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An Empirical Study of the Effectiveness of CMbL on China's EFL Students Critical Thinking in Speaking

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Abstract: With the in-depth development of globalization, international competition has become increasingly fierce, the cultivation of critical thinking skills is regarded as one of the important directions of China's higher educational reform. In China, the development of college students' speaking lags behind the development of listening, reading, writing and translation due to the limited classroom teaching hours, the fixed teaching mode, the lack of real language environment, students' weak self-confidence and self-satisfaction, and the lack of critical thinking ability. The study mainly investigated to the impact of Collaborative Mobile-blended learning on the EFL students' critical speaking proficiency with respect to the seven intellectual standards proposed by Richard Paul and Linder Elder (2013). Experimental research design was conducted to examine the differences between the non-treatment and treatment groups. Data were drawn from 61 students of the English Language Teaching department and collected through the designed task rubric and speech samples. The findings indicated that the CMbL mode has an positive imfluence on effect on the oral performance of the speakers.Additionally, The quantitative results showed a statistically significant difference between two main research groups. This study proposes language teachers a synthesized CMbL model enhanced with critical thinking standards in students' speaking proficiency.

1. Introducation

In recent years, Optimizing the education and teaching process and improving students' critical thinking ability and learning effectiveness has been the focus of studies in higher education and related fields in China[14] [20][21][25](Luo & Zhou, 2024; Wang & Zhang, 2019; Zhengshuan & Yingxin, 2014). However, in English EFL teaching, instructors are still mainly concerned with students' grasp of the form and meaning of language, as well as training in listening, speaking,

reading, and writing[24](Zhang & An, 2019).Thus, this misunderstanding and emphasis casuse "the absence of critical thinking" in the second language teaching and learning process.

Additionally, in EFL speaking class, The deep-rooted problem is EFL students' insufficient confidence and low self-efficacy and their their ambiguous and incomplete sentences and confusing thinking logic fails in speaking out a second language freely and proficiently(Figure1). Gradually, these blocks the way to internalization and language output.

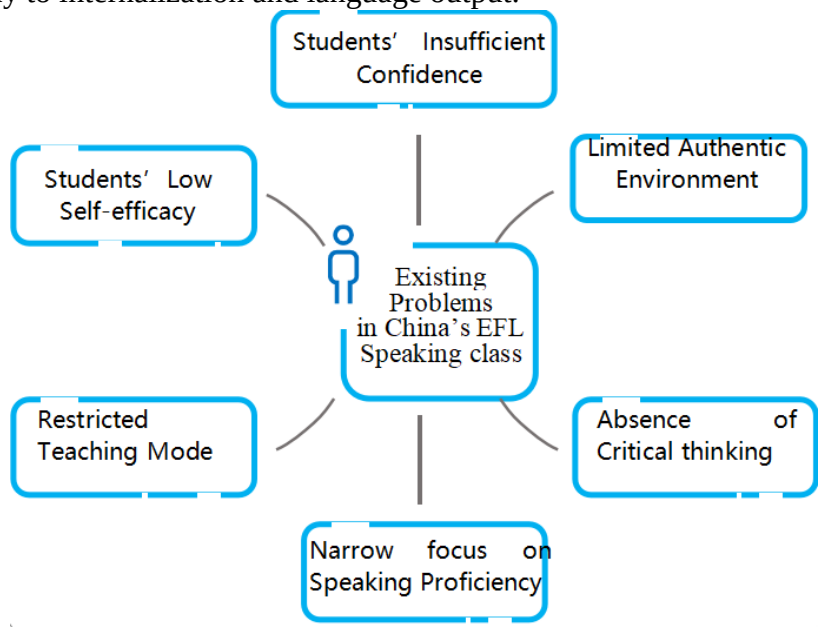

Figure 1. The Obstacles of China's EFL Speaking Class

After the outbreak of COVID-19 , Chinese higher education is increasingly integrating the technology and education.mobile-blended learning mode has become an inevitable trend of college English curriculum reform in China. Collaborative Mobile-blended learning(Figure2), namely, combines the collaborative learning and mobile-blended learning.Collaborative learning, known as CL, is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product[12] (Laal & Laal, 2012), understood as a " fundamentally social process of knowledge building"[16](Miyake & Kirschner, 2014).Mobile blended learning is a blended learning system with an assistance of using mobile communication technology where its characteristics are mobility and situational learning . That means, formal and informal learning can be supported by mobile technologies and even "a small and wider online learning community including participation of teachers and family in various modes of interaction"[3](Borup et al., 2020).

