

Optimize Reciprocal Collaborative Pedagogy in ESP Reading Comprehension Skills Using E-Learning Platform

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Abstract

Globalization requires students to be trained in English for Specific Purposes (ESP) reading comprehension to learn English in a particular professional field for academic success and competitiveness in today's job market. The study investigated the impacts of reciprocal collaborative pedagogy on ESP reading comprehension skills. A quasi-experimental approach was used. Fifty Indonesian electrical engineering polytechnic students were equally assigned to control groups that learned in the conventional reciprocal teaching method individually, and experimental group engaged in reciprocal collaborative pedagogy. MSLQ was used for quantitative analysis, and the interview was used for qualitative. Using the e-learning platform facilitated the distribution of ESP reading materials, announcements, and so on, supporting students' involvement, accessibility, and active learning. The quantitative and qualitative results demonstrated that the tasks within reciprocal collaborative pedagogy promote comprehension, positively reduce anxiety, and build confidence in ESP-specialized text. In conclusion, the pedagogy reinforces each other to facilitate learning by working together, keeping together, coming together, and progressing together through peer interaction, and active engagement in group dynamic discussions enhances learning performance.

Keywords: Reciprocal teaching, Collaborative learning, English for specific purposes, Reading comprehension, E-learning

1 Introduction

With globalization, English has proven to be a primary language across all diverse fields [1]. Workers with English proficiency is increasingly in demand within the trades and industries sector [2]. It leads to the need to prepare vocational students, such as polytechnic students, with practical training to meet English requirements in competitive job applications for future careers. As they graduate, students have competence in English proficiency, not just for excellent academic performance but also for today's jobs re-

quired in the marketplace. Therefore, English for Specific Purposes (ESP) reading comprehension is introduced in training students to learn English in a particular professional field via exposure to discipline-specific language. Reading comprehension becomes ESP's central concern regarding its content, methods, and techniques, which balance specific skills and language proficiency [3].

However, some research reveals that students at the college level are unsatisfactory proficient enough to read and comprehend ESP texts, which are often complex and specialized [4] and frequently result in difficulties in learning content from ESP textbooks with technical texts and vocabulary terms [5]. Such issues were also experienced by Indonesian electrical engineering polytechnic students, which caused them to lose interest, producing fear, worry, and frustration in in-depth comprehension of ESP's various texts. Therefore, to address these deficiency issues to enhance the quality of comprehension and engagement with engineering technical texts and terminology, an excellent instructional approach and evaluation should meet the expectations of students to cope with reading anxiety, which can hinder their progress and improve self-efficacy that involve them in managing and facilitating belief to achieve positive learning in ESP text.

The common method of reciprocal teaching (RT) has demonstrated its effectiveness in improving students' reading comprehension in four ways: prediction, clarification, questioning, and summarization [6-8]. However, despite the evidence showing that RT is a good approach, some studies show the different effects of the various aspects of RT on students' capabilities [9]. RT students still face anxiety in implementing each stage of learning in their reading comprehension skills [9-10]. Nevertheless, the RT strategy affects student anxiety when applying all stages or each stage of learning with college-level texts [11]. Monitoring student comprehension in four RT methods shows that students still find the strategy steps of the learning process to be dull, uninteresting, and anxiety-producing, as they are afraid of making mistakes [12-13]. Qualitative analyses [10, 14] showed that RT could not be separated from student reading anxiety, influencing the learning experience.

To improve this situation, RT is put to good use mainly for Asian students labeled as more passive, knowledge receivers, shy, reluctant to be creative or critical, and rarely

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DOI: <https://doi.org/10.70003/160792642026012701008>

taking the initiative in classroom discussions [15] so such students can perform well in each RT stage in monitoring comprehension of ESP texts. This study adopts collaborative learning (CL) as a new pedagogy approach to minimize issues of reading anxiety experienced by Asian students, mainly Indonesian ESP learners. As teamwork is crucial within the vocational field [16], so this study emphasizes that learning collaboratively is a key approach to the best practices for the polytechnic environment, considering students' academic capabilities, diverse English proficiency, classroom characteristics, and cultural background. Through this study, collaborative learning attempts to bridge the gap of Asian student stereotypes in the classroom with a better learning approach. Collaborative scenarios bring students actively into the educational process to become independent and critically involved in the learning process. Moreover, collaborative group work potentially provides students satisfaction, which promotes their success in comprehending ESP texts through interaction and actively engaging in text dynamic discussions involving a wide range of effortful problem-solving impacts on reducing reading anxiety and belief in their capabilities to increase their self-efficacy toward unfamiliar scripts or cultural material. Group work activities drive the development of higher-order thinking skills, and interactive learning encourages them to overcome complex issues, learn to interact with others, and create innovative ideas [17].

