Effect of Scaffolding and Peer Review on Learning in a PAD Class

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Abstract

We investigated the effectiveness of peer review in the PAD class teaching mode in a university English course in northwest China using both qualitative and quantitative methods; we collected data through teaching platform observation, text analysis, and questionnaires. 378 useable responses were received from non-English major undergraduates.

Peer review assignments in the PAD class improved the autonomy, collaboration and critical consciousness of university students in learning English. The active participation, help, question raising and problem solving of peers allowed students to improve their English. In the correlation analysis, the three dimensions：peer feedback analysis; analysis of online speech; discussion, and writing analysis of questionnaire survey of peer review showed significant correlation in a peer review survey (p<0.01). Among them, the attitude and evaluation ability of peer review were related to "subjective initiative, critical thinking, learning ability and evaluation ability to promote learners' English application ability", and the organization way of peer evaluation was related to "open mind and systematic ability". There were strong correlations between the evaluation criteria of peer assessment and "systematic ability and cognitive maturity" (0.6<r<0.8). The other dimensions were very strongly correlated (r>0.8).

Peer review in the PAD class mode was effective; most learners showed a positive attitude towards this method; adopting it can not only avoid increasing teacher workload, but also gave multidimensional feedback to the teachers about student learning situations. It can also guide the second language learners to improve their learning methods.

Keywords: PAD class mode, peer review, English course

1. Introduction

English was first introduced as a school subject in China in the 19th century (Gao, 2005). However, with the development of China's technology and economy, many teaching methods were introduced to improve learning of English as a second language. One which had a strong and effective was Communicative Language Teaching (CLT) (Hu, 2005a) - a learner centered approach, which regards communication as an important goal (Holliday, 2007). Driven by CLT, in China, many textbooks have been updated, and textbook authors and publishers have worked together on the updates (Hu, 2005b).

1.1 Communicative Language Teaching (CLT)

Starting in the 1970s and early 1980s, CLT has encouraged a transition in language pedagogy which has evolved from a grammar-translation method to a direct, audiolingual method (Schmitt, 2002). The CLT method attempts to emulate a target-culture environment and "to create in the classroom the conditions which exist in 'natural' language learning" (Hughes, 1983). CLT has had a major influence on language teaching practice, including syllabus design, textbook compilation and in the methodology of English language teaching. The focus of English teaching reform was an emphasis on listening and oral abilities and a shift from reading-centered English teaching to a teaching mode that emphasized oral and listening skills. Schulz (2006) contended that communicative competence. To better cultivate students' communicative competence, we should adopt socially-based approaches to how language was used and learned. Following Firth and Wagner (1998), who viewed that use and learning are inseparable, because they are part of the same dialectically organized activity, sociocultural theory recognizes the community as the entity enabling and creating the language mediation, that is fundamental to both language acquisition and use.

In China, the College English Curriculum Requirements (Zhang, 2017) opened a greater scope to encourage the implementation of learner-centered teaching approaches; it viewed language proficiency as a whole and especially stressed cultivating oral skills. The requirement was practical and useful and tried to solve the "dumb-and-deaf English" problem. It demonstrated a stronger determination and more strongly encouraged development of a learner-centered curriculum than ever before. CLT has been widely seen at every level of English language teaching in China in recent years. However, many language teachers feel confused as how to implement CLT in the classroom (Rahimpour & Zakeri, 2011). There has always been a conflict between traditional English teaching and CLT methods and learning concepts in cultivating student language application ability and critical thinking ability.

Many years ago, western classroom pedagogy changed to become essentially student-centered (Mitchell & Lee, 2003): the curriculum was dominated by knowledge to be transmitted, and the emphasis was on convergence of behavior and thought, whereas in China, the school culture of conformity and control remained reinforced by social norms of reverence for authority (Tomlinson, 1988).

The College English Curriculum Requirements (Zhang, 2017) stated that the objective in teaching English was to cultivate comprehensive use of English, especially listening and oral skills, and to enable them to carry on effective communication in the future study, work and social interaction. At the same time, students' self-study ability and comprehensive cultural awareness should also be enhanced so as to meet the social development and international communication (Zhang, 2017).

Therefore, innovation in teaching methods is imperative: with the development of the education technology, traditional methods remain difficult to continue to adapt to the current English second language education environment in China, thus the education community needs a new method, - one that conforms to the Chinese teaching culture.

1.2 Adaptation of CLT: Western Countries vs China

The CLT method, widely adopted in the west, is not simply and directly adapted to a Chinese environment due to China's long and unique cultural background. Education in China has long been teacher centered: teachers present new facts and then assign homework tasks, which usually focus on mechanical memorization, resulting in student lack of independent thinking ability; However western countries have long been student-centered, with a strong sense of independence and critical thinking ability (Ding, Sitthiworachart, & Morris, 2023). English teaching in China used to be teacher-centered, and students were regarded as passive learners (Cai, 2005; Wu, 2003). However, it is recognized, at least among some scholars, that the language learning necessarily involves gaining mastery over the sociolinguistic and pragmatic rules of the target language (Canale & Swain, 1980; Paulston, 1974). For learners of a foreign language, while linguistic forms are important aspects of learning, functional abilities in the target language in real-life communication are the ultimate goals. However, the general situation of English teaching in China does not seem to recognize this. With the aim of keeping up with the rapid development of society and the economic globalization, English, as an international language and an international working language, is becoming more and more important for all who live in this global village. Therefore, "communicative competence" was clearly stated in the College English Curriculum Requirements (Zhang, 2017), where one of the main objectives of educational systems was to maintain the status quo and to train students to become obedient and responsible citizens (LoCastro, 1996).

