The Effectiveness of Reciprocal Peer Teaching in an EAP Class

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Abstract

Peer teaching refers to the process of students teaching other students and has been applied in various contexts because of its positive impact on student academic performance as well as its social and cognitive values. Yet, most research on peer teaching tends to be long-term programmes with fixed student tutors and is mostly conducted in the field of science. This research, therefore, aims to examine the effectiveness of reciprocal peer teaching in a 50-minute EAP lesson to undergraduate students in a transnational university in China. Students alter their roles to teach and be taught by their peers on provided materials. Retention of knowledge was tested after 2 weeks to investigate the effectiveness of peer teaching, and a questionnaire-based survey was conducted to gather students' perceptions of this learning approach. Results show that peer teaching has a positive impact on student retention rate, especially for student tutors. Students' perception of reciprocal peer teaching is mainly positive but mixed with concerns, particularly regarding unguaranteed teaching quality. Further considerations have been discussed in this regard. Future research is also recommended to expand peer teaching in other teaching contexts and combine peer teaching with other instructional methods to better facilitate learning.

Keywords: reciprocal peer teaching, effectiveness, retention rate, EAP

1. Introduction

Research in the recent half-century has suggested a transition from a teacher-centred approach to student-centred practices in education. Active learning, including collaborative learning, has been seen as one of the most efficient mechanisms for knowledge acquisition, and the essence of education is considered to be involving students in their learning instead of passively receiving knowledge from their teachers (Rubin & Hebert, 1998). The Learning Pyramid also suggests that students' learning retention rates strikingly increase when students are actively involved in the learning process, particularly when teaching others (Lalley & Miller, 2007).

Peer teaching, as its name suggests, refers to the process of 'students teaching other students' (Sorcinelli, 1991, p. 17). As one of the important forms of collaborative learning, peer teaching places students in the role of instructors and actively engages students in their academic work (Wagner& Gansemer-Topf, 2005). The effectiveness of peer teaching in enhancing learning has been examined and proved through different studies. Since the late 1970s, meta-analyses of peer teaching have shown its positive outcomes on students' academic performance (Fisher, Frey, Marsh, & Gonzalez, 2019); at the same time, its value in psychological, cognitive, and economic aspects are also well recognized by researchers (Wagner & Gansemer-Topf, 2005).

However, one issue that often emerges among Chinese students in English for Academic Purposes (EAP) classes is that they tend to have difficulties fitting into student-centred teaching activities and are more adapted to a teacher-centered approach. According to Cheng and Ding (2022), the effectiveness of the leaner-centred teaching paradigm among Chinese students still needs to be further explored. Meanwhile, despite the fact that peer teaching has been studied in different contexts and has been recognized as an effective teaching method, the applicability and effectiveness of this pedagogical approach in EAP teaching remain unexplored. Therefore, it will be intriguing to explore how Chinese students respond to reciprocal peer teaching, as a student-centred collaborative learning activity in an EAP class. By investigating the effectiveness of this new instructional mode compared to direct teaching from teachers, the study attempts to provide insights into the designing of learning and teaching practices in EAP classes and seeks to augment student engagement and long-term retention of learning.

2. Literature Review

2.1 The Applications and Different Forms of Peer Teaching

Peer teaching has been widely utilized among students of different levels, ranging from preschool, elementary, secondary, and postsecondary education. In higher education, studies on peer teaching have been conducted in various subjects including sciences, mathematics, physics, and reading (Fisher et al., 2019); in recent years, more practical subjects such as medical education (Omar, Zaheer, & Ahmed, 2018; Bentley & Hill, 2009.; Mohamad et al., 2012; Alshareef, 2020; Chan, Botelho, & Wong, 2021), nursing (Meng, Xu, Chen, & Zhang, 2022), technological studies (Rusli, Degeng, Setyosari, & Sulton, 2021), and electrical engineering (Bakare & Orji, 2019; Reith et al., 2022) have also adopted peer teaching to enhance learning and teaching.