Critical thinking is a purposeful, self-regulatory process that involves interpreting, analyzing, evaluating, and inferring information to make reasoned judgments and solve problems (Facione, 1990).Chinese scholar Wen Qiufang suggests that critical thinking should be understood as a higher-level thinking ability. It contains skills for identifying, analyzing, and evaluating arguments, overcoming biases, and making intelligent, reasonable decisions. Richard Paul and Linder Elder (2012) classified several intellectual standards referring to the thinking abilities, namely clarity, accuarcy, relevance, significance, completeness, logic and depth. However, most researches conducted the study of EFL speaking from the linguistic aspects. Seldom consider their speaking from those intellectual aspects. Therefore, this study investigate the effectiveness of integrating the

CMbL into the EFL speaking class with the consideration of the above mentioned seven standards. Based on the above focus, the research aims to:

(1) To investigate participants' speaking proficiency before and after the the treatment of CMbL both in EG and CG.

(2) To investigate which intellectual standards have been significantly in EG class.

2. Literature Review

The cover of the Web and mobile devices among the students has brought new opportunities to the subject of teaching and learning[9](Hwang & Tsai, 2011). The Internet can provide rich learning resources, break through the time and space constraints of collaborative learning, and provide a variety of communication tools[11](Kukulska‐Hulme & Viberg, 2018).

The benefits of collaborative learning activities in a mobile blended learning environment are as follows.

First, the integrative nature of the formal and informal teaching and learning environments facilitates maximizing the advantages of resources[8](Halim et al., 2023).Collaborative learning activities require more than enough time to be carried out. This means that although traditional classroom collaboration enables face-to-face interaction, collaboration and communication in a formal classroom, the activities cannot be completed in a short classroom time and mobile blended learning environments provide students with many supports for informal learning[2](Ashraf et al., 2021).

Second, the diversity of interactions facilitates effective communication.In the mobile blended learning environment, the way of communication and interaction is more flexible and free[1](Alammary et al., 2014). Researchers have highlighted the transformation of interaction spaces (from physical classrooms to online platforms), the overlap of interaction times (including synchronous classroom interactions, synchronous online interactions, and asynchronous online interactions), and the diverse range of interaction participants (such as interactions between students, between students and teachers, between individual students and online resources, as well as interactions within and across different student groups)[2](Ashraf et al., 2021).

Third, unlike ordinary distance education or online teaching, the mobile blended teaching model has to be guided by teachers to carry out collaborative learning activities in a purposeful and planned manner under agreed activity goals. After receiving tasks through learning groups or communities, learners analyze and effectively use the various advantages of blended learning environments and tools to optimize the design and implementation of activities[11][16][19](Kukulska‐Hulme & Viberg, 2018; Miyake & Kirschner, 2014; Shaodong, 2023).

Fourth, the flexibility in developing activities allows for the optimal integration of various factors or dimensions, such as technology, content, learning methods, and learner interaction, ensuring a more effective and adaptable learning experience .In a mobile-blended environment, the form of collaborative learning is not limited to one form of organization, but is constantly sent to change according to the content of the learning activities[18](Romero-Rodr ́guez et al., 2020).

In more recent decades, Research indicates that critical thinking is not merely an abstract skill but a practical one that can be developed through specific educational practices. For instance, Drennan's study suggests that critical thinking is best cultivated in educational settings that prioritize problem-solving, written assignments, and class discussions over rote memorization and multiple-choice exams[6] (Drennan, 2010). Butler demonstrats that critical thinking assessments can predict real-world outcomes, reinforcing the notion that critical thinking skills are vital for success in the 21st-century workforce[4](Butler, 2012).

Wen Qiufang and her group members (2009) reviewed domestic and foreign studies on college students' thinking ability and analyzed three main theoretical models related to thinking ability in their research. On this basis, a hierarchical theoretical model is proposed to construct the competence of Chinese foreign language students.They drew on three major theoretical models at home and abroad and proposed the hierarchical theoretical model on the basis of these models. The model advocates that discursive ability consists of two levels: meta-discursive ability and discursive ability, with the former being at a higher level and having influence and control over the latter.

Wu Yajie and her colleagues (2014) believe that critical thinking should be developed through application in life and learning like reading and writing, so that students can promote the development of critical thinking while practically applying critical thinking, and identify the nine-step teaching for the construction of a teaching model for the development of critical thinking through empirical research interviews (Wu et al., 2014).

Both international and China's researchers have consistently focused on the critical thinking ability since last century. They made plenty of researches related to different levels of EFL students from the aspect of writing, listening, reading and speaking. The integration of critical thinking with specific EFL programs is mainly reflected in the teaching of reading, writing, translation and oral presentation.

In the area of reading, critical reading research has covered a wide range of materials, from drama and fiction at the literary level, to intensive reading textbooks, to newspapers and current news and so on. Research on critical thinking in reading teaching generally agrees that the discussion-based reading teaching method helps to improve students' critical thinking skills[5][10][13][15][17](Cohen, 2018; Jones, 2014; Lintangsari et al., 2022; Malloy & Gambrell, 2010; Murphy et al., 2009)

3. Method

The study aims to investigate the impact of CMbL mode on the cognitive development of students' critical thinking. The treatment was desgined following linguistic and critical thinking intellectual standards. There are 61 participants in this research with 29 students in controlled group (CG) and 32 students in experiment group (EG). Only the participants in EG were trained on the critical thinking standards. 32 students were randomly grouped in six groups. CMbL class were organized in a integrated way of formal and informal learnings, ensuring the participants' collaborative learning and teacher-student interactivity. Before the class, the instructor set clear teaching goals for the session and posted in the wechat group. Students are encouraged to collaboratively engage in informal learning by collecting relevant information, predicting potential problems and discussing the topic collaboratively. During class, the instructor facilitate formal learning by provide key expressions, concepts and informations related to the topic and then guide discussions to deepen their understanding of the topic. Duiring this phase, students exchange ideas with peers in different groups to gain more insights. After each unit , they were required to refine their ideas and complete a reflective journal(Table1). The teaching intervene lasted for ten weeks with two class hours in each week, focusing on five topics including "Mother Nature", "Ambition","War and Peace","Creativity", "Honesty and Integrity" (Table1 Teaching Contents), consisting of RolePlay, Presentation, Group Discussion and Public Speaking activities.

