

# A Empirical Study on Critical Thinking Ability in College English Reading Teaching under CBI

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**Abstract:** In the context of the new liberal arts, the ordinary English teaching model is difficult to adapt to the development of college English teaching, and English reading, as a necessary part of cultivating students' comprehensive language ability and critical thinking ability, has played an important role in college English teaching. As a text-based teaching method, Content-Based Instruction (CBI) is more in line with the learning of English reading. Based on Krashen's input hypothesis and Swain's output hypothesis theory, it selected 66 English major seniors from Y University as the research subjects, who subsequently are divided into control classes and experimental classes. Data was collected by survey questionnaires and reading tests. Based on the analysis and discussion of relevant data, it concludes that: firstly, the critical thinking ability of college students is at a moderate level. Secondly, the CBI teaching method is significantly positively correlated with students' critical thinking ability. Thirdly, the CBI teaching method has a positive impact on students' critical English reading skills.

**Keywords:** College English; Reading Teaching; CBI; Critical Thinking Ability.

## 1. Introduction

Under the background of the promotion of the 'Belt and Road' initiative, the construction of a discourse system that integrates China and foreign countries, and the construction of the 'new liberal arts', foreign language talents from a single discipline can no longer meet the needs of the country's foreign development strategy. At this time, the normal language teaching model is also difficult to make English teaching adapt to the development of the times. Content-Based Instruction (CBI) is a teaching model based on subject content, emphasizing the integration of subject learning and language learning, thereby promoting students' diverse development. CBI had four essential features: 'learning a language through academic content, engaging in activities, developing proficiency in academic discourse, and fostering the development of effective learning strategies' (Crandall, 1999). CBI can be applied to English language learning through specific text input.

In language learning, English reading relies on a large amount of text content input, so this article focuses on discussing the application and impact of CBI theory in English reading teaching. The teaching guidelines for undergraduate foreign language and literature majors in ordinary higher education institutions put forward clear requirements for students' English reading: students should master English reading strategies, improve logical and speculative abilities, and other aspects of content. However, the current teaching of English reading in universities largely focuses on the English language itself and does not combine language learning with textual background, nor does it place great emphasis on cultivating students' critical thinking abilities. CBI can effectively integrate English reading text learning with English language learning. At the same time, the application of CBI in English reading teaching may also affect students' thinking abilities to some extent. This is because language is inherently a tool for thinking, and the two are inherently inseparable. So this article aims to explore the impact of language teaching under the CBI model on students'

critical thinking ability and give some suggestions for English reading teaching.

## 2. Theoretical Basis

### 2.1. Krashen's Input Hypothesis

Krashen's input hypothesis theory suggests that the key to second language acquisition lies in receiving a large and understandable amount of language input, but he overlooks the point of output (Leng 2021: 16). The core of this theory is the "i+1" mode. Krashen (1992) believes that "i" represents a student's current ability, "+1" represents the distance between the student's current level and the next level, and "i+1" represents the level that the student has achieved through learning. However, achieving a leap from "i" to "i+1" requires a large amount of language input. And CBI is a teaching method based on a large amount of text, which is conducive to promoting this leap.

### 2.2. Swain's Output Hypothesis

Swain's output hypothesis theory is a response to Krashen's theory, emphasizing the output of language. Swain (1993) believes that output theory consists of three functions: noticing, hypothesis-testing, and conscious reflection. Noticing refers to the learner's awareness of their current gaps and shortcomings in the process of learning the target language. Hypothesis-testing refers to the learner's continuous making of hypotheses and testing their validity during the learning process. Subsequently, improvement of learning methods is carried out. Conscious reflection refers to the learner continuously reflecting on their own problems and correcting them during the process of outputting language. Meanwhile, the teaching method of CBI requires language output, and attention, reflection, and correction are also indispensable parts of CBI teaching.

## 3. Results and Discussion

In this chapter, the author analyzes the results of the pre-questionnaire, post-questionnaire, reading test and interview,

The reading test is also aimed at further discussing the impact of CBI on specific reading skills and understanding the views of students with different ability levels on CBI through interviews. The author will conduct descriptive analysis, independent sample testing and paired samples t-tests on the collected data in SPSSAU to identify relevant rules. The author will provide specific explanations below.

### 3.1. Results and Discussion of the Questionnaire

This part involves a survey questionnaire, mainly a survey on critical thinking ability. The questionnaire survey is mainly

used to understand the current status of students' critical thinking ability and the impact of CBI on students in seven dimensions.

#### 3.1.1. Descriptive Analysis of the Questionnaire

In order to understand the current status of students' critical thinking ability, the author conducted descriptive analysis on the pre teaching survey data of CC and EC, as shown in Tables 1 and 2. At the same time, in order to understand the impact of CBI on EC classes, the author also conducted descriptive analysis on the post teaching survey data of CC and EC, as shown in Tables 1 and 2.