Depending on students' roles, peer teaching can be mainly divided into two forms: either in a unidirectional way, which means that students' roles as tutors and tutees are fixed, or in the form of reciprocal peer teaching, meaning that students take turns to be tutors and tutees (Fisher et al., 2019). In most studies, however, a unidirectional approach was adopted by researchers, in which students were selected to be tutors based on their academic performance or other skills with the aim of increasing the possibility of the success of the programmes, and therefore leaving reciprocal peer teaching inadequately addressed (AlShareef, 2020). However, the benefits of reciprocal peer teaching are underscored by scholars. Some believe that reciprocal peer teaching is superior to the unidirectional approach because it provides equal opportunities for all students to learn by teaching (Cheng & Ku, 2009).

Although studies on peer teaching vary in their execution, almost all of the existing studies are targeted at comparatively long-term programmes, ranging from several weeks to several years (Rekrut, 1994; Maricle, Collins, Schuster, & Grisham-Brown, 2001; Muñoz-García, Moreda, Hernández-Sánchez, & Valiño, 2013; AlShareef, 2020). To assess the impact of peer teaching on students' academic performance, an eight-week long programme was conducted by Rusli, et al. (2020), while Alshareef's reciprocal peer teaching programme lasted for a whole academic year (AlShareef, 2020). Meta-analyses by Leung (2015), however, discover that a higher effect size can be generated for peer teaching programmes in a shorter duration (within 10 weeks or less) than a longer one.

Another common feature among many peer teaching studies is that researchers choose to provide training on the target materials to student tutors prior to peer teaching as a way to enhance teaching quality, believing that training of students is mandatory to effectively use peer tutoring (Topping, Dehkinet, Blanch, Corcelles, & Duran, 2013). For example, in Muñoz-García et al.'s (2013) electrotechnical laboratory peer teaching programme, training was provided to student tutors. In the peer tutoring experiment, to teach beginning algebra problem-solving skills in heterogeneous classrooms, student tutors were also trained for 4 days by teachers and researchers on teaching skills and teaching materials (Allsopp, 1997). In a more recent study on the impacts of reciprocal peer teaching on medical students, training in presentation skills and an evidence-based medicine course were also provided (AlShareef, 2020). Durling and Shick (1976) believe that one of the major benefits to peer tutors derives from teachers' explanations on the target teaching materials. However, there are also scholars who hold an opposite view and emphasize the negative impacts it may bring, such as the consumption of curricular time from both students and teachers, which makes reciprocal peer teaching more expensive (Alemu, 2020). Furthermore, pre-teaching on target materials imposes a negative effect especially on student tutors as the initial self-learning experience will be deprived if they are taught before teaching their peers (Lalley & Miller, 2007), which is also against the basic rationale of peer teaching, namely, teaching others is a more effective way to learn (Bohmbach, 2004).

2.2 The Effectiveness of Peer Teaching

The effectiveness of peer teaching in different contexts has been verified by an overwhelming amount of evidence gathered from studies over the last 50 years. The meta-analyses on peer teaching conducted by Bowman-Perrott et al. (2013) examined 26 studies and reported an overall effect size of 0.75, which means that peer tutoring can result in moderate to large academic gains. Another meta-analysis conducted in the following year involved 20 studies that investigated the non-academic outcomes brought by peer teaching and found that peer teaching had strong social and emotional benefits (Bowman-Perrott, Burke, Zhang, & Zaini, 2014).

In more recent studies, peer teaching has also been widely recognized as an effective tool to enhance students' learning performance. Rusli et al. (2020) investigated the effectiveness of peer teaching in comparison to direct teaching by comparing the test scores of the experimental and the control group. Results show that peer teaching is effective in enhancing students' academic performance. Dioso-Henson (2012) compared the results of reciprocal and non-reciprocal peer teaching with traditional classroom instruction and found that both types of

peer teaching resulted in more significant academic gains than direct teaching while reciprocal peer teaching is slightly more effective in increasing student's academic performance than non-reciprocal peer teaching. Bailey et al. (2018) adopted reciprocal peer tutoring in homework assignments and found that the test results of the experimented section outperformed the other sections by 6%. A similar finding was also given by Bakare & Orji (2020), stating that reciprocal peer teaching has a positive impact on the academic performance of students in electronic and computer fundamentals.