However, most language teachers feel confused as how to carry out the CLT in the classroom (Rahimpour, 2011). There have always been conflicts between CLT and traditional Chinese teaching method and learning concepts. One of the main objectives of educational systems seems to be to maintain the status quo and to train students to become obedient and responsible citizens (LoCastro, 1996). Classroom pedagogy is essentially teacher-centered (Mitchell & Lee, 2003), the curriculum is dominated by knowledge to be transmitted, and the emphasis is on convergence of behavior and thought. In China the school culture of conformity and control is reinforced by social norms of reverence for authority (Tomlinson, 1988). English teaching in China used to be teacher-centered, and students were regarded as passive learners (Cai, 2005; Wu, 2003). However, it is recognized, at least among some scholars, that the language learning necessarily involves gaining mastery over the sociolinguistic and pragmatic rules of the target language (Canale & Swain, 1980; Paulston,1975).

1.3 PAD Teaching Mode

The Presentation Assimilation Discussion (PAD) classroom model and many positive teaching methods were born from a background where English teaching was time-consuming and inefficient (Zhang, 2016). The PAD class is a new teaching approach in China, originally created by Zhang and his colleagues. It has three components: 'Presentation', 'Assimilation', and 'Discussion'. Compared with traditional classrooms, whereas before teachers gave lectures, under the 'chalk and talk' or 'whole-class teaching' method, the PAD class advocated allocating part of the class time to students for independent learning and cooperation with peers, and is described in more detail in Section 2.1.

1.4 Research Questions

The PAD teaching method in a university English course, was augmented with peer review and discussion. Three research questions, related to the PAD teaching mode, were posed in this paper:

    (1)   Which critical thinking abilities of learners were improved by peer review?

    (2)   What were the scaffolding effects of peer review?

    (3)   What were student attitudes towards peer review in a PAD class?

2. Literature Review

2.1 PAD Class

The PAD class mode has been shown to be successful in promoting English teaching (Ding et al,, 2023). In the PAD mode, D represents discussion: in the discussion, many peer review activities are involved, which further promotes the development of teaching depth, and provides students with more opportunities to think deeply and cultivate critical thinking.

The PAD class mode is a new teaching approach in China, which was originally created by Chinese educators. The PAD class mode comprises 'Presentation', 'Assimilation', and 'Discussion'. Compared with traditional classrooms where teachers give lectures under the 'chalk and talk' or 'whole-class teaching' method, the PAD class advocates allocating part of the class time to students for independent

learning and cooperation with peers, usually in groups, after the teacher's presentation (Zhang, 2016). From 2014 to 2016, with the help of the internet and word-of-mouth from practitioners, the PAD class continued to develop in practice (Zhang, 2016). It is worth noting that unlike the Quality Education and the Curriculum Reform in Basic Education that were previously implemented at the national level, the PAD class was not formally promoted by the national education department, but the founder and proponents actively promoted it through lectures and training programs (Zhang, 2017). Therefore, there are no mandatory policies and measures in the implementation process, but the acceptance of the PAD class among local education bureaus, school leaders and front-line teachers has continued to increase (Zhang, 2017). By December, 2021, Ding et al. (2023) found that the PAD class approach has been implemented in more than 1000 schools and more than 3,400 papers and studies on it were published in China. Several others were published by Chinese proponents of the technique in international journals (Li et al., 2021; Xu et al., 2021; Wang et al., 2021).

The PAD Class mode has four closely connected elements - Presentation, Assimilation, Discussion and Dialogue (see figure 1):
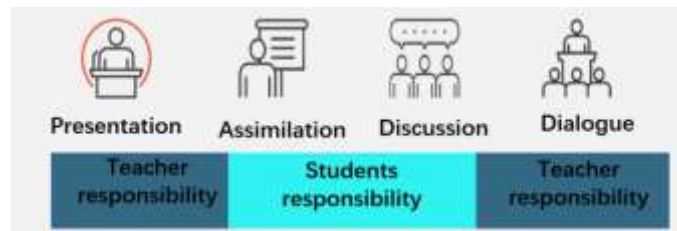

Figure 1. Four Elements of PAD Class Mode - taken from Zhang (2017)

Its implementation steps are scientific and can be applied to teach many disciplines - see Figure 2:
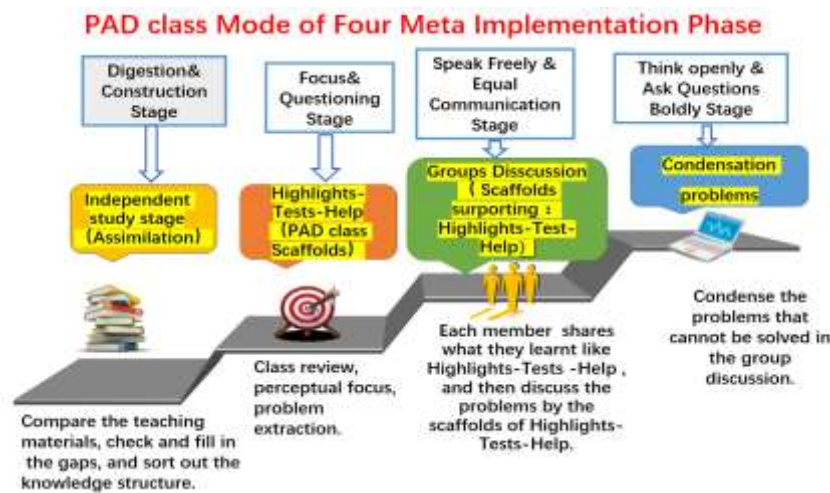

Figure 2. PAD class - Four Implementation Phases - taken from Zhang (2017)

The PAD class theory combines Vygotsky's SCT's (1978, 1987, 1989), especially the effectiveness of teacher-student negotiation and interaction under the framework of scaffolding and the Zone of Proximal Development (ZPD) – see section 2.3.

