

# The Psychological Influence of Online Community of Inquiry on University Students' Critical Thinking Dispositions and English Academic Level

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**Abstract**— Critical thinking is becoming part of core competences for the future career development and it is also a crucial objective for talent development at the information age. Critical thinking encompass both cognitive skills and disposition to think. The better the development of critical thinking dispositions, the stronger the individual's critical thinking ability is. However, There is comparatively little empirical study on critical thinking dispositions among students who do not major in English in China. As a result, the usefulness of online community of inquiry in improving Chinese university students' critical thinking dispositions and English academic level were investigated in this study. 50 freshmen enrolled in a College English course at a university in Tangshan, Hebei, China, took part in the study. The study's findings suggest that online community of inquiry can improve students' English academic level and critical thinking dispositions with significantly positive impact on students' English academic level but without significant positive influence on students' critical thinking dispositions. The limitations of research and their implications are also discussed.

**Index Terms**—online community of inquiry, critical thinking disposition, university students, English academic level

## I. INTRODUCTION

The World Economic Forum's "The Future of Work" report, which was released in October 2020, predicted that the fourth industrial revolution will cause not just widespread disruption of company models but also significant changes in the skill sets required for future labor. People eager to meet the challenges of the future career need the following top five competencies for 2025: 1. Innovative and analytical thinking 2. Learning techniques and active learning 3. Solving complicated problems 4. Analysis and critical thinking 5. Originality, initiative, and creativity. These are the fundamental cognitive abilities for future development. From above list, it is can be seen that critical thinking is becoming part of core competences for the future career development and it is also a crucial objective for talent development.

Basis on the above predication, the world is investigating how to reform the curriculum to cope with the changes of the 21st century and what types of students can be trained to adapt to the development of the 21st century society and meet the needs of the 21st century information society featuring globalization and sustainable development. The United States developed the Framework for 21st Century Learning by integrating the 4 "C" into the 3 "R" (reading, writing, and arithmetic). These 4 "C" are critical thinking and problem solving, communication and collaboration, creativity and innovation, in order to make the classroom environment more similar to the real-world environment and to place more emphasis on the development of creativity and innovation in students. In France, fundamental characteristics of people and citizenship include the capacity for introspective and critical thought. In Singapore, one of the three skills focusing on students' basic values—respect, responsibility, integrity, caring, perseverance, and harmony—is critical and creative thinking.

A distinctive Japanese core competency is the emphasis on problem-solving, critical thinking, and metacognitive abilities. In a paper of a similar nature published by China titled "Core Literacy for Student Development in China," critical thinking is specifically mentioned as one of the crucial elements of core literacy. In a word, many countries have realized critical thinking is a key competence to cultivate students to become competent in an information society.

## II. KEY CONCEPTS AND LITERATURE REVIEW

Critical thinking can refer to the ability that effectively determines what action to take and whether the information is reliable through the processes of reasonable reflective thinking or problem solving as well as the disposition to apply these abilities [1]. Critical thinking encompasses both cognitive skills and disposition to think [2], [3], [4]. Critical thinking dispositions (CTD) refers to an individual's beliefs, values, attitudes, and preferences about critical thinking, and is a stable internal drive that motivates individuals to solve problems and make decisions through critical thinking activities [3]. Seven traits of CTD are proposed by [2], which are truth-seeking, openness, analysis, systematicness, self-confidence, inquisitiveness and maturity. CTD, as another dimension of critical thinking, is not only the psychological basis for the effective execution of critical thinking ability, but also plays an important role in directing and monitoring the operation of critical thinking skills. The better the development of CTD, the stronger the individual's critical thinking ability is, the more inclined they are to find, analyze and solve problems or make decisions in a critical way [2].

Theoretically, skills and dispositions can reinforce each other, and the more critical people are and the more likely they are to apply their critical thinking to discover, analyze, and solve problems or make judgments [6]. In reality, however, skills and dispositions do not always go hand in hand. It is not unusual to come across individuals who are capable but unwilling to think, or who are capable but lacking in willingness. Positive CTD supports the development of cognitive skills, as well as pupils' academic competence and development, according to empirical research [5].