Furthermore, to promote and improve interactive learning in ESP-specialized text for students in today's advanced information technology and the Internet [1], e-learning is used in this study as an alternative model for the distribution of teaching content, communication and knowledge transfer, which teaching effectiveness can be improved. This system allows for efficient data saving, sharing, and updating [18]. It provides students with positive learning opportunities, enhances the quality of lectures, and gives them autonomy and connectedness to learning. According to [19], e-learning represents a revolutionary progression in learning through the flexibility of occurring anywhere, at any time, and reduced costs. Accordingly, to enhance the high quality of the learning process for students, one of the various e-learning forms, the Learning Management System (LMS), namely ELIA, implemented by the institution to manage e-learning as an effect of the COVID-19 pandemic, was used by the English teacher to optimize access to all ESP materials, courses, announcements, and experiment documents. This system can significantly support students in consistently engaging or participating in the learning process at all times. They can relate the materials to personal experiences in and out of class and improve ESP reading comprehension through effective autonomous learning.

2 Literature Review

2.1 Reciprocal Collaborative Pedagogy in ESP Reading Comprehension

Education research indicated that combining two learning approaches yields superior learning outcomes compared to employing either strategy alone [20]. As [21]

proved, students in the reciprocal teaching (RT) + self-regulated learning (SRL) condition could better enhance their peers with informative feedback and arrange their group work on reading comprehension task-oriented than those in the RT condition. Another study by [22] which integrated RT strategy with peer-assisted learning for sharing and engaging in reading exercises. Their finding reported that students reading in pairs could keep track of their reading and increased chances to apply reading strategies through practice. To researchers, integrating various reading strategies has become a new trend that benefits from rich, diversified learning content and instructional activities to tackle complex texts and tasks, improving students' comprehension skills [20, 23]. Therefore, to enhance the quality of students' learning in ESP reading by minimizing time, locating the most crucial information in the text, grasping specialized vocabulary on technical terms, and critically evaluating its accuracy, this study integrates two reciprocal collaborative learning approaches.

RT is an ongoing dialogue to build text [8]; thus, scaffolding is needed to enhance communication and interaction in college classrooms to develop meaningful dialogue within RT. As a result, collaborative scenarios are best practices for students with diverse English proficiency. They engage in high-quality dialogue and actively take well-rounded roles in four RT processes as responders, listeners, and contributors in the group. Thus, this study will argue that integrating two reciprocal collaborative learning approaches reinforces each other to encounter feelings of anxiety and the growth of self-efficacy in ESP texts. In collaborative group work, students engage dynamically in interaction and participation to comprehend ESP-specialized texts through ideas exchange and peer teaching, which can confront problems, raise questions, and discuss challenging issues through multiple problem-solving efforts to alleviate anxiety. Then, they encourage each other, share experiences, and provide positive feedback to build confidence. So, this type of enrichment improves learning outcomes. Awareness of working together influences each other for knowledge transfer, enhances creativity, boosts the value of respect, and finds new solutions for completing reading tasks [24-25]. Several studies have revealed the benefits of CL, which allows students to reduce reading anxiety in classroom activities [25-26]. Then, scholars [27-28] have presented CL improving students' reading self-efficacy.

2.2 Anxiety and Reading Comprehension

Studies report reading anxiety affects the quality of comprehension [5, 26]. Students encounter reading anxiety when comprehending a non-native language. They must simultaneously learn the content and language [26]. A few studies have addressed between anxiety and reading comprehension. Scholars e.g. [5, 26, 29] revealed that anxiety or emotional intelligence influences how students interact with the text while processing its meaning to understand unfamiliar scripts or topics, unfamiliar writing systems, struggle with comprehension, unknown vocabulary terms, fear of mistakenly, and nervousness about the reading tasks. Highly anxious students in a non-native language tend to recall less text content, which causes lower reading

comprehension performance [5, 30]. Scholars, i.e., [26, 31], indicated that reading strategies are essential to assist students in tackling reading anxiety about generating information from reading different texts in English to improve reading comprehension. Moreover, educational research has found that teaching and using various types of reading strategies can combat negative attitudes or anxiety during reading comprehension tasks, resulting in better comprehension, and increased confidence in comprehending main ideas, word meanings, and textual references [23, 29, 31].