Perceptions on peer teaching among students have also been studied over the years. For example, Chan et al. (2021) conducted a survey among 131 students and found that peer teaching is preferred and regarded to be helpful in skill acquisition for medical students. A similar finding was concluded by Bentley and Hill (2009) based on the results of a survey of students studying the medical gross anatomy laboratory. The vast majority of participants found reciprocal peer teaching beneficial and advocated it to be continued in future classes. AlShareef et al. (2019) conducted a survey involving 410 medical students and evaluated students' perceptions of the reciprocal peer-teaching program from both perspectives of tutors and tutees. Results show that students' views on being taught by their peers are mixed, while the vast majority value the experience of being student tutors and reported that they benefited both personally and professionally.

Although overwhelming evidence from previous research has proven the effectiveness and positive impact of peer teaching including reciprocal peer teaching on students, it is still vital to note that research results are not entirely positive. In the research of an online reciprocal peer tutoring project for improving language competence, Topping et al. (2013) find a paradoxical effect of reciprocal peer tutoring, namely, more learning opportunities for student tutors will result in less learning for tutees and vice versa. In another study, AlShareef (2020) compared the impacts of reciprocal peer teaching with faculty teaching for medical students in KSA and found that students from the faculty teaching seminars outperformed those from reciprocal peer teaching seminars. The researcher mainly attributed the research results to students' poor teaching quality.

2.3 Research Gap

Despite the fact that peer teaching has been widely adopted and studied in different contexts and forms, there are still some areas that can be further explored. First, peer teaching is mostly conducted in the science field in laboratories, and the applicability of this pedagogy in English for Academic Purposes (EAP) teaching remains unexplored. Second, most studies in recent years focus on the impact of peer teaching on tutees using the unidirectional approach and therefore leaves room for a study on the reciprocal way of peer teaching in which the academic performance of both student tutors and tutees are examined. Third, almost all of the current research on peer teaching is targeted at comparatively long-term programmes and thus it is worthwhile to inquire into its effectiveness as a class activity in a short duration, such as in a 50-minute lesson. In addition, training on the target materials to student tutors prior to peer teaching will affect the retention data of student tutors and may impede the comparison of the learning outcomes between different teaching methods.

2.4 Purpose and Research Questions

Based on the literature review and the gaps mentioned, it would be intriguing to investigate peer teaching as a teaching activity in a 50-minute EAP lesson. A reciprocal way has been adopted to maximize the possibility for students to experience both teaching and being taught by their peers so as to verify the effectiveness of both roles in peer teaching and to better guide the following teaching and learning activities to improve student academic performance.

The research intends to fill the research gaps and address the following research questions:

(1) How effective is reciprocal peer teaching for both student tutors and tutees in an EAP context?

(2) How do Chinese students perceive the learning experience of teaching and being taught by their peers?

3. Methodology

3.1 Participants

Two groups (a total number of 38) of students from the same module of EAP025 in a transnational university in China participated in this study. All of them were Year 1, Semester 1 Chinese students with English language proficiency at the Common European Framework of Reference for Languages (CEFR) B1 level. None of them had any background knowledge about the target topic (i.e., academic style). A reciprocal peer teaching mode was used in Group 1 (the experimental group), which contained 21 students in total; Group 2, with a total number of 17 students, was treated as the control group and received a lecture on the same topic from the teacher.

3.2 Subject Materials

To ensure the validity of the research, the 10 rules of academic styles were chosen as the subject material for this experiment mainly for the following reasons: First, it was completely new to Year 1, Semester 1 students, which minimized the influences from their previous knowledge. Second, each rule was concise and straightforward, with relevant examples provided, which made it easier for students to teach and learn in a limited time slot and also minimized the demand for additional training from the teacher to the peer tutors. Third, all the rules were of a similar length and difficulty level, which provided a fair basis for all peer tutors and also made it easier for calculating the retention rates later.