2.2 Peer Review

Peer review has become a fundamental practice for classroom-based assessment in terms of its learning-oriented and formative nature and has been extensively reviewed (Ding, Sitthiworachart & Joy, 2021): it has multiple benefits for student learning – for one recent discussion, see Yin et al. (2022). Note that, for this paper, peer assessment and peer review are mostly synonyms: we chose 'review' as the simpler term. We use 'assessment' only when some formal score is generated, so review covers the more informal process of simply improving or correcting a document, whether or not some score was assigned.

There are three main stakeholders (i.e., agents) in formative review - teachers, students and peers. Teachers need to help students understand the criteria for success and present opportunities for evaluation to the latter through assessments. Students should be responsible for their learning and adjust by asking questions, undertaking self-reflection, and revising their work in response to the assessment results (Turner and Purpura, 2016). At least three types of dyadic relationships are relevant in this process, including examiner-to-examinee, examinees with themselves, and examinee-to-examinee. However, the dynamics between human beings can be complicated, which adds to the challenges for effective formative assessment (Bennett, 2011; Yin et al., 2022). Peer review is an excellent type of formative assessment (Brown, 2004). Formative peer review happens through the development of student learning activities. The students can improve their writing ability by assessing and editing their own and peer writing. It involves t students' participation in the learning process. They provide not only quantitative marks during learning, but also detailed feedback on strengths and weaknesses (Topping et al., 2000).

Providing feedback to learners is the goal of peer review (Topping, 2009). Ding, Sitthiworachart & Morris (2023) claimed that feedback from friends was helpful because it is from their point of view rather than an expert's feedback. However, the students must be reminded to provide constructive comments and given clear guideline in giving feedback to their peer's writing. Peer review has three key elements - feedback from givers, the content, and to receivers. Firstly, the giver is a student who provides feedback or gives comment. Secondly, the content is the actual comment. Thirdly, the receiver is a student who receives the feedback (Morran et al., 1985).

In addition to conventional sources, The China National Knowledge Infrastructure database (CNKI) was used to find sources, particularly "PAD" appears in many CNKI entries, but relatively rarely in international sources. Searching CNKI for "peer" + "assessment" or "review" as well as "English as a foreign language" returned more than 2200 articles.

In the past two decades, peer review has been widely used in English teaching and has led to significant research in second language acquisition (Yu, 2021) . In peer review, students provide oral or written feedback for their peers' assignments in paris or in larger groups (Yu & Lee, 2016). It is an important feedback mechanism that affects the speaking and writing quality of second language learners. Studies outside China mainly focus on the type and characteristics of peer review, and believe that peerscores are an important part of assessment (Patchan & Schunn, 2016). Peer comments and teacher comments have the same effect, and peer evaluation can better help peers improve learners' learning ability (Cho & MacArthur, 2011). On the other hand, Chinese research mainly focused on the promotion of peer review on English learning: Cai (2011) found that peer review helped students form English learning communities.

2.3 Scaffolding Theory

The term "scaffold" comes from the "scaffolds", added outside a building to support its construction. It was adopted by the New Vygotsky School, including Bruner, a famous American psychologist and educationist (Vygotsky ,1978), for a new theory of the 'zone of proximal development' (ZPD); Lantolf (2000) described this zone a site for the social forms of mediation; he also emphasized that the ZPD should not be understood as a physical place in time and space, but rather as "a metaphor for observing and understanding how meditation was appropriate for understanding". The second stage of PAD mode-Assimilation embodies this principle。

2.3.1 Scaffolding

"Scaffolding" refers to the collaboration to facilitate learning, analogous with the builder's "scaffolds", close to face of a new building to support workers during construction.

It can be "adult-child" or "professional" or "amateur " collaborative behavior, or peer interaction (Lantolf & Thorne, 2006). Scaffolds help learners to cross the ZPD give full play to their subjective initiative, critical thinking, learning and evaluation ability through cooperation with peers (Vygotsky, 1989).,

2.3.2 Scaffolding in the PAD Class

Teacher presentation in the PAD class is a 'scaffold' to provide a clear explanation and interpretation of new knowledge to develop and advance the ZPD of individual students. Additionally, scaffolding comes – not only from teachers - but also from peers who are expected to mediate the ZPD with each other in discussion and negotiation. Students have the opportunity to review and reconstruct their understanding of knowledge through task sheets in the assimilation section and are better prepared to enter the group discussion stage to verify their understanding. Students are exposed to the target language and involved in the negotiation of meaning (Long, 1981), when discussing different topics. They, therefore, learn how to work with others and receive help and correction from outstanding peers. In the PAD class, students actively engage with learning and are exposed to comprehensible input about the target language.

Many researchers have linked English teaching and peer assessment or English teaching and scaffolding, but no research to date has linked PAD teaching with peer review and scaffolding.

3. Methodology

This study combined qualitative and quantitative research methods – qualitative research mainly used literature search, whereas quantitative research mainly used a questionnaire. The questionnaire included the peer review effect scale, i.e. the size of the peer review group, and a peer review preference score. The evaluation scale measured the effect of peer review, and obtained comments on suggestions for improving peer review.

Students completed a questionnaire after the peer review activity using the "PAD class peer review activity questionnaire", and analyzed their participation in the activity. Details of the subjects are listed in Table 2: they were Chinese, whose majors were not English language.