2.3 Self-efficacy and Reading Comprehension

Developing reading self-efficacy is essential, and it relates to a belief in one's capabilities in completing diverse reading comprehension tasks [32-33]. Reading self-efficacy motivates college students to promote their self-perception of capabilities to comprehend the text correctly [34]. Some students were perhaps confident in their ability to recognize words in a text but had difficulty comprehending the same text. Low self-efficacy students undermine their interest in making an effort to comprehend. High self-efficacy students make more effort and persist in facing challenges in accomplishing reading tasks [35]. Reading strategies instruction has become one of the methods to improve reading comprehension performance, have better learning control, and, as a direct result, foster high self-efficacy [30, 33, 36]. The strategies can regulate students' self-efficacy to perform complex tasks successfully, monitor learning performance, and comprehend the texts that connect their reading with prior knowledge [36]. Few studies have explored a strong relationship between using a combination of reading strategies and self-efficacy [21, 23]. This new trend yields effective learning, resulting in high self-efficacy and great control over students' knowledge to improve comprehension performance.

2.4 E-learning Platforms for the Quality of Lectures

Technological platforms have provided modern learning in the classroom, which is utilized to enhance the efficiency of acquiring resource [37]. This has led to electronic learning as a new alternative to facilitate learning and teaching. E-learning is one of the most pivotal innovations that offer benefits over traditional learning, shifting toward a student-centered education and providing flexibility in time and place [18, 38]. E-learning delivers educational materials utilizing information and communication technology (ICT), including the Internet, cell phones, and other media [18-19]. E-learning is facilitated through various online platforms. For example, the Learning Management System (LMS) has emerged as one type of e-learning that has gained interest in higher education during the COVID-19 pandemic [38]. It benefits students and teachers through its feature tools, such as a discussion forum, sending files, links, notes, etc., in which various learning activities can be done, learning content can be controlled, and the quality of teaching/learning can be enhanced [18-19, 38]. Much research has been conducted regarding the influence of e-learning on language acquisition. Using e-learning, [18, 39] demonstrated that integrating e-learning in a classroom environment positively influences the

improvement of students' reading comprehension skills and motivation. Therefore, the current study uses e-learning in the form of LMS to transform and influence learning/teaching in the classroom and outside. Students can benefit from accessing and learning ESP texts anytime, anywhere, at their own pace and convenience [38], and work independently to enhance their learning engagement and experience with the ESP reading comprehension lectures.

2.5 Purpose of the Study and Research Questions

Most research on reciprocal teaching methods has been conducted in General English, with limited attention given to English for Specific Purposes (ESP) in tertiary institutions such as polytechnics. However, there is a lack of research focusing on the effectiveness of integrating two reciprocal collaborative learning approaches that reinforce each other in practical learning, which affects anxiety reduction and self-efficacy improvement in ESP reading comprehension skills.

In brief, this study investigated the impact of reciprocal collaborative pedagogy for polytechnic students as a reading strategy practice to help reduce anxiety while processing textual meaning in exploring and enjoying ESP-specialized texts and then positively improve self-efficacy in negotiating difficulties toward the ability to control and face challenging ESP tasks despite unfamiliar material. Thus, three research questions guide this study:

1. Does the reciprocal collaborative pedagogy reduce students' anxiety in ESP reading comprehension?
2. Does the reciprocal collaborative pedagogy improve students' self-efficacy in ESP reading comprehension?
3. How do students respond to implementing the reciprocal collaborative pedagogy in ESP reading comprehension?

3 Methodology

3.1 Research Design and Procedures

This study uses mixed methods with a quasi-experimental design, and a qualitative was undertaken through interviews. Fifty electrical engineering students (38 men and 12 women) from Kupang State Polytechnic in Eastern Indonesia participated. They were assigned to control group (n=25), learned with the conventional RT method, individually comprehending ESP texts for reading worksheet task. Experimental group (n=25) adopted reciprocal collaborative pedagogy involving peer interactions in a group comprehending the same ESP text for reading worksheet task. Experimental group involved heterogeneous students based on the Study Preferences Questionnaire [40]. Students leverage team members' differences in heterogeneous groups as resources to enhance learning. Students were enrolled in ESP reading courses in the second year of specialization (third semester). They had taken General English courses in their first year. The same English teacher taught the two groups to ensure consistency of treatment and avoid biases. Table 1 illustrates the characteristics of experimental groups.