Even though critical thinking is becoming a must in 21st century talent cultivation. There are some problems in cultivation of critical thinking in Chinese higher education. [7] reflect on the current talent training mode of colleges and universities in China, the problems such as lack of critical thinking, single subject knowledge and insufficient reading ability have a profound impact on the quality of talent training in colleges and universities in China. [8] also describe more than 26% of the surveyed students do not have CTD or temperament. [9] reveal the critical thinking ability of foreign language majors did not improve significantly in college. [10] reports that among the surveyed students, the self-confidence of seeking truth, systematization ability, analysis ability, thirst for knowledge among the seven dimension of critical thinking show a negative tendency. [11] reveal scholars in the field of foreign language education in China also have gradually noticed the absence of critical ability in English learners in China. They believe that most foreign language learners use English for oral and written expression with vague content, lack of logic and critical thinking. They called on English education to cultivate learners with competent and profound English abilities, significant humanistic quality, extensive knowledge, critical thinking and innovative capacity, and a perception of social responsibility [12].

Currently, Chinese research on CTD is primarily concerned with the development of measurement tools [13], [14], as well as the examination of students' CTD [15], [16]. Cultivation pathways are not yet fully explored [17] and the primary subject of study for students majoring in foreign languages, particularly English. There is comparatively little empirical study on CTD among students who do not major in English. Critical thinking and perceived learning have been identified as two important indicators of student learning outcomes in the inquiry community framework studies [18]. Despite the claim made by [19] that there is insufficient proof that

communities of inquiry result in students learning things deeply and meaningfully, subsequent partial empirical studies have found that communities of inquiry are crucial for fostering critical thinking and discourse skills, which in turn improve student learning outcomes [19], [20]. [21] investigate how case-based discussion, debate, and open-ended discussion affect students' ability to think critically. According to the findings, students' critical thinking skills improved as they felt more at ease posting online. [22] discovered that instruction-guided and feedback-received learning groups more commonly created higher-order learning thought than groups that did not. Yet, it is impossible to compare critical thinking abilities, perceived learning, and satisfaction with the learning outcomes that students really achieve. Research that demonstrates how the theoretical framework might directly improve learners' actual, observable learning outcomes (such as course grades, GPA, etc.) is scarce in the existing literature and will need to be confirmed in the future [18]. Therefore, my study will focus on how online community of inquiry (CoI) will influence university students' CTD and academic performance in College English course. CoI was mainly used to guide online teaching when it was proposed by Garrison et al. in 2000. The model not only defines the key elements of online learning, but also further develops the secondary dimensions and support strategies of teaching presence, social presence and cognitive presence (see Figure 1), which provides a theoretical framework for the design, implementation and evaluation of online teaching. Open communication, personal/affective, and group cohesion were used to describe social presence. The triggering event, exploration, integration, and resolution phases make up the definition of cognitive presence. The definition of teaching presence includes design, facilitation, and direct instruction. It should also be emphasized that relationships between each CoI's presence and student satisfaction and perceived learning have been observed. Based on community of inquiry, we can establish a complex opening system for students in higher education to improve their CTD.

ELEMENTS	CATEGORIES	INDICATORS (examples only)
Social Presence	Open Communication Group Cohesion Personal/Affective	Learning Climate/Risk-Free Expression Group Identity/Collaboration Self Projection/Expressing Emotions
Cognitive Presence	Triggering Event Exploration Integration Resolution	Sense of Puzzlement Information Exchange Connecting Ideas Applying New Ideas
Teaching Presence	Design & Organization Facilitating Discourse Direct Instruction	Setting Curriculum & Methods Shaping Constructive Exchange Focusing and Resolving Issues

Figure1. Operational definitions of presence by [23]

### III. RESEARCH DESIGN

The study mainly focuses on three research questions: first, what is the university fresh students current CTD? Second, can online CoI promote students' CTD? Third, can online CoI promote students' English academic performance?