The questionnaire had three parts: actual questions in Chinese and English are in Appendix 2.

a) 22 questions: to judge peer review from the perspective of personal benefits in three dimensions: advantages and disadvantages of it, discussing and reading peer assignments, discussing and evaluating peer work (Liu, 2021),

b) 8 questions: related to student assignments contents, (Wu &Chen, 2021) and

c) 10 questions: mainly about peer review in the group, divided into three dimensions: recognition of peer review, benefits of peer review, and suggestions for peer review（Ding et al., 2023）.

3.1 Research Design

3.1.1 Course objectives

Based on university English courses, we designed peer review activities to improve student critical thinking level, while achieving the course objectives. The course had five units - see Table 1.

Table 1. Teaching Content and Peer Review Activities (Units 1 to 5 were taken from Ji et al., (2021).

Teaching Content		Unit 1 Growing up	Unit 2 Friendship	Unit 3 Understanding Science	Unit 4 The American Dream	Unit 5 Work to Live or Live to work
PAD Teaching Steps and related peer review activities	**P**-Presentation (Teacher)	Detailed explanation - teaching content following curriculum plan				
	Activity	None				
	A-Assimilation (Students)	Summarized content and showed as mind map				
	Activities (Peers)	Discuss mind maps in the process of assimilation				
	D-Discussion (Teachers & Students)	Process includes student-student group discussion and teacher-student Q&A communication.				
	Activities	In combination with English courses, screened contents of mutual evaluation Two rounds of peer review activities by selecting comprehensive works with two themes of oral and writing assignments Teachers take an example case to guide students.				

3.1.2 Students

In peer review activities, students are the active group: they need to evaluate the course content, complete the evaluation, and objectively evaluate peer work - see Table 3. Evaluators point out the advantages and disadvantages of peer work by reviewing it, encourage and affirm the advantages, provide reference for themselves, and propose improvement or suggestions for the shortcomings. From peer review comments, the evaluated student will improve his or her own work and its quality. In this process, each student is both an evaluator and a subject.

The design of the peer review steps takes the development of student critical thinking as the main line. First, teachers upload learning resources on the online platform to instruct students how follow the PAD class mode process, so that they can become familiar with the course content, assign homework, and let students understand what they learned. After that, according to the assignment content, teachers and students have online discussions to generate assignment evaluation criteria (see Table 3). Then teachers organize students to evaluate formally to ensure peer review quality.

3.1.3 Peer Review Interaction Platform

The questionnaire used the "Superstar Learning Link" platform (Wenjuanxing, 2022), which is very convenient for teachers to manage their classes and understand student progress.

3.2 Research Subjects

The subjects, classes, and majors involved are shown in Table 2.

Table 2. Demographics

University	Lanzhou University of Arts and Sciences			
City	Lanzhou City, Gansu Province, China (36.06516°N, 103.89595°E)			
Total Number of students	400			
Gender	male	200	female	200
Age range	18-21			
Majors	Preschool Education	Chinese Lang & Lit	Law	Biological Engineering
Students	120	80	80	120

3.3 Research Tools

The questionnaire had 40 questions, which were divided into four dimensions to test students' subjective initiative, critical thinking, learning and evaluation ability (see Appendix 2 for Chinese and English versions). A 5-level Likert scale was used: strongly disagree=1, disagree=2, uncertain=3, agree=4, strongly agree=5.

The questionnaire captured student perception of their learning experience: it had three parts:

- 22 questions to judge peer review from the perspective of personal profits in three dimensions: advantages and disadvantages, discussing and reading peer assignments, discussing and evaluating peer work assignments;

- 8 questions related to student assignments contents.
- 10 questions, mainly about peer review in the group, divided into three dimensions: recognition of it, benefit from it, and suggestions.

They were scored on degree of conformity of each statement to itself, according to the actual situation. Scores were Poor= 1, Improved=2, Fair=3, Good=4, and Excellent=5. The last part contained open questions about peer review, that prompted students to detail their experiences during the course. Specifically, the questions addressed were:

- student overall perception,
- whether students benefited from peer assessment key points and
- other comments.

These open questions were also used in subsequent interviews to further solicit student opinions. All participants were Chinese, so the questionnaires and interviews were conducted in Chinese – see original wording in Appendix 2.

Research tools also included an online teaching platform during the epidemic (Dingding, 2022), mainly using broadcast or screen sharing. The texts were:

- New Horizon College English Reading and
- Writing Course 2 (Third Edition) units 1-5,

both taken from Ji, Wu, & Chen (2021).

3.4 Research Implementation

Peer evaluation attaches importance to students' dominant positions. Students first explain the teaching resources uploaded by the teacher, then the teacher arranges for students to assimilate them, and then discuss and assign assignments. The assignment requirements were: complete knowledge points covering four sections: introduction, explanation, expansion and evaluation and reflection. PowerPoint assignments will be submitted after completion. After that, students will discuss online with teachers and peers to generate evaluation standards. Teachers will take a case as an example to make comments to guide students.

In combination with English courses, the content of mutual evaluation was screened, and two rounds of peer reviews were made by selecting comprehensive works with two themes: oral assignments and writing assignments - see Table 3 Peer evaluation of oral and written English was based on a given topic, for example, "Omicron's harm to people and the optimal way of treating it", to introduce thinking consciousness into English practice teaching activities, and guide students to seek ways to solve real problems.