Table 1. Group characteristic

Characteristics	Conventional RT	Reciprocal collaborative
Groups	Control	Experimental
Sample size	25 students (not required of SPQ form)	25 students (heterogenous students, two serialists, and three holists based on SPQ form)
Age	20- 23 years	20- 23 years
Gender	19 males and six females	19 males and six females
Grade	3rd	3rd
Academic year	2021-2022	2021-2022

Before the learning activity, students were introduced to the experimental procedure and completed the pretest via the ELIA system. The teacher introduced the details of the proposed teaching method in each meeting to ensure what students were expected to do individually for control group or during group task activities for experimental group to achieve the expected learning outcomes. The two groups received learning methods for six weeks, respectively. Each group lasts for two hours (100 min) for the lessons. In week 6, students completed the posttest after the experiment. The experiment was conducted in the fall semester of the 2021-2022 academic year during the COVID-19 pandemic. The learning material comprised six topics of ESP texts. It was adapted from English for Electrical and Electronics Engineering of Lac Hong University Press. The ESP texts were presented at an intermediate difficulty level. The texts were delivered to the students weekly in sequence (Table 2).

Table 2. Reading topics and time allocation

Week	Meeting (s)/hours	Duration	Topics
1	1/2	@ 50 min	Conductors, Insulators, and Semiconductors
2	1/2	@ 50 min	Circuit Elements
3	1/2	@ 50 min	DC Motors
4	1/2	@ 50 min	Process Control System
5	1/2	@ 50 min	Cathode Ray Tube
6	1/2	@ 50 min	Circuit Symbols

Experimental students were divided into five groups, each of five (three holists and two serialists students), composed of men and females, working collaboratively. To create effective learning in a vivid classroom atmosphere on reciprocal collaborative pedagogy, some tasks were provided to (1) prevent students from being passive, (2) help them better organize in the learning process, (3) assist students more independent through interaction, and (4) enhance their learning activeness. These tasks consist of *reading worksheet tasks* to evaluate students' learning pace in comprehending ESP texts on the RT method (Appendix

A1). The *preface* assists students in quickly predicting the unread text sections (Appendix A2). The group leader uses the "*help sheet*" to lead text discussions. Its sheet guides group leaders in independently organizing and directing members' reading activities. Each member had the chance to practice a "*help sheet*" (Appendix A3). Lastly, a reciprocal collaborative *group activity handout* will reinforce each member's engagement in text parts discussion and keep students active in rapidly better content comprehension of ESP texts (Appendix A4). Figure 1 illustrates diverse learning scenarios assigned for both groups.

Both groups were administered a survey questionnaire before and after the proposed method was completed to identify variations in student reading anxiety and self-efficacy. Both groups had the same learning materials, worksheet tasks, assignments, tests and teacher; the only difference was the instructional approach. Then, interviews were conducted with experimental students to explore their feelings about the pedagogy and the ELIA system's features and activities. Figure 2 illustrates the experimental procedure. In addition, as an essential part of enhancing learning, the ELIA system is used primarily as a complementary tool to deliver or upload ESP teaching materials, announcements, tests, experiment documents, and make discussion forums available. This system adds flexibility and time efficiency and keeps track of students' work; they can review what they were learning in ESP texts. Learning tools within the system help students foster interaction in knowledge transfer through open discussions, posting comments, sending notes, files, links, and assignments, and sending a direct message to the teacher. Students of both groups can easily access course materials anytime through the URL <https://elia.pnk.ac.id>. This study distributed the course's teaching and learning materials as a section of digital textbooks. Figure 3 illustrates ESP reading in the ELIA system.