3.3 Procedure

Before the research was conducted, all participants were checked on their previous knowledge about academic styles, and it was confirmed that no participants had studied the subject materials before. Participants in the experimental group were then divided into four smaller groups, and each group member was assigned to teach two academic rules to their team members.

To reduce intervention from the teacher and enhance student confidence in being a student teacher, a collaborative planning and preparation session among the student tutors was employed, as suggested by Allsopp (1997). During this preparation session, students assigned with the same academic style rules were asked to gather together and discuss and negotiate the ways of teaching. The teacher's instruction and intervention in this session were limited to provoking discussion and checking understanding. Afterward, students were asked to sit back in their original groups and took turns teaching their group members about the ten rules. As for the control group, all ten rules were taught in the form of a lecture from the teacher.

A retention quiz on the ten academic rules was conducted two weeks after the peer teaching activity in class to examine the teaching outcomes. In this quiz, students from both groups were required to write down all the academic style rules they could recall. In addition, a paper-based questionnaire that contained 6 questions was carried out in the experimental group to obtain students' views on peer teaching. Survey questions mainly focused on how participants felt about their experience of peer teaching, including being a peer tutor and being taught by their peers, their expectations of the teacher's role in the peer teaching process in the form of 5-point Likert Scale, and an open-ended question on additional suggestions or comments.

3.4 Data Analysis

In total, 38 retention quiz results (21 from the experimental group and 17 from the control group) and 21 questionnaire responses were collected. Statistical data generated from the retention quiz and the 5 close-ended questions from the questionnaire was computed and analyzed using Excel. Results from the open-response questionnaire were coded and analyzed thematically. Both results were correlated to findings from previous research to uncover the similarities and differences.

4. Results and Discussion

4.1 The Effectiveness of Peer Teaching

The purpose of this research is to examine the effectiveness of peer teaching, and the results demonstrate that this instructional method is beneficial to both student tutors and tutees. Retention quiz results show that the retention rate of student tutors is strikingly higher than those either taught by their peers or by the teacher. As can be seen in Figure 1, for student tutors, the retention rate is 61.9%, much higher than the retention rate of tutees (31.5%) and the control group (28.3%). Among the 21 participants from the experimental group, 17 remembered at least one of the two rules that they taught to other students, and 9 of them remembered both rules. Although the retention rate of peer tutors is less than 90%, as presented in the learning pyramid (Lalley & Miller, 2007), the result is still impressive. Apart from the positive impact on student tutors, it is noteworthy that peer teaching also benefits tutees. By comparing the retention rates of students taught by their peer tutors (31.5%) with that from direct teaching in lectures (28.3%), students seem to retain knowledge better when taught by their peers. Overall, the research results indicate that peer teaching is a more effective way than lectures in assisting students' retention of certain knowledge. This finding aligns with previous studies on the impact of reciprocal peer teaching on students' academic performance in various fields. For example, Dioso-Henson (2012) proved that reciprocal peer teaching is more effective in increasing students' academic performance than both non-reciprocal peer teaching and direct teaching. In their study, Rusli et al. (2021) also compared the results of direct teaching and peer teaching, and confirmed that peer teaching has a more positive effect on students' academic performance in the context of theological studies.
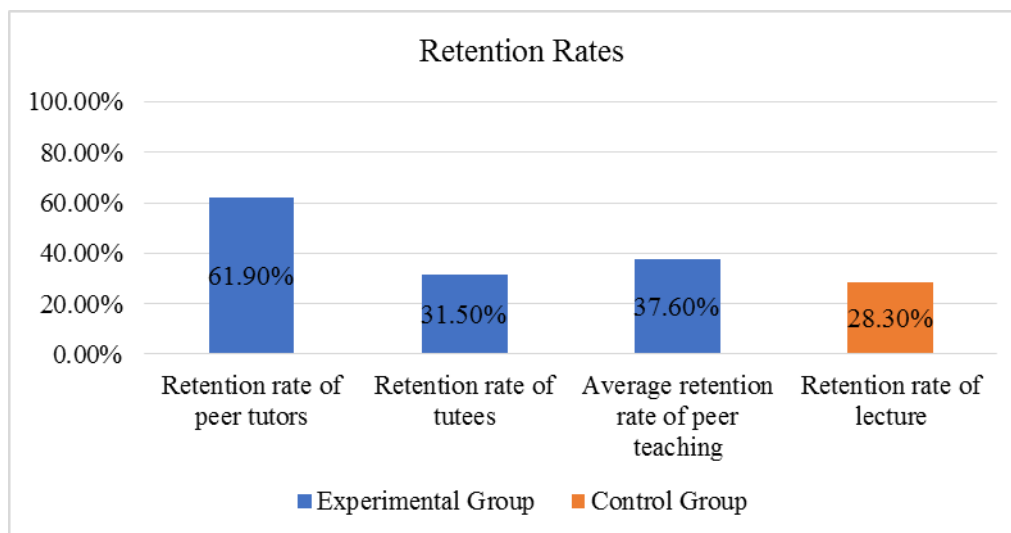
Figure 1. Retention rates of different teaching methods