The participants of this study's research are 50 first-year students of two classes in respective law and business majors at a provincial comprehensive university. Law major has 29 students and business major has 21 students. They all take part in College English Test- Band 4 (CET-4) at the beginning of the term. CET-4 is a national standard test to check university students' English academic level and it is held twice every year nationwide. The paper includes four parts: listening, reading, writing and translation and it can reflect learners' overall

English level. Thus, in this study, one of CET-4 papers has been used to exam freshmen's English academic level in the beginning and at the end of the term and to figure out students' current English academic level. The average score for law students is 59.5 and business major is 57.6 in the beginning of the term. There is no significant differences between the two majors in test scores. From September to December, this study lasts 16 weeks. The CTD -CV is tested at the beginning of the study and the findings of the questionnaire are served as the pre-test data. It attempts to investigate the current state of college students' CTD. The CTDI-CV is given to the students once more at the end of the semester, and the results are served as post-test data. Test papers are also distributed online at the end of the term to testify students' English level after 16 weeks of online learning. During the data collection phase, 50 questionnaires and test papers are distributed and withdrawn online at the beginning and at the end of the semester. 44 valid questionnaires were completed, yielding an effective rate of 88% after the deletion of 6 incomplete invalid surveys. 50 valid test papers are collected and the effective rate is 100%. The Data were collected by Excel software with statistical analysis performed by SPSS 29.0. The data can be seen in table 1.

Table 1. The number and gender for questionnaires

Questionnaires	Law	Business
Male	9	4
Female	20	11
Test	Law	Business
Male	9	6
Female	20	15

#### IV. RESEARCH METHODS

The California Critical Thinking Disposition Inventory (CCTDI) developed by [2] is one of the most well-known and widely utilized tools in the world. CTDI-CV was chosen as the study's questionnaire to gauge students' CTD. It is the Chinese translation of the CCTDI that [24] have further changed so that its content might represent Chinese cultural traits. [24] claim that using the CTDI-CV as a measure of CTD can help students identify their CTD-related strengths and weaknesses as well as help teachers assess CTD their students' performance. Based on the evaluation, instructors can improve their course-teaching procedures.

The CTDI-CV has eight items with a total of 75 questions and a 6-point Likert scale which ranges from strongly agree=6, agree=5, generally agree=4, generally disagree=3, to strongly disagree=1. Their overall score is based on seven CTD features: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity with a possible range of 60 points and the total score range is 70-420 . Negative CTD is manifested by a sub-scale score between 10 and 40 points and a total score below 210; ambivalent or unstable CTD is indicated by a sub-scale score between 30 and 40 points and a total score between 210 and 279 points; positive CTD is indicated by a sub-scale score between 40 and 50 points and a total score between 280 and 349 points; and a sub-scale score above 50 points and a total score above 350 points indicate a strong positive CTD [25]. Table 2. shows CTD score classification

Table 2. CTD score classification

	Score Range	Score	CTD		Score Range	Score	CTD
Sub-scale score	10-60	10-30	Poor and negative	Total score	70-420	<210	Poor and negative
		30-40	Ambivalence or unstable			210-279	Ambivalence or unstable
		40-50	Positive			280-349	Positive
		>50	Strongly positive			>350	Strongly positive

The validity and reliability of the CTDI-CV were later used and demonstrated in numerous research to determine if each item accurately expresses CTD from a positive or negative viewpoint. A content validity index was used to determine the extent of their consent. It is clear from the estimated findings that the CVI for each of the seven qualities ranged from 0.61 to 0.89. The seven attributes ranged from 0.603-0.838 and the CTDI-overall CV's alpha was 0.88 [26] (Gu, 2021). The findings in this study demonstrate that reliability and validity of CTDI-CV are consistent and reliable in consistent with the previous researches, as it can be seen from the following table 3. The reliability coefficient value is 0.852, which is higher than 0.8, as can be seen from the table below, indicating that the reliability quality of the study data is strong.

Table 3. Reliability of CTDI-CV

Cronbach $\alpha$		
Item number		Cronbach $\alpha$
78	44	0.852

As can be seen from the table 4 below, the validity was confirmed by the KMO and Bartlett's test. The KMO value is 0.814, and data from the study is suitable for information extraction when the KMO value is more than 0.8.

Table 4. Validity of CTDI-CV

KMO and Bartlett		
KMO		0.814
	Approximate chi-square	169.794
Bartlett	<i>df</i>	21
	<i>p</i>	0.000

## V. RESEARCH RESULTS

The same 50 test papers of College English Test- band 4 (CET-4) have been distributed online at the beginning and at the end of the term. Table 5 shows the following data: in test 1, the minimum score is 33 and the maximum score is 86. The average score for students is 59.06. In test 2, the highest score and the lowest score is 39 and 95. The average score is 75.97.