	Control Group	Hour	Experimental Group	Hour
1 st Week	<ul style="list-style-type: none"> Pre-test Pre-questionnaire ESP reading material in ELIA (E-learning) Introduction to RT (<i>Prediction, clarifying, questioning, summarizing</i>) 	2	<ul style="list-style-type: none"> Students fill out the SPQ form (reciprocal collaborative groups composition criteria) Pre-test Pre-questionnaire ESP reading material in ELIA Introduction to reciprocal collaborative pedagogy (<i>p, c, g, s</i>) include its tasks used in groups learning 	2
2 nd Week	<ul style="list-style-type: none"> Brief review from teacher on <i>Prediction</i> (1st techniques taught) Students self-practice on <i>Prediction</i> (worksheet) Feedback and reflection 	30' 50' 20'	<ul style="list-style-type: none"> Students divided into heterogeneous groups (3 holists, 2 serialists) Brief review from teacher by applying pedagogy tasks at <i>Prediction</i> in a group collaboratively Students working in a team on <i>Prediction</i> in a reciprocal collaborative scenario (worksheet) Groups' report and feedback 	30' 50' 20'
3 rd Week	<ul style="list-style-type: none"> Brief review from teacher for <i>Clarifying</i> (2nd techniques taught) Students self-practice of <i>Clarifying</i> (worksheet) Feedback and reflection 	30' 50' 20'	<ul style="list-style-type: none"> Brief review from teacher for reciprocal collaborative pedagogy on <i>Clarifying</i> Students discuss for <i>Clarifying</i> in reciprocal collaborative groups (worksheet) Groups' report and feedback 	30' 50' 20'
4 th Week	<ul style="list-style-type: none"> Brief review from teacher of <i>Questioning</i> (3rd techniques taught) Students self-practice on <i>Questioning</i> (worksheet) Feedback and reflection 	30' 50' 20'	<ul style="list-style-type: none"> Brief review from teacher for reciprocal collaborative pedagogy on <i>Questioning</i> Students discuss ESP text in a team on <i>Questioning</i> (worksheet) Groups' report and feedback 	30' 50' 20'
5 th Week	<ul style="list-style-type: none"> Brief review from teacher on <i>Summarizing</i> (4th techniques taught) Students self-practice on <i>Summarizing</i> (worksheets) Feedback and reflection 	30' 50' 20'	<ul style="list-style-type: none"> Brief review from teacher for reciprocal collaborative pedagogy on <i>Summarizing</i> Students discuss ESP text in groups on <i>Summarizing</i> (worksheet) Groups' report and feedback 	30' 50' 20'
6 th Week	<ul style="list-style-type: none"> Teacher refreshed RT elements Complete worksheet individually Post-test Post-questionnaire 	20' 40' 40'	<ul style="list-style-type: none"> Teacher refreshed the reciprocal collaborative pedagogy used Complete worksheet engaged in teamwork Post-test Post-questionnaire Interview section (4 students) 	10' 40' 40' 10'

Figure 1. Learning scenarios

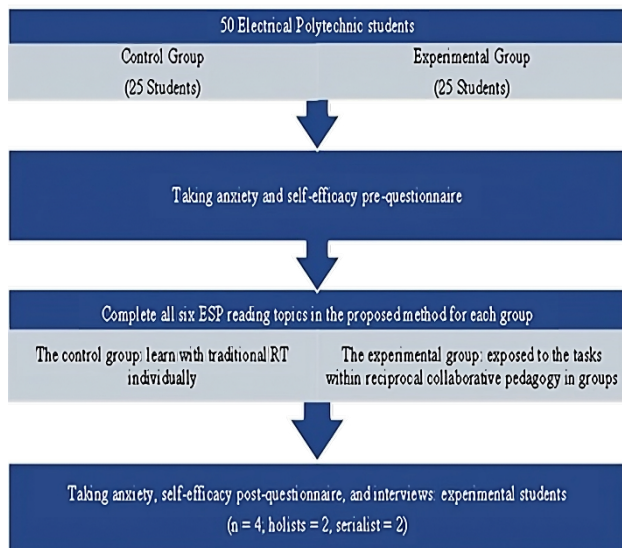


Figure 2. Experimental procedure

ESP COURSE IN LMS

- 1 LOGIN ELIA**
Students login using name and student ID
- 2 SELECT ESP COURSE**
Select ESP Course among the available courses.
- 3 ALL COURSE CONTENT**
Students select all material based on meeting.
- 4 ACTIVITY**
Students can access the reading material, worksheet, test. The learning resources include file, link, book.
- 5 FORUM DISCUSSION**
Students can share their uncertainties or interpretations, raise questions, and confront problems.
- 6 REVIEW**
Students keep track of what they are learning in ESP texts.

Figure 3. ESP reading in the ELIA system

3.2 Instruments

The Motivated Strategies for Learning Questionnaire (MSLQ) developed by [41] was adopted to measure reading anxiety and self-efficacy. The survey has five items to assess students' anxiety in learning. These items were rated on a 5-point Likert scale ranging from 5 (*strongly agree*) to 1 (*strongly disagree*). Cronbach's alpha for the above questionnaire was .848, indicating that the MSLQ has good reliability and internal consistency for this study.

An eight-item questionnaire scale measured students' self-efficacy before the proposed method (pre-efficacy) and after the learning activity was completed (post-efficacy). The questionnaire utilized a 5-point Likert scale to assess self-efficacy in task performance and ability to complete it. Cronbach's alpha for the above questionnaire was .825 for this study.

The interview was undertaken after the intervention was completed. Several questions were modified from [42] to gain deeper insight into students' feelings about the learning activity. Four experimental students (two holists and two serialists) were randomly invited.