Yet, it is worth mentioning that along with a higher retention rate generated from peer teaching, the error rate also increased. From the results of the retention quiz, 2 mistakes were found from the control group, and 9 errors were found from the experimental group, which contributes to around 10% of the total number of answers from that group. Although no simple conclusion can be drawn from the abovementioned data (because it is hard to identify whether the high error rates come from the retention process of the tutees themselves or inappropriate teaching by their peer tutors), it does indicate that, when celebrating the positive values gained from peer teaching, considerations should also be given to ensure teaching quality and accuracy.

4.2 Students' Perception of Peer Teaching

Students' perception of peer teaching was mainly positive. The majority of students viewed peer teaching as an interesting and worthwhile experience. 61.9% of students chose to agree or strongly agree with the statement 'Peer teaching is more interesting than lectures delivered by the teacher', and none of them disagreed with the statement; only one student disagreed with the statement 'I think it's a valuable experience to be taught by my peer', indicating that peer teaching is valued and favoured by the majority. This finding corresponds with previous studies. For example, based on the results of a survey studying students' views on reciprocal peer teaching in the Medical Gross Anatomy Laboratory, Bentley and Hill (2009) conclude that the vast majority of participants find reciprocal peer teaching beneficial and advocate it to be continued in future classes. A similar finding was concluded by Chan et al. (2021), who finds that peer teaching is preferred and regarded to be helpful in skill acquisition for medical students. One reason for this may be closely related to the 'flat hierarchies' brought by peer teaching when students can better engage in a more relaxed and informal way of learning from their peers compared with from a teacher (Elhassan, 2017).

However, students' opinions on peer teaching are also mixed with concerns, among which the greatest one probably lies in the lack of confidence in the teaching quality they receive from the peer teachers. This insufficient confidence is shown in questionnaire answers to Q4 ('When my classmates teach me something, I learn it better than when taught by my teacher in lectures'). Only one student chose to agree with this statement, while the rest chose to either disagree to different extents or remain neutral. For Q5 ('I prefer a mixture of peer teaching and lecture. For example, peer teaching followed by a brief review session from my teacher'), 85.7% of students chose to agree or strongly agree. Comments in the open-ended question on Q6 ('Other comments or suggestions on peer teaching') are also typically related to this concern, for example, 'Peer teaching is interesting, but lectures are more efficient and useful', 'If the content is difficult, lectures can be more effective', and 'It will be helpful if we can receive some training on the content from the teacher before we teach'. This worry, however, is not unique to this study and has also been noticed by other researchers. According to Ramaswamy, Harris, and Tschirner (2001), a similar concern was also raised by their target students as one of the major weaknesses of peer teaching. Bentley and Hill (2009) also argued that the unreliability of the teaching quality from peers is the major drawback of reciprocal peer teaching.