Table 3. Research Implementation

Research Process	Peer Review Items	Evaluation Standards	Scaffolding		Critical Thinking
Students first explain teaching resources uploaded by the teacher on the learning platform	(1) Peer review of oral recordings (2) Peer evaluation of writing Assignment Title: "Omicron's harm to people and the optimal way of treatment".	Students discuss online with teachers and peers to generate evaluation standards.	Teaching resources provide a scaffolding framework	The whole teaching process P (Presentation) A (Assimilation) D (Discussion) D (Dialogue) is a whole process scaffold	Self Confidence in Critical Thinking
Teacher presentations			Key teaching content		Learning Ability
Students assimilate them			Key points of mind mapping		Learning Ability
Students (according to different unit contents): introduction, explanation, expansion and evaluation and reflection.			Introduction, explanation, expansion and evaluation and reflection		Evaluation Ability& Learning Ability
Students submitted the Power Point assignments			Assignments tasks		Self Confidence in Critical Thinking

3.5 Data Collection

We collected the data from three sources: student review assignments, statistical data from the Ding Ding teaching platform (Dingding, 2022) and questionnaires.

3.6 Data Analysis

A paired sample *t*-test was run on the critical thinking tendency scale to observe the changes in student critical thinking following peer review activities, and to verify that peer review improved critical thinking. Finally, correlations were computed between subjective initiative, critical thinking, learning ability and evaluation ability of peer assessment activities, and the tendency of learners to promote their

English application ability to confirm the reason for this improvement Peer review was analyzed from three aspects:

1) peer feedback analysis.

2) analysis of online speech, discussion, and writing

3) analysis of questionnaire survey.

4. Results

4.1 Reliability and Validity of the Questionnaire

4.1.1 Reliability Analysis

Reliability analysis ensured the stability and reliability of questionnaire analysis - set Table 4. Cronbach-α coefficients of the full questionnaire and all dimensions of it were above 0.8, confirming a high internal consistency of the scale.

Table 4. Questionnaire Reliability Analysis

Variable	Dimension	Item	α
Peer Review	Peer Evaluation, Attitude and Feeling	11	0.977
	Peer Review Organization	6	0.918
	Peer Evaluation Criteria	5	0.908
	Total	22	0.976
Critical Thinking	Self Confidence in Critical Thinking	12	0.927
	Learning Ability	10	0.952
	Evaluation Ability	9	0.925
	Total	31	0.965

4.1.2 Validity Analysis

Validity refers to the effectiveness of a test tool, which can reflect the accuracy of a test. The analysis by SPSS 27.0 showed that the Kaiser-Meyer-Olkin test (KMO) values of all dimensions and the overall scale were >0.7, and Bartlett values were $p<0.001$, see Table 5, confirming that the scale items were valid.

Table 5. Questionnaire structure validity analysis

Variables	Dimension	KMO	Bartlett sphericity test		
			χ^2	df	p
Peer Review	Peer Evaluation, Attitude and Feeling	0.935	1053.4	55	<0.001
	Peer Review Organization	0.824	305.8	15	<0.001
	Peer Evaluation Criteria	0.879	208.9	10	<0.001
	Total	0.921	1847.5	231	<0.001
Critical Thinking	Self Confidence in Critical Thinking	0.921	632.4	45	<0.001
	Learning Ability	0.889	348.6	21	<0.001
	Evaluation Ability	0.900	405.1	36	<0.001
	Total	0.780	4931.6	2016	<0.001

4.2 Data Analysis

4.2.1 Paired Sample t-test.

A paired sample t-test confirmed a significant improvement following peer review from pre- to post-test data in each dimension of critical thinking - see Table 6. In the three dimensions of analytical ability, intellectual curiosity and critical thinking confidence, the post-test versus pre-test showed very significant improvements ($p<0.001$), whereas systematic ability and subjective initiative and learning ability had smaller, but significant, improvements ($p <0.05$) and evaluation ability improved slightly, but not significantly ($p=0.32$, i.e $p>0.05$).

Table 6. Paired sample t-test

Pre- test and post -test comparison of various dimensions of critical thinking				
Dimension	Pre-test	Post-test	*t*	*p*
Self Confidence in Critical Thinking	2.7±0.8	3.6±0.8	-5.489	<0.001
Learning Ability	2.9±0.8	3.5±0.7	-4.058	<0.001
Evaluation Ability	3.0±0.9	3.2±0.7	-0.991	0.325

Table 6 shows that after adding peer review activities, student critical thinking improved in all dimensions compared with before the activities, i.e the peer review designed here had the expected benefit.

4.2.2 Correlation Analysis

Correlation analysis can objectively explain the closeness of the relationship between things, and outputs a correlation coefficient, *r*, to express the correlation between variables. We computed correlation coefficients on the four dimensions of peer review to investigate the impact of peer review on critical thinking. The results are in Table 7.

Table 7. Correlation Analysis

Dimension	Statistic	Self Confidence in Critical Thinking	Learning Ability	Evaluation Ability
Peer Review, Attitude and Feeling	Pearson Correlation	0.767[**]	0.863**	0.746[**]
	Significance (Bilateral)	<0.001	<0.001	<0.001
Peer Review Organization	Pearson Correlation	0.843[**]	0.874**	0.817[**]
	Significance (Bilateral)	<0.001	<0.001	<0.001
Peer Review Criteria	Pearson Correlation	0.870[**]	0.839**	0.758[**]
	Significance (Bilateral)	<0.001	<0.001	<0.001

Strong correlations are marked with **

The data confirmed that the three dimensions of peer review were significantly correlated (p<0.01)

5. Discussions

5.1 Research Question 1

What critical thinking skills were improved by peer review?

From analysis of the classroom discourse, our study suggested that is a viable framework for investigating the peer review process during the English instructional episodes in the classroom setting. In the classroom situation, the teacher used various strategies to provide students with scaffolding, mainly during dependent exchanges, promoting a positive learning attitude, subjective initiative, critical thinking, learning ability, evaluation ability and cultivating autonomous learning ability - see Tables 3 & 7.