3.3 Data Analysis

The quantitative data were run using SPSS 25. Analysis of covariate (ANCOVA) examined the post-survey to control for potential between-group differences by considering the pre-survey. Pre and post-survey on anxiety and self-efficacy results were compared using a paired *t*-test to assess the enhancement. Interview data were analyzed and later transcribed on a specific influence on the students' feelings during the proposed method in the learning process.

4 Results

4.1 Reducing Students' Anxiety in ESP Reading Comprehension

The (Sig.) value in Table 3 indicated that control and experimental groups reported no significant difference in the final results. After both groups had received the intervention, the posttest means scores of experimental groups reported a more significant reduction in anxiety than those of the control group ($t(24) = -15.816, p = .000 < .05$; Table 4). It demonstrated that reciprocal collaborative pedagogy was conducive to reducing the reading anxiety of experimental students in ESP texts; it implies that involving peer group interaction in learning collaboratively might be more effective at fostering a friendly and supportive learning environment.

Table 3. ANCOVA on between-group student anxiety

Group	Mean	Std. error	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Control	3.264	0.163	0.771	1	0.771	1.338	0.253	0.028
Experimental	3.539	0.159						

Note: sig. < 0.05

Table 4. Paired *t*-test on student anxiety

Class	Variable	Pre-test		Post-test		t	df	p
		Mean	Std. deviation	Mean	Std. deviation			
Experimental	Anxiety	2.552	0.753	3.880	0.842	-15.816	24	0.000*
Control	Anxiety	2.767	0.989	2.967	1.072	-1.155	23	0.260*

Note: *p < 0.05

4.2 Improving Students' Self-efficacy in ESP Reading Comprehension

ANCOVA and a paired *t*-test were performed for both groups to measure the proposed method enhanced students' self-efficacy. Table 5 indicated that the (Sig.) value of the two groups, control and experimental, showed a significant difference in the final results.

Table 5. ANCOVA on between-group student self-efficacy (SE)

Group	Mean	Std. error	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Control	4.124	0.095	4.297	1	4.297	20.305	0.000	0.306
Experimental	3.539	0.159						

Note: sig. < 0.05

After the intervention, a statistical analysis exhibited a significant difference between the two groups ($t(24) = -4.988, p = .000 < .05$; Table 6). The posttest means scores revealed that experimental group was significantly higher than control group. It indicated that the value of dynamics discussions in peer group interaction influences experimental students' self-efficacy improvement. Students were confident to develop more effort to learn ESP texts with this pedagogy. It demonstrated that working together positively impacts group members' belief in success when the chance and consistency of sharing increase self-confidence naturally grows.

Table 6. Paired *t*-test on student self-efficacy (SE)

Class	Variable	Pre-test		Post-test		t	df	p
		Mean	Std. deviation	Mean	Std. deviation			
Experimental	SE	4.240	0.436	4.760	0.308	-4.988	24	0.000*
Control	SE	4.067	0.503	4.088	0.629	-0.186	23	0.854*

Note: *p < 0.05

4.3 Students Respond to the Learning Activities

The interview data analysis concluded that learning activities in reciprocal collaborative pedagogy greatly benefit students' ESP reading comprehension skills in numerous aspects. Heterogeneous group discussions led these interviewee students to achieve positive learning, including (1) flexibility and accessible learning, (2) motivated, responsible, and more active, (3) cultivate other language skills, (4) gain problem-solving skills, (5) reduce anxiety, and (6) more confidence and relaxed. The interviewee described their learning experience as follows:

Serialist students 1:

"The pedagogy helps me enjoy learning. The ELIA system boosts the quality of lectures. Course materials are available and can be accessed independently. It encourages

es to prepare for self-paced learning at class meetings."

Holists students 1:

"Both the ELIA system and the pedagogy tasks support active learning. The ELIA system assists in participating in the learning process at all times. I learn by doing, accessing learning resources directly. I feel motivated; group work gives a sense of shared responsibility. No one feels underestimated."

Serialist students 2:

"The pedagogy tasks help cultivate other skills, i.e., speaking, listening, and writing beyond reading comprehension skills. I lead text discussions, speak out, learn to listen, then write short summaries of a text. The pedagogy provides a solution."

Holists students 2:

"Diverse English proficiency enables us to tackle challenges collectively in ESP texts and rapidly complete its tasks. All engaged in problem-solving and developed a critical analysis. No one stays silent. Supportive feedback and encouragement improve confidence."

Serialist students 1:

"Peer interaction fosters warm and productive learning. Learning in groups changed everything. I did not feel afraid of ESP texts. All members pleasantly complement each other in a relaxed sphere."