Table 1. Students' views on peer teaching

Items	Strongly agree/agree	Neutral	Strongly disagree/disagree	Mean (SD)
Q1. Peer teaching is more interesting than lectures delivered by the teacher.	61.9%	38.1%	0.0%	4.0 (0.9)
Q2. When I teach others something, I learn it better myself.	76.2%	19.0%	4.8%	4.0 (0.8)
Q3. I think it's a valuable experience to be taught by my peer.	66.7%	28.6%	4.8%	4.0 (0.9)
Q4. When my classmates teach me something, I learn it better than when taught by my teacher in lectures.	4.8%	42.9%	52.4%	2.4 (1.0)
Q5. I prefer a mixture of peer teaching and lecture. For example, peer teaching followed by a brief review session from my teacher.	85.7%	14.3%	0.0%	4.2 (0.7)

(1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree)

A widely adopted solution to address this issue could be teachers providing preteaching to student tutors (Rekrut, 1994). However, as discussed before, if this were to occur, the peer tutors would lose their opportunity to gain from autonomous learning and collaborative working while also consuming large amounts of class time. Therefore, instead of pretraining, an alternative solution based on my observation and students' feedback is to offer a brief review session lectured by the teacher after peer teaching, so as to reinforce the key information and correct the errors. In this way, 'the professor would thereby play the role of mentor, coach, and expert in the profession' (Ramaswamy et al., 2001, p. 170).

Another area that may influence student confidence and peer teaching quality is students' involvement in the 'teaching preparation session'. Allsopp (1997) pointed out that the use of collaborative planning and preparation before peer teaching can largely reduce the pretraining time provided by teachers. A similar approach was adopted by Rubin and Hebert (1998). In their research, student teachers were assigned into groups to negotiate ways to run a class before teaching their peers and the approach was believed to be worth using. In my research, the collaborative work of 'teaching preparation sessions' was also adopted. Observations have found student involvement in this session largely varies. Although more data need to be collected in future research, it may be worth the effort for teachers to encourage student engagement in the group discussion to amplify the effectiveness of collaborative learning and thereby enhance the quality of peer teaching.

Besides, it may also benefit students if more preparation time can be provided before peer teaching. This is also suggested by one of the student participants in the questionnaire, who stated, 'We should be better prepared before class so we won't waste class time.' A combination of peer teaching with flipped classroom could be considered in this case. In fact, recent research in other subjects has started experimenting with the combination of these two learning approaches, and the results have been positive (Chan et al., 2021; Meng et al., 2022; Lu et al., 2022).

5. Conclusion

This study applied reciprocal peer teaching in a 50-minute EAP class at a transnational university in China and aimed to investigate the effectiveness and students' views on this learning approach through the instruments of a retention quiz and a questionnaire. Results indicate that reciprocal peer teaching is more effective than lectures in enhancing knowledge retention for both student tutors and tutees, while the effect on student tutors is more prominent. Students' attitudes towards reciprocal peer teaching in EAP classes are mostly positive and they regard it as an interesting and valuable learning experience to teach and be taught by their peers. However, concerns regarding the uncertainty of teaching quality also arise from quantitative and qualitative data with a comparatively higher error rate and students' lower confidence in peer teaching compared with direct teaching from the teacher. Influential factors were discussed and possible solutions were provided for improving peer teaching quality, including adding a teacher review session after peer teaching activities, encouraging student engagement in the teaching preparation session, and combing peer teaching with flipped classroom.

Further research can be carried out on how to better equip student tutors both on their knowledge of the subject materials and teaching skills so as to enhance confidence and ensure the teaching quality of reciprocal peer teaching. Consideration could also be given to the possibility of expanding the scope of reciprocal peering

teaching in EAP classes and examining not only students' knowledge retention but also higher-order thinking skills. In addition, even though based on the results collected in this research it seems that peer teaching is a more engaging and effective instructional method compared to a more teacher-centred way of lecturing, it is still important for us to note that no single instructional method should be considered as the only or best way of teaching in all scenarios. Instead, it is always necessary for us to acknowledge the complementary nature of different instructional methods; thereby, it is suggested for further study to explore the combination of different teaching approaches so as to satisfy different learning needs.

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