Learning attitude was the main intrinsic motivation for students to actively participate. The scores of learning interest, learning experience, learning habit, learning cognition and the total score of learning attitude were high. Peer review deepened student internal and external understanding of the course; it also stimulated student motivation and improved the classroom atmosphere; an online and offline interactive teaching mode ensured that students could ask questions at any time. The effective integration of these teaching methods continuously cultivated student interest, optimized their experience and cognition, developed good study habits, and then formed a positive learning attitude and improved learning engagement. Similar studies confirmed this (Li, Leng & Wang, 2020; Ren, Ren & Feng, 2020; Dong, Bu & Bong, 2019). The online PAD support App "Duifen Yi" or "对分易" (Ding et al., 2023) effectively transformed the online class into a conventional class.

5.2 Answering Research Question 1

What were the scaffolding effects of peer review in PAD teaching?

Few studies have analyzed the interaction and scaffolding effect of peer review in English teaching. Therefore, we combined scaffolding theory to explore peer review in an English classroom, so that teachers could better handle different interactions from the students, guide students to effectively use the steps in the PAD model and promote the effectiveness of peer review and improve the quality of English learning.

The PAD class presentation focused on the intensive teaching of key knowledge points, students were required to learn independently and assimilate their knowledge with the "Highlight-Test-Help" as the scaffold support. Although it added moderate learning pressure on the students, it also inspired student discussion and motivation to increase their interest in learning. In the follow-up, students used groups of peer review discussions with questions, and teachers randomly checked the teaching mode of asking and answering questions, to ensure that theoretical knowledge was firmly grasped, and improved knowledge assimilation in the discussion. It helped to cultivate the cooperative concept of peer review and interaction, so as to better adapt to new trends.

It was evident that, during peer review, students repaired and reworded their o w n w o r d s , and assisted each other to find the right form. Scaffolding promoted this a t b o t h word and sentence level - see Tables 3 & 6.

Scaffolded assistance was given in an interactive way and it was greatly determined by the students, who actively participated. Our analysis demonstrated the importance of the joint social activity and the value of the scaffolded assistance, during the multiple peer interactions. We also found that the PAD class scaffolding, during peer review interactions, catered for language learning in general. It exposed more scaffolding from the expert (teacher), in group discussions, teacher-student conversations and teacher feedback. This is consistent with Wu (1996, 1997), who emphasized that one of the essential factors in determining learner development of English skill was the interaction between the teacher and students in the classroom.

In the discussion stage, peer review had scaffolding support, and there was an extra stage before the discussion - see Figure 3. During the discussion, the teacher used scaffolding support to put forward the discussion framework, to be efficient.
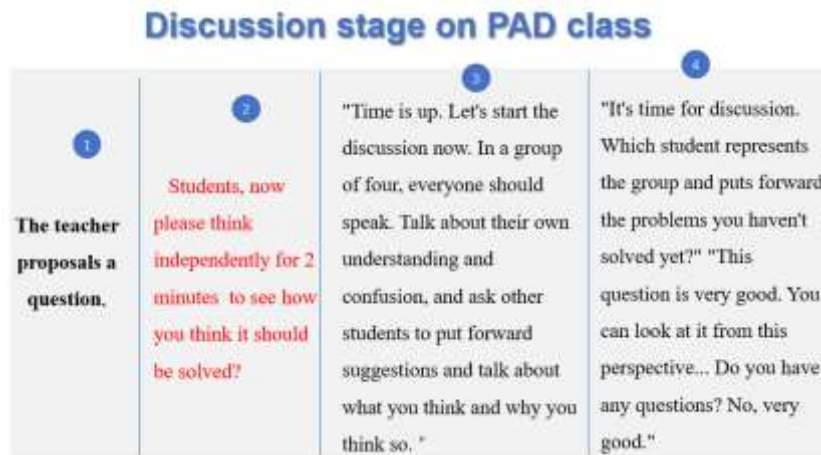
Figure 3. Discussion stage of PAD class

5.3 Answering Research Question 3

Student attitudes to peer review in a PAD class

We found that students were more satisfied with their experience in three aspects: teaching strategy, teaching evaluation and emotional experience (see Table 4). In PAD class teaching, there were more interactions between teachers and students and between students (see figure 3), which promoted communication with the actors effectively activating the classroom atmosphere, promoting students to examine and analyze problems from the perspective of others, and improving the ability of critical thinking and knowledge assimilation. At the same time, the online and offline interactive teaching platform effectively integrated teaching and multimedia, and allowed students to turn mobile phones into learning tools, enjoy learning, and ensured that teachers and students could effectively communicate and answer questions at any time (Ding et al., 2023). In summary, we provided evidence that PAD class scaffolding maintained student attention on the target language, while their participation in peer review helped them to reproduce linguistic features more accurately and fluently, since students had more opportunities to perform the set task. On the other hand, guiding students to follow a particular linguistic form induced them to fall back on their rule-based systems (Skehan, 1998).

6. Conclusion

Based on a quantitative and qualitative analysis of peer review in the PAD class mode, peer review and evaluated criteria were confirmed to be important factors to be considered when designing and targeting campaigns.

Our study showed that peer review in the PAD class mode was effective in learning the target forms; our analysis showed that the quality of peer review in PAD class extended students' English language ability. Students completed the task with great independence as a result of discourse with the teacher and their peers in class.

Through peer review in the PAD class, students predominantly discussed the meaning of words first, in order to smooth understanding, before turning to the linguistic features of the language.

Firstly, this study concerns the ways in which peer review helped the development of language skill. The peer review in PAD class provided a very effective form of interaction and pushed the individual student development, owing to the high quality of teacher and student interactions and teacher roles during scaffolding.

We argue that language ability can be stretched from the existing level of development to a new level through adequate, appropriate and high-quality external assistance at the right time by the teacher. It is the quality that guarantees learning and students can perform tasks independently via internal mediation within peer review.

Further, the study added interaction to the PAD class with peer review, so that student language proficiency developed from a sociocultural perspective.

6.1 Contributions

The contributions of this paper are:

- The combination of peer review and scaffolding in a PAD class has not been previously discussed.
- This teaching structure made teaching more compact and learning more efficient.
- We also showed how scaffolding theory was implemented in the PAD concept – linking two concepts - see Table 3.

6.2 Limitations and Future Research

6.2.1 Limitations

The present study was a small-scale, exploratory analysis of peer review interaction in PAD class mode at a single university in China: only 400 students from four majors in this university were selected. The experiment lasted only one semester.

6.2.2 Recommendations for Further Research

Future research needs to focus on analyzing individual differences in peer review learning. How the teacher takes care of these differences, when some students need more assistance than others, needs to be further discussed. It should examine a larger number of subjects with different proficiency levels. It should also cover different contexts that would contribute to a comprehensive understanding of the role of PAD class mode.

Disclosure statement

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Appendix 1. Semester course schedule

Period	Teaching period allocation	Teaching	Quiz	Assessment mode	Test
64		62	2	Credit	3
Textbooks	*New College English Comprehensive Course* (Second Edition), 2021,Volume 1 Ji Peiying, Wu Xiaozhen, Chen Jin, Shanghai Foreign Language Education Press				
Reference books	*College English comprehensive course for teachers, 2nd ed, publisher*：Shanghai Foreign Language Education Press				
	Zhang Dao's authentic English grammar, Foreign Language Teaching and Research Press				
	College English listening and speaking course for teachers, 2nd ed, Foreign Language Teaching and Research Pres				

Week	Teaching Content
1	Unit 1 Growing up New words and phrases Background Information Global reading of Text A: Writing for Myself
2	Unit 1 Growing up Detailed study of Text A & Exercises Text B: The Scholarship Jacket
3	Unit 1 Growing up Long passage reading: Text 1 Listening and speaking course
4	Unit 2 Friendship Words and phrases explanation Background Information Global reading of Text A: All the Cabbie Had Was a Letter
5	Unit 2 Friendship Detailed study of Text A & Exercises Text B: Never Let a Friend Down
6	Unit 2 Friendship Long passage reading: Text 1 Listening and speaking course
7	Unit 3 Understanding Science Words and phrases explanation Background Information Global reading of Text A: Public Attitudes Toward Science
8	Unit 3 Understanding Science Detailed study of Text A & Exercises Text B: How to Make Sense out of science
9	Unit 3 Understanding Science

	Long passage reading: Text 1 Listening and speaking course
10	Mid-term Test Unit 4 The American Dream Words and phrases explanation Background Information
11	Unit 4 The American Dream Global reading of Text A: Tony Trivisonno's American Dream Detailed study of Text A & Exercises
12	Unit 4 The American Dream Text B: With His Own Two Hands Long passage reading: Text 1
13	Unit 4 The American Dream Listening and speaking course Test Yourself (Unit 1—4)
14	Unit 5 Work to Live or Live to work Words and phrases explanation Background Information Global reading of Text A: The Company Man
15	Unit 5 Work to Live or Live to work Detailed study of Text A & Exercises Text B: You Might Be a Workaholic If …
16	Unit 5 Work to Live or Live to work Long passage reading: Text 1 Listening and speaking course

Appendix 2. PAD Questionnaire

The actual wording of the questionnaire follows, with rough translation to English interpolated.

<div align="center">

同伴互评调查问卷

Peer Review Questionnaire

</div>

　　各位同学好，本问卷主要调查英语学习者在参与同伴互评的感受。请大家认真阅读问卷并填写，所有数据仅用于研究目的，将妥善保管。本次问卷大约需要 7 分钟时间完成。

Hello, everyone. This survey is being run by the researcher to measure English learners' feelings about participating in peer review. Please read and fill in the questionnaire carefully. All data are collected for research purposes only and will be kept securely. This survey takes about 7 minutes to complete.

　　*评分题请根据实际情况，评定每一项表述与自己符合的程度，1 分表示"非常不符合"，2 分表示"不符合"，3 分表示"一般"，4 分表示"符合"，5 分表示"非常符合"。

　　*Please rate the degree of conformity of each statement to yourself according to the actual situation. 1 point means "Poor", 2 points means "Improvement", 3 points means "Fair", 4 points means "Good", and 5 points means "excellent".

　　*请根据实际情况对每个陈述的符合程度进行评分。请尽可能准确地回答调查。

　　*Please rate the degree of conformity of each statement to yourself according to the actual situation. Please answer the survey as accurately as possible.

　　谢谢大家！

　　Thank you!

一、个人体验

Part One Individual Experience

1. 我喜欢参与同伴互评。

　　I like to participate in peer review.

　　　　1 ○　　　2 ○　　　　3 ○　　　　4 ○　　　5 ○

2. 同伴互评方式对提高我的英语能力会有很大帮助。

   Peer review will be very helpful to improve my English ability.

        1 ○   2 ○   3 ○   4 ○   5 ○

3. 我喜欢阅读其他同学的作业。

   I like reading other student assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

4. 我愿意让其他同学读我的作业。

   I 'd like other students read my assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

5. 我喜欢讨论其他同学的作业。

   I like to discuss other student assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

6. 我喜欢给其他同学的作业写评语。

   I like to write comments on other students' assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

7. 我认为我能够客观地评价其他同学的作业。

   I think I can objectively evaluate the work of other students.