5 Discussion

The study revealed that students in experimental group exhibited significantly higher learning experiences than those in control group with conventional RT. It means that reciprocal collaborative pedagogy positively influences the quality of learning for students in terms of reduced reading anxiety and improved self-efficacy in ESP-specialized texts and task completion. This study's results indicated the features of collaborative scenarios as the best practices in polytechnic environment.

Reciprocal collaborative pedagogy highlighted that students felt safe in group work activities. The result echoes what certain scholars state [24, 43-44] that group work makes students feel more secure, relaxed, and enhances understanding in a supportive environment. Reciprocal collaborative students acknowledged that in peer group discussions, they feel more comfortable, actively engaged, and well-prepared in comprehension, enhance language skills, build trust, and develop real-world communication skills. All tasks' activities within groups can help shift students' attention away from anxious about ESP text. Students engaged in analyzing text, answered comprehension questions, provided writing summaries, and delivered oral reports. Diverse English proficiency becomes an advantage for group members to enhance the learning outcomes of experimental students. The weak ones assisted from practice with the brighter students in discussing complex concepts, asking questions, sharing their uncertainties or

interpretations, and constructing knowledge collectively. It aligns with [26] findings that underperforming students could gain insights from successful peers, while bright students might benefit from interactions with their average classmates. Moreover, seeking clarification and debates in a friendly environment for fresh solutions to tackling ESP text can reduce anxiety stemming from confusion. This conforms with [24-25] findings that students become learning resources for each other, leading to better outcomes.

Meanwhile, the interviewed students acknowledged that practicing tasks within the pedagogy and using the ELIA system to access all ESP content supports their involvement and active learning. The tasks in group discussions led experimental students to be actively engaged in deepening their understanding of ESP texts, fostering critical thinking in analyzing text and drawing conclusions, building confidence, and reinforcing technical vocabulary, grammar, and real-world communication skills. Moreover, in the pedagogy tasks, students can cultivate other language skills, such as speaking, listening, and writing, beyond reading comprehension skills as a direct effect of the pedagogy. This is in tune with [45] note that collaborative learning stands out as the most beneficial approach to active learning. Meanwhile, the ELIA system allows students to learn by doing. With all the ESP materials available, it is easier to access them at any time. Students are responsible for exploring and studying it, keeping track, reviewing, and strengthening their understanding of what they are learning in ESP texts at their own pace. The ELIA system can help prepare students for tests and allow them to have unrestricted autonomous learning. This study agrees with [18], which recommends using e-learning and face-to-face learning to enhance reading comprehension.

Experimental students have more confidence in performing ESP texts and tasks and believe they have control over their achievement than control students with conventional RT. Reciprocal collaborative students demonstrated improvement in self-efficacy as the positive effects of learning collaboratively in group text discussions. These students acknowledged that peer encouragement, feedback, and validation of their contribution reinforced their belief in their reading ability, which improved self-efficacy. This agrees with [25, 46] that peer encouragement promotes higher achievement, and positive feedback improves learning outcomes. Experimental students indicated in the learning process that the more they participate and interact with peers in learning, the more they influence and inspire each other to develop confidence in their abilities. Success is fetched because they feel competent and ready to learn. It corroborates [47] findings that interaction enhances self-efficacy in learning. Experimental students revealed that working in collaborative groups frequently develops a sense of community among students. Allowing them to address problems, pose questions, and discuss challenging issues together results in placing trust and receiving support that positively impacts their ESP reading self-efficacy. Accordingly, this study corroborates prior research on collaborative learning groups improving students' reading self-efficacy, which enhances comprehension proficiency [27-28].

Regarding interview results, students emphasized the tasks in the reciprocal collaborative pedagogy facilitate learning as well as the ELIA system. The system features assist students in activities by providing easy access to all ESP learning materials and interaction among them. The collaborative scenario gives students an advantage in alleviating reading anxiety and building confidence in ESP reading comprehension.

6 Conclusions

This study revealed that reciprocal collaborative pedagogy reinforces each other to facilitate learning. The tasks within reciprocal collaborative pedagogy contribute to active learning that cultivates other language skills, i.e., speaking, listening, and writing beyond reading comprehension skills for students through collaborative scenarios in ESP-specialized texts. Interaction and active engagement in peer group discussions prove that working together, keeping together, coming together, and progressing together results in better learning outcomes to alleviate anxiety and facilitate the growth of self-efficacy in processing ESP-specialized texts. Interaction with peers develops a sense of camaraderie in a non-stressful atmosphere. Peer encouragement and positive feedback create a more positive self-perception that improves confidence.