Table 5. Descriptive statistical analysis for English academic level

Item	N.	Min.	Max.	mean
Test 1	50	33	86	59.06
Test 2	50	39	95	75.97

From table 6, it can be seen that the difference of average score between test 1 and test 2 is -16.91 and p is 0,000. Therefore, the average score between test 1 and test 2 is significant. This table can answer research question 3 that online CoI can have significantly positive influence students' English academic level. The finding is corresponding to [20].

Table 6. Paired t-test for English academic level

Paired t-test					
Item	Paired t-test		Dif.	t□	p□
	1	2			
Test 1 and Test 2	59.06±12.57	75.97±12.54	-16.91	-7.01	0.000**

\*  $p < 0.05$  \*\*  $p < 0.01$

This study examined 7 items and 70 questions of CTD in order to evaluate the current state of CTD among college students. According to Table , college students' CTD scores are currently poor or negative, with a mean score of 203.864. The top and lowest scores are also shown in the table, too. There are students with negative and ambivalence CTD, with a minimum of 136 and a maximum of 262. Among the 7 items, truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity. Open-mindedness is the highest item and also the only item can obtain the positive scores with the average of 41.682. The lowest item is inquisitiveness with the average of 21.841. Through descriptive statistical analysis, it can be seen there is still plenty that can be done to promote CTD among college students. This table can also answer the research question 1 that freshmen's current CTD is poor or negative in consistence with [8],[9],[11].

Table 7. Descriptive statistical analysis for CTD

Items	Min	Max	Mean	Std.□
1. Truth seeking	14	50	30.159	7.195

Items	Min	Max	Mean	Std.□
2.Inquisitiveness	10	36	21.841	7.396
3.Analyticity	11	36	24.136	5.183
4.Open-mindedness	31	50	41.682	4.654
5.Self-confidence	10	50	29.841	7.166
6.Systematicity	12	47	29.636	7.499
7.Cognitive maturity	16	39	26.568	5.748
Total	136	262	203.864	29.917

From table 8, it indicates the following data: the difference, standard variance, t value and p value of average score for seven items of CTD. All the p value is higher than 0.05. Therefore, the average score for seven items of CTD between pre-test and post-test 2 has no significance. This table can answer research question 2 that online CoI has no significant influence on students' CTD. The finding is in keeping with [27].

Table 8. Paired t-test for CTD

title	Paired t		dif.	t□	p□
	1	2			
1. truth-seeking	30.16±7.19	32.34±6.44	-2.18	-1.349	0.184
2.inquisitiveness	21.84±7.40	22.91±7.06	-1.07	-0.687	0.496
3.analyticity	24.14±5.18	26.07±6.67	-1.93	-1.454	0.153
4.open-mindedness	41.68±4.65	40.66±6.74	1.02	0.975	0.335
5.self-confidence	29.84±7.17	29.36±7.11	0.48	0.329	0.744
6.systematicity	29.64±7.50	31.07±6.48	-1.43	-0.976	0.334
7. cognitive maturity	26.57±5.75	27.45±6.76	-0.89	-0.665	0.509
total	203.86±29.92	209.86±29.40	-6.00	-0.969	0.338

\*  $p < 0.05$  \*\*  $p < 0.01$

However, there are still some significance difference ( $p < 0.05$ ) between pre-test and post-test in some individual items under the subscales. The second question of the first subscale- truth seeking: If there are four arguments in favor of something and just one against it, I will opt to agree with it. The ninth question of the second subscale- inquisitiveness: Compulsory subjects in school are a waste of time. The third and tenth question of the third subscale- analyticity: Provide justifications when you disagree with someone's viewpoint. My experiences in life

have taught me that you don't always have to act logically. The second and tenth question of the fourth subscale- open-mindedness: I'm making an effort to make my judgments less arbitrary.I won't question what all men assumed to be true.The eighth question of the fifth subscale- self-confidence: Being able to appreciate other people's viewpoints makes me happy. The seventh question of the sixth subscale- systematicity: I stop reading when I find a new product's instructions to be complicated and challenging to comprehend.The fifth question of the seventh subscale- cognitive maturity:If I can, I'll do my best to avoid reading.

Table 9. Paired t-test for individual items under the subscales of CTD

Sub-scales	Paired <i>t</i>		Dif.	<i>t</i> □	<i>p</i> □
	1	2			
1. Truth seeking					
1.2.If there are four arguments in favor of something and just one against it, I will opt to agree with it.	3.32±1.43	3.98±1.23	-0.66	-2.311	0.026*
2. inquisitiveness					
2.9. Compulsory subjects in school are a waste of time.	1.48±0.85	1.91±1.12	-0.43	-2.172	0.035*
3.analyticity					
3.3 Provide justifications when you disagree with someone's viewpoint.	1.55±0.76	2.18±1.15	-0.64	-2.822	0.007**
3.10. My experiences in life have taught me that you don't always have to act logically.	2.16±0.91	2.64±1.26	-0.48	-2.087	0.043*
4.open-mindedness					
4.2. I'm making an effort to make my judgments less arbitrary.	4.11±1.38	3.32±1.22	0.80	3.312	0.002**
4.10.I won't question what all men assumed to be true	2.39±1.24	4.27±1.17	-1.89	-6.974	0.000**
5.self-confidence					
5.8. Being able to appreciate other people's viewpoints makes me happy.	2.11±0.87	2.59±0.90	-0.48	-2.852	0.007**
6. systematicity					
6.7.I stop reading when I find a new product's instructions to be complicated and challenging to comprehend.	2.75±1.08	3.23±1.05	-0.48	-2.066	0.045*
7. cognitive maturity					
7.5. If I can, I'll do my best to avoid reading.	2.14±1.03	2.75±1.10	-0.61	-2.690	0.010*

Paired <i>t</i>					
Sub-scales	Paired <i>t</i>		Dif.	t	<i>p</i> □
	1	2			
				□	

\*  $p < 0.05$  \*\*  $p < 0.01$

## VI. DISCUSSION

### A. English Academic level

After 16 weeks of online English learning basis on CoI, students have significantly improved their English academic level on average. The results suggest CoI can play a significant role in online learning and its elements can facilitate learners' online English learning. Under the guidance of teaching presence, teachers can provide effective course design, direct instructions and guided discourse via online platform which enhance students' English learning. The carefully designed online activities can provide sufficient cognitive challenges to the students and promote students' academic English level.

### B. Critical Thinking Dispositions

Online CoI can improve students' CTD, but total score has show no significant influence. The finding may be due to the following reasons: first, the research period is rather short for only 16 weeks, while CTD needs to be nurtured and cultivated for a longer period of time; second, Chinese students have a relatively low scores on CTD and it is difficult to change the situation completely within one term; third, online CoI is a new thing for both students and teachers: the students need time to get used to the learning environment and the teacher need time and guidance on how to design suitable online course to develop students' CTD.

However, there are still some significant improvement on certain items in subscales of CTD. It can be revealed from the significant improvement: first, Chinese university students have certain awareness about truth seeking; second, they regard compulsory courses in the university are important and worthwhile; third, they believe that thinking logically is vital in life and reasons should be provided when presenting arguments; fourth, they tend to be open-minded to others' views and are ready to listen to others' ideas; fifth, they are willing to spend time in reading, even though it is challenging and complicated.

From above discussion, it can be summarized that Chinese university students are willing to improve their CTD via university compulsory courses. They are ready to improve their CTD by doing challenging tasks and they are open to new concepts and theories.

## VII. CONCLUSION

Despite the fact that the study suggests that online CoI does not have significant influence on the students' CTD. Online CoI has improved students' English academic level with significance, learner's total scores on their CTD and their scores on the most CTD subscales. The discovery in this study supports the previous study findings that CTD cultivation is an extended and challenging procedure. Therefore, a future study can have a longer research period to determine whether or not long-term training and practice can encourage CTD in students. To ascertain whether there are variations in students' CTD, this study can be applied to second- or third-year college students. Also, more investigations are required into study how CoI may successfully apply to online environment or other learning model such as blended learning and meet the numerous demands placed on students to enhance their critical thinking abilities across a range of disciplines. What's more, different types of

CTD instruments can be used in checking learners' CTD, thus it can be found which type of instruments is more suitable for Chinese students.

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