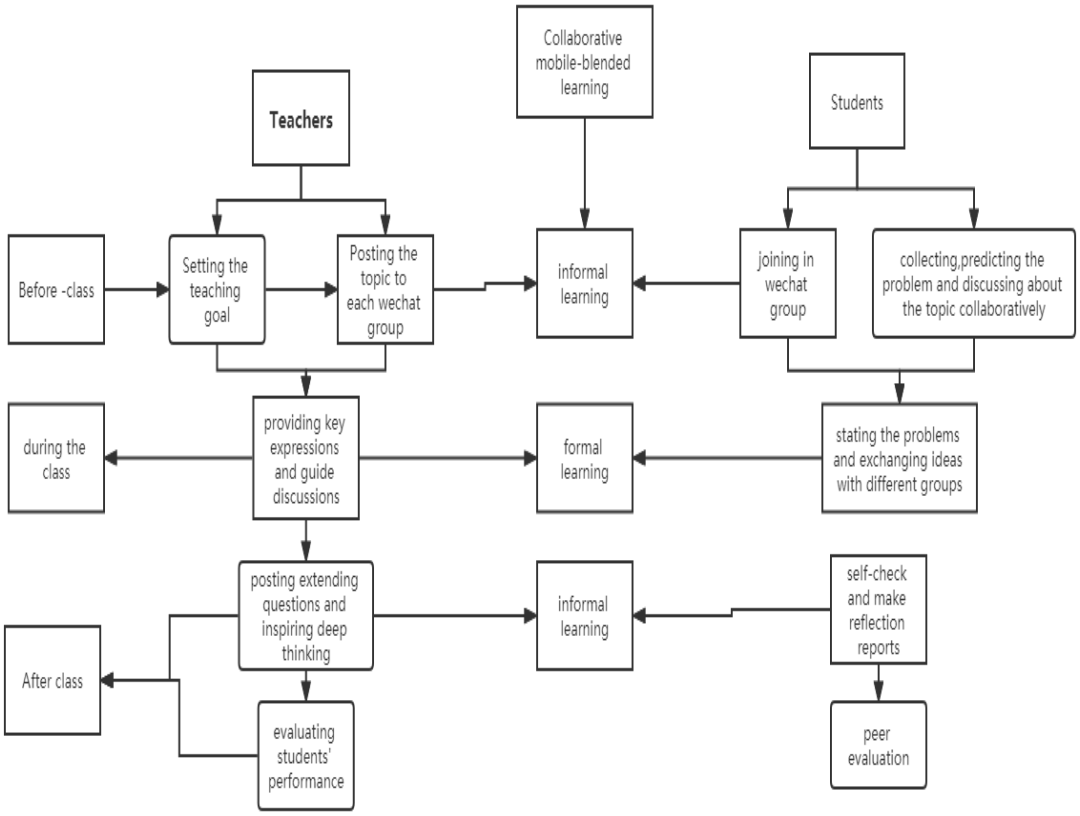

Figure 2. The Procedures of CMbL Mode

Table 1. Teaching Contents

	Main Topic	Students' Subtopics
Students' Topics in Speaking Experiment	Mother Nature (week2-3)	1. Ecosystems and Biodiversity 2. Climate Change 3. Conservation Efforts 4. Pollution and Its Effects 5. Renewable Energy
	Ambition (week4-5)	1. Personal Ambitions and Goal Setting 2. Overcoming Obstacles 3. Ambition in Different Cultures 4. Ambition and Ethics 5. Ambition and Professional Settings
	War and Peace (week6-7)	1. The Impact of War on Society 2. Peacebuilding Efforts 3. The Role of International Organizations in Peacekeeping 4. The Psychological Effects of War 5. Literary Depictions of War and Peace
	Creativity (week8-9)	1. Historical Conflicts and Their Resolution 2. The Concept of Creativity 3. Creativitive Solutions in Different Contexts

		4. Creativity Thinking Strategies 5. Creative Environment
	Honesty and Intergrity (week10-11)	1. The Importance of Honesty in Personal Relationships 2. Integrity in Academic Work 3. Honesty in Professional Setting 4. The Role of Integrity in Leadership 5. The impact of Intergrity on Teamwork

4. Data Collection And Analysis

A qualitative analysis was applied during this process. Participants were required to take an oral test before and after the treatment. Their oral proficiency were graded according to Paul & Elder's explication of intellectual standards (2008).For data collection, all students presenting both in EG and CG were recorded and the recorded data were transcribed.The results from all groups were compared based on the variables stated on the intellectual rubric. To increase the reliability of the applied rubric, three raters was also asked to use the rubric to rate the participants' speaking performance. the inter-rater reliability between two raters was high .In EG pretest, the three raters' inter-rater correlation is 0.698 (Table 2), which is between 0.6 and 0.8, suggesting a high level of concordance. The high level of concordance was also witness in the EG postest (Table 3).

