yu, 2019](#)). Additionally, several studies have shown that gender differences play an important role in the enhancement of English proficiency in reading, writing, speaking and listening ([Aditomo & Hasugian, 2018](#); [Wang, 2019](#); [Yang & Quadir, 2018](#); [Yau & Lee, 2018](#)).

The students were familiar with ways of learning from inquiry-based learning. They were enthusiastic and got motivation to learn because they got autonomy from their teacher to manage their activities as long as they solved the problems. In other words, the challenges they have solved inspire them to additional problems until they get new knowledge from the data they have researched. The students shared their new knowledge with their friends. Meanwhile, the teacher should encourage the students because some students' own resistance behaviors mean that not participating in the course, not being interested in the course, not taking care of friends, seeking attention, not respecting the teacher, not all the students have motivation to follow the teacher's instruction, this condition may be the cause of many factors, for example, the lack of background knowledge and the lack of economy. Inquiry-based learning gives students infinite opportunities to investigate, explain, construct and apply what they learn. However, implementing inquiry-based learning in the classroom is difficult and frequently experiences a number of obstacles ([David & Nsengimana, 2022](#); [Song et al., 2014](#)).

[Hariyanto et al. \(2020\)](#) looked at five major obstacles to using inquiry-based learning: teachers find it extremely time-consuming to prepare students for unknown and boundless peripheral open questions due to a lack of motivation, accessibility of investigating techniques, background knowledge, management of extended activities, and the practical constraint of the learning context. Inquire-based learning needs understanding and serious efforts from the teachers to implement it. If teachers do not understand request-based learning, they will have no interest in implementing it in their studies. According to [Isra' and Asrobi \(2018\)](#), these incompetent teachers will eventually skip the inquiry learning approach and use only half of the available classroom time. This condition will result in affective issues that need to be resolved in the learning environment to prevent students and teachers. The sources of issues are recognized in the writing as immediate directions from the teachers, deficient opportunity for growth, absence of self-assurance, low scholastic accomplishment, unreasonable ways of behaving towards understudies, learning conditions in which racial and social issues are focused on and the utilization of improper educational strategies for understudies' learning styles and foundations ([Abid et al., 2023](#); [Alzaanin, 2023](#); [Giles & Yazan, 2023](#)).

Inquiry-based learning encourages students to be active and cooperative. Students who are active need cooperation with their friends to solve the problems they find from evidence and become inquirers. [David and Nsengimana \(2022\)](#) contend that inquiry-based learning makes it possible to be inquirers where they are encouraged to explore new ideas and understandings through personal discoveries and explorations as well as interactions with objects and with other people. As a result, the students' achievements from cycle one up to cycle four get enhanced. The students always submit questions based on the evidence they found from the material they studied, this matter causes the students to get new knowledge from the process they found in or out of the

classroom. The more familiar the procedures of inquiry-based learning for the students, the more improvement of knowledge towards evidence they studied. Communication also happened in the classroom which allowed them to speak English with their friends to improve their fluency.

6. Conclusion and Implications

The enhancement of college students' English achievement is the responsibility of the teachers. The teachers are expected to find a method that can push the students to learn. The knowledge of teachers in the teaching classroom might be useful to increase students' performance. There is a significant impact that teachers' knowledge has on their instructional practices and students' learning outcomes (Amukune & Józsa, 2023; Hooli et al., 2023). That's why the role of the teachers' knowledge or skills to push students' achievement can influence the selected of the appropriate method of teaching that gives autonomy to the students to decide what they do to solve the problem. The teaching and learning environment would affect the students understanding and motivation. Inquiry-based learning is the skill and desire of teachers. Kao (2023) concluded that when compared to conventional lecture-based learning, an inquiry-based approach yields better learning outcomes for students. It encourages students to think for themselves rather than just listen to lectures.

7. Limitations and Suggestions

This study only investigates the involvement of gender differences as a moderating factor related to the effect of inquiry-based learning on college students' English achievement. The results of this study reveal that gender differences have a significant role in college students' English achievement in inquiry-based learning. This indicates that the enhancement of college students' English achievement is not only caused by the intervention of inquiry-based learning but also by gender differences. As a consequence, other moderating factors such as educational level, school geographical location, intervention duration, class capacity and others are important to investigate and examine. Therefore, researchers should investigate and examine those moderating factors for future relevant studies.

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