Meanwhile, the usage of the ELIA system positively affects students' involvement and active learning. This system prepares students for self-paced learning in organizing, structuring, and exposing knowledge at class meetings. Both face-to-face learning and the ELIA system can benefit students from the accessibility of resources while still having opportunities for direct interaction, collaboration, communication, and guidance from peers and teachers in the classroom. However, this study has limitations. First, the number of participants (50 students) is small, which might influence the statistical strength of the results. Second, the class only lasted six weeks of the semester. Third, the study only investigated the impact of reciprocal collaborative pedagogy on anxiety and self-efficacy. Future studies should involve additional participants, research the whole semester, and explore additional learning that could be influenced by the proposed method.

Acknowledgements

This study was funded by The Ministry of Science and Technology, Taiwan, R.O.C (MOST), Grant numbers: MOST 110-2511-H-224-003-MY3, and MOST 111-2628-H-224-001-MY3.

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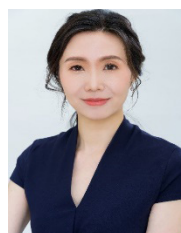
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Appendices

Appendix A1. Worksheet-based task

Reciprocal Collaborative worksheet

Name/Group :

Text Title :

What do you learn from the text?

Predicting:

Clarifying:

Questioning:

Summarizing:

Appendix A2. The preface

Preface

It is mentioned as a technique to control and monitor processes. It involves an action to monitor and adjust the process to maintain desired output. Its tasks maintain quality and performance for mission-critical applications.

PROCESS CONTROL SYSTEM

Control systems provide a means of replacing human operators in many industrial processes. They are used widely to monitor and control pressure, temperature, motor speed, the flow of a liquid, or any other physical variable. They must be capable of fulfilling a number of functions. First, the physical variable to be controlled, such as the air temperature in the factory or the pressure of a hydraulic system, must be measure. Then its value must be compared with the desired value. Next, action has to be taken to reduce to zero the difference between the actual and desired value.

The basic components of a control system are an input transducer, an error sensor, a controller and an output transducer. The input transducer converts changes in the physical variable into electrical signal. Figure 1 shows one type of transducer which converts changes in pressure to frequency changes. Pressure changes move in L1 which forms part of a tuned circuit. This causes the frequency of the circuit to change, thus alternating the output frequency of the oscillator. The output is then fed to an error sensor.

Figure 1

Appendix A4. Reciprocal collaborative group activity handout

Reciprocal Collaborative Group Activity Handout	
Procedure	Group Activities
Group Leader	Open discussion, ask the group members some questions, the answer of that is in the text The question should be about: 'How do you know about...; why is it important in ... area?' 'What can you learn from the title?' avoid yes/no questions
Predicting:	Before you start to read, tell the group to look at the title, pictures, diagrams, and other passage features. Share your predictions first, and encourage all group members to add their predictions. <i>I predict that this text about the function of the...;</i> <i>I assume that the next section will be about what is it the...;</i> <i>Based on (a clue), I imagine that ...; My evidence is ...</i>
Read:	Students read the text together in the group
Clarifying:	You must clarify when: the group is confused by what they have read. Work with the group to clarify the meaning of any words or phrases that are unclear. <i>Does anybody need anything clarified? Is there something you would like to share? I'd love to find out what...means; What is this word?</i>
Questioning:	Begin poses questions for the group to discuss. Then, work with the group to decide where the answer to these questions might be in the passage. <i>My question is, why is the essential? What, Where, When, Which, Why, Who, How</i>
Summarizing	Write the summary of essential information from the text. Work with the group about the main idea and the most essential details. <i>The paragraph is about....; Could you please summary is...; This is what I think is the most crucial from the text...; The main idea is....</i>

Appendix A3. Help sheet

Help sheet for group leader

Predicting

Clarifying

Questioning

Summarizing

Ask:

who wants to make a prediction what will be happen in the next passage?

Assist:

what may be figured out in the next paragraph?

How are the chances to happen?

Feedback:

what could be improved a lot?

Ask:

who need to clarify: the meaning of unfamiliar word?

Assist:

Reread the sentence before and after

Ask whether someone in your group could explain this term to you

Feedback:

What could still be improved?

Ask:

who wants to ask a question?

Assist:

Which of the following questions will assist you help to determine whether or not someone has comprehended the text?

Which question might the teacher asks?

Feedback:

What could still be improved?

Ask:

who wants to summarize the text in your own words?

Assist:

What is the most important information from the text?

Summarize in a simple sentence?

Feedback:

What could still be improved?