        1 ○   2 ○   3 ○   4 ○   5 ○

8. 我认为我可以看出其他同学作业中的优点和缺点。

   I think I can see the advantages and disadvantages of other students' assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

9. 我相信我的同学可以客观地评价我的作业。

   I believe my classmates can objectively evaluate my assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

10. 我相信我的同学能够看出我作业中的优点和缺点。

   I believe my classmates can see the advantages and disadvantages of my assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

11. 我认为同学的评分应当算入最后的总成绩。

   I think peer assessment scores should be included in the final total score.

        1 ○   2 ○   3 ○   4 ○   5 ○

12. 我愿意让其他的同学讨论我的作业。

    I like other students to discuss my assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

13. 我喜欢阅读同学给我的作业的评语。

    I like reading the comments on my assignments given by my classmates.

        1 ○   2 ○   3 ○   4 ○   5 ○

14. 同伴互评可以帮助我提高对作业的积极性。

    Peer review can help me improve my enthusiasm for assignments.

        1 ○   2 ○   3 ○   4 ○   5 ○

15. 参与同伴互评不会让我感到不舒服。

    Participating in peer review will not make me feel uncomfortable.

        1 ○   2 ○   3 ○   4 ○   5 ○

16. 讨论&阅读其他同学的作业帮助我有了更多的想法和灵感。

    Discussing & reading other students' assignments helped me have more ideas and inspiration.

1 ○   2 ○   3 ○   4 ○   5 ○

17. 讨论&阅读其他同学的作业帮助我改善了自己作业的结构。

　　Discussing & reading other students' assignments helped me improve the structure of my assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

18. 讨论&阅读其他同学的作业帮助我改进了自己作业的语言能力。

　　Discussing & reading other students' assignments helped me improve the language ability of my assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

19. 讨论和评价其他同学的作业，帮助我丰富了自己作业的内容。

　　Discussing & evaluating the assignments of other students helped me enrich the content of my own assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

20. 同学的评语帮助我丰富了自己作业的内容。

　　Peer comments helped me enrich my assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

21. 同学的评语帮助我改善了自己作业的结构。

　　Peer comments helped me improve the structure of my assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

22. 我在作业中会经常考虑到同学给我的建议。

　　In future assignments, I will always consider the peer assessment suggestions.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

二、作业的具体内容

Part Two Assignments contents

1. 在作业中更有条理地组织想法。

　　Organize your ideas more systematically in your assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

2. 在作业中使用准确的语法。

　　Use accurate grammar in assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

3. 在作业中涵盖合适的内容。

　　Include appropriate contents in the assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

4. 在作业中使用丰富的词汇。

　　Use rich vocabulary in assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

5. 作业中的形式和规范。

　　Forms and specifications in assignments.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

6. 同伴互评可以提高我的整体作业质量。

　　Peer evaluation can improve my overall work quality.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

7. 同伴互评可以加强我和同伴的交流与合作。

　　Peer review can strengthen the communication and cooperation between me and my peers.

　　　　1 ○   2 ○   3 ○   4 ○   5 ○

8. 同伴互评应该在作业训练中使用。

Peer assessment should be used in English learning.

    1 ○   2 ○   3 ○   4 ○   5 ○

三、小组

Part Three Group

1. 同伴互评是否让你们小组对课程论文和发言的重视程度有提高？

    Does peer review make your group pay more attention to course assignments and speeches?

        1 ○   2 ○   3 ○   4 ○   5 ○

2. 同伴互评是否让你在听取其他小组发言时的认真程度有提高？

    Does peer review make you more careful when listening to other groups?

        1 ○   2 ○   3 ○   4 ○   5 ○

3. 在评价他人学习成果的时候，你自己对学习目标（如何写好课程作业、做好课件和发言）的认识是否有提高？

    When evaluating others' learning achievements, have you improved your understanding of learning objectives (how to write course assignments, courseware and speech)?

        1 ○   2 ○   3 ○   4 ○   5 ○

4. 你认为课程作业交叉互评的评价是否客观准确？

    Do you think the peer evaluation of cross evaluation of course assignments is objective and accurate?

        1 ○   2 ○   3 ○   4 ○   5 ○

5. 你认为课程作业发言组间互评的评价和打分是否客观准确？

    Do you think the peer evaluation and scoring of the mutual evaluation between the speaking groups of the course assignments was objective and accurate?

        1 ○   2 ○   3 ○   4 ○   5 ○

6. 你认为组内同伴互评（确定贡献系数）是否客观准确？

    Do you think peer evaluation (determination of contribution coefficient) within the group was objective and accurate?

        1 ○   2 ○   3 ○   4 ○   5 ○

7. 你认为组内同伴互评（确定贡献系数）对减少"随同现象"是否有效果？

    Do you think peer evaluation within the group (determining contribution coefficient) has any effect on reducing "following others"?

        1 ○   2 ○   3 ○   4 ○   5 ○

8. 你认为同伴互评的评分应该如何反馈？

    How do you think peer review ratings should be fed back?

        1 ○   2 ○   3 ○   4 ○   5 ○

9. 你认为课程作业发言组间互评表的设计是否合理？

    Do you think the design of the inter group evaluation form for course assignments was reasonable?

        1 ○   2 ○   3 ○   4 ○   5 ○

10. 对于同伴互评，你有什么建议？可以分享一下自己具体的感受。

    What suggestions do you have for peer review? You can share your feelings.