**Table 1.** Descriptive Analysis of CC before Teaching

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Truth seeking	33	1.900	4.800	3.406	0.621	3.400
Open mindedness	33	1.900	4.400	3.439	0.620	3.600
Analytical	33	1.800	4.300	3.418	0.584	3.400
Systematic	33	2.000	5.100	3.439	0.575	3.400
Confident	33	2.200	4.400	3.479	0.587	3.500
Inquisitive	33	2.200	4.400	3.391	0.571	3.500
Cognitive maturity	33	1.700	4.600	3.455	0.665	3.500
Total score of critical thinking ability	33	137.000	318.000	240.273	36.673	254.000

According to the questionnaire survey conducted, a score greater than or equal to 40 in each dimension indicates positive critical thinking ability, meaning that a score of 4 or more in each question is considered positive. From the above table, it can be seen that there are no outliers in the data, and

the average value can be directly described and analyzed. The average score for each dimension of the control class before teaching is between 3 and 4 points, and the total score is 240.273. We can also see from the table that the standard deviation is around 0.6.

**Table 2.** Descriptive Analysis of EC before Teaching

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Truth seeking	33	2.000	4.300	3.521	0.557	3.600
Open mindedness	33	2.600	4.600	3.624	0.468	3.600
Analytical	33	2.600	4.700	3.570	0.463	3.600
Systematic	33	2.600	4.500	3.564	0.527	3.600
Confident	33	2.600	4.700	3.661	0.460	3.700
Inquisitive	33	2.700	4.500	3.542	0.431	3.500
Cognitive maturity	33	2.500	4.400	3.503	0.430	3.600
Total score of critical thinking ability	33	204.000	283.000	249.848	25.987	261.000

Similarly, from Table 2 above, it can be seen that there are no outliers in the data, and the average value can be directly described and analyzed. The average score for each dimension of the experimental class before teaching was between 3 and 4 points, and the total score was 249.848. We can also see from the table that the standard deviation is around 0.5, indicating that the numerical difference is not significant.

In summary, the data in Tables 3 and 4 have little difference in terms of mean and standard deviation, and are basically consistent. In order to gain a deeper understanding of the changes in students' critical thinking abilities after teaching, the author collected a survey questionnaire after teaching and conducted a descriptive analysis. The specific data analysis is shown below.

**Table 3.** Descriptive Analysis of CC after Teaching

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Truth seeking	33	2.200	4.300	3.521	0.466	3.500
Open mindedness	33	1.800	4.600	3.588	0.563	3.600
Analytical	33	2.900	4.400	3.576	0.380	3.600
Systematic	33	2.800	4.700	3.655	0.469	3.700
Confident	33	2.600	4.500	3.645	0.468	3.600
Inquisitive	33	2.500	4.600	3.552	0.503	3.600
Cognitive maturity	33	2.500	4.100	3.539	0.441	3.600
Total score of critical thinking ability	33	190.000	288.000	250.758	25.802	261.000

According to table 3, the mean scores of truths seeking (M=3.521; Std.=0.466), open mindedness (M=3.588, Std.=0.563), analytical (M=3.576, Std.=0.380), systematic (M=3.655, Std.=0.469), confident (M=3.645, Std.=0.468),

inquisitive (M=3.552, Std.=0.503), and cognitive maturity (M=3.539, Std.=0.441) are below 4.00. Also, the mean of the total score is 250.758.

**Table 4.** Descriptive Analysis of EC after Teaching

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Truth seeking	33	2.400	4.500	3.518	0.616	3.700
Open mindedness	33	2.800	5.500	4.339	0.839	4.700
Analytical	33	2.700	5.600	4.361	0.934	4.800
Systematic	33	2.800	5.800	4.330	0.841	4.500
Confident	33	2.800	5.500	4.312	0.892	4.700
Inquisitive	33	2.600	5.500	4.306	0.886	4.800
Cognitive maturity	33	2.600	5.400	4.233	0.914	4.600
Total score of critical thinking ability	33	212.000	354.000	294.000	54.865	331.000

According to table 4, the mean scores of open mindedness (M=4.339, Std.=0.839), analytical (M=4.361, Std.=0.934), systematic (M=4.330, Std.=0.841), confident (M=4.312, Std.=0.892), inquisitive (M=4.306, Std.=0.886), and cognitive maturity (M=4.233, Std.=0.914) are higher than 4.00, while the mean score of truth seeking is below 4.00. Also, the mean of the total score is 294.000.