Table 2. Inter-rater Reliability of the Experimental Group in Oral Pretest

N	3
Kendall's Wa	.698
Chi-Square	12.571
df	6
Asymp. Sig.	.050
Kendall's Coefficient of Concordance	

From the data above, a collaborative mobile-blended learning yielded positive effects on the students' speaking outcome.After ten-week teaching intervene, students' performance on the seven intellectual standards have significantly changed ($P<0.05$).

Table 3. Inter-rater Reliability of the Experimental Group in Oral Postest

N	3
Kendall's Wa	.840
Chi-Square	15.127
df	6
Asymp. Sig.	.019
Kendall's Coefficient of Concordance	

Before the application of CMbL, according the Independent Sample Test from SPSS27, participants' oral performance in CG and EG shows no significant differences(p-value =0.206,p>0.05.) with EG mean=14.47and CG mean=13.83(Table 4). After the CMbL treatment, the significant differences has been witnessed from the Independent Sample Test. The mean score of EG is 20.67 while the mean score of CG is 18.13. $P<0.05$, indicating that there is significant differences between the two groups in the post-oral test(Table5).The Paired Paired Samples Test in EG Oral Tests shows the significant improvement in the seven intellectural standards (Table 6).

Table 4. Independent Samples Test of Oral Test pre-tests of EG and CG

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Pre test	Equal variances assumed	.347	0.558	1.280	59	.206	0.638	0.50

Table 5. Independent Samples Test of Oral Test post-tests of EG and CG

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Post test	Equal variances assumed	.149	.701	6.199	59	.000	2.53929

Table 6. Paired Samples Test in EG Oral Tests

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair1	Clarity	-.75	.60	.11	-.97	-.54	-7.12	31	.000
Pair 2	Accuracy	-.96	.60	.11	-1.17	-.74	-9.00	31	.000
Pair 3	Relevance	-1.11	.50	.09	-1.29	-.92	-12.41	31	.000
Pair 4	Significance	-.71	.51	.09	-.90	-.53	-7.83	31	.000
Pair5	Completeness	-1.07	.48	.08	-1.24	-.90	-12.67	31	.000
Pair 6	Logic	-.78	.53	.09	-.97	-.60	-8.45	31	.000
Pair 7	Depth	-.74	.48	.09	-.91	-.56	-8.64	31	.000

5. Findings and Discussion

From a constructivist perspective, this collaborative approach allows students to actively engage with content, building understanding through shared experiences and interactions[22][23](Yu & Wu, 2021). In the process of topic discussion, students have already done a good job in understanding relevant knowledge, enquiring and reading extra-curricular references, sorting out their views, and mastering relevant English expressions, which is also the initial stage of the development of students' critical thinking. In order to discuss the topic, students firstly share their views and arguments within

the group, during which teachers and students have to coordinate activities to ensure that each member of the group has the opportunity to express his/her views. This process is a stage for students to exchange ideas and collide with each other, which is conducive to exercising students' self-expression and reasonably explaining their own views in questioning. Through the discussion of timely revision of views, so that the thinking is clearer, more logical and more profound. Meanwhile, this teaching mode not only helps students make connections between what they are learning and real life, but it also gets them more interested and motivated. Constructivists say that students are more likely to take responsibility for their education and join in discussions when they can see how what they are learning applies to real life. Additionally, speaking proficiency can't be seperated from critical thinking and also can not be only dependent on critical thinking skills. Intellectual standands proposed by Paul and Elder[7](Elder & Paul, 2013) play an important role in developing students' language development. Students participating in numerous linguistic contexts must clear and enough every message and completely present information.The use of intellectual standards within the context of CMbL help students deepen their understanding of critical thinking rather than resisting thinking critically or having no idea how to thinking critically.

6. Conclusion

The application of Paul and Elder's intellectual standards within the Collaborative Mobile-Blended Learning (CMbL) context supports students in refining their critical thinking abilities and achieving deeper understanding, promoting active and effective participation in diverse linguistic settings.

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