### 3.1.2. Discussion on Descriptive Analysis

Based on the data analysis of the survey questionnaire mentioned above, the author can understand the current situation of students' critical thinking ability and the impact of CBI on their critical thinking ability. Firstly, the author discusses the pre-questionnaire data. According to Tables 1 and 2, the author found that the average score of the seven dimensions is between 3 and 4. Therefore, it can be seen that students' critical thinking ability is currently at a medium to low level. The average total scores of both classes are also around 240, indicating that their critical thinking abilities are at the same level. This provides conditions for the stability and credibility of subsequent research.

Secondly, the author discusses the data after teaching. From Tables 1 and 3, it can be seen that the average values of the seven dimensions of CC after teaching are between 3 and 4, which is basically consistent with the data before teaching. The average total score of CC before teaching is 240.273,

while the average total score of CC after teaching is 250.758. The changes between the two are not significant and generally consistent. These data indicate that the grammar translation method adopted by CC cannot effectively improve students' critical thinking ability. From Tables 2 and 4, it can be seen that the average values of the seven dimensions of EC after teaching, except for the truth seeking, are all greater than 4. This data is significantly different from the pre-teaching data. These data indicate that the CBI adopted by EC may improve students' critical thinking ability. According to Tables 3 and 4, the author found that after teaching, except for the little change in truth seeking, the scores of other dimensions were increasing. Based on this, the author speculates that CBI has a greater impact on a skill rather than a thinking mode such as the pursuit of truth.

In summary, based on the descriptive analysis of the survey questionnaire, the author found that the current critical thinking ability of students is at a medium to low level, and CBI may affect their critical thinking ability to some extent.

### 3.1.3. Independent Sample T-test for the Questionnaire

In order to understand whether CBI can affect students' critical thinking ability, the author conducted independent sample t-tests and paired t-tests on the survey questionnaire data using SPSSAU, as shown in Tables 5, 6, 7, and 8.

**Table 5.** Independent t test before teaching

	Group (Mean±Std. Deviation)		<i>t</i>	<i>p</i>
	Before-CC( <i>n</i> =33)	Before-EC( <i>n</i> =33)		
Truth seeking	3.41±0.62	3.52±0.56	-0.793	0.431
Open mindedness	3.44±0.62	3.62±0.47	-1.367	0.177
Analytical	3.42±0.58	3.57±0.46	-1.168	0.247
Systematic	3.44±0.57	3.56±0.53	-0.915	0.363
Confident	3.48±0.59	3.66±0.46	-1.401	0.166
Inquisitive	3.39±0.57	3.54±0.43	-1.217	0.228
Cognitive maturity	3.45±0.67	3.50±0.43	-0.352	0.726

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

From the above table, it can be seen that using t-test (also known as independent sample t-test) to study the differences between groups in seeking truth, open mindedness, analytical, systematic, confident, inquisitive, and cognitive maturity, a total of 7 items. From the table, it can be seen that different groups of samples do not show significant differences in seeking truth, open mindedness, analytical, systematic, confident, inquisitive, and cognitive maturity ( $p > 0.05$ ), which means that different groups of samples show consistency in seeking truth, open mindedness, analytical, systematic, confident, inquisitive, and cognitive maturity, and there is no difference.

In summary, it can be concluded that different groups of samples do not show significant differences in seeking truth,

being open-minded, analytical, systematic, confident, inquisitive, or cognitive maturity.

From the above table, it can be seen that using t-test (also known as independent sample t-test) to study the differences in truth seeking, open mindedness, analytical, systematic, confident, inquisitive, and cognitive maturity among groups, a total of 7 items. From the above table, it can be seen that different groups of samples do not show significant differences in seeking truth for a total of 1 item ( $p > 0.05$ ), which means that samples from different groups all show consistency in seeking truth, there is no difference. In addition, the samples from different groups showed significant differences ( $p < 0.05$ ) in six aspects: openness to thinking, analytical, systematic, confident, inquisitive, and cognitive

maturity. This indicates that there are differences in the levels of openness to thinking, analytical, systematic, confident,

inquisitive, and cognitive maturity among samples from different groups. Specific analysis shows that:

**Table 6.** Independent t test after teaching

	Group (Mean±Std. Deviation)		t	p
	After-CC (n=33)	After-EC (n=33)		
Truth seeking	3.52±0.47	3.52±0.62	0.023	0.982
Open mindedness	3.59±0.56	4.34±0.84	-4.271	0.000**
Analytical	3.58±0.38	4.36±0.93	-4.472	0.000**
Systematic	3.65±0.47	4.33±0.84	-4.030	0.000**
Confident	3.65±0.47	4.31±0.89	-3.800	0.000**
Inquisitive	3.55±0.50	4.31±0.89	-4.255	0.000**
Cognitive maturity	3.54±0.44	4.23±0.91	-3.930	0.000**

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

The group showed a significant level of 0.01 ( $t = -4.271$ ,  $p = 0.000$ ) in terms of ideological openness, and the specific differences in comparison indicate that the mean value of post test CC (3.59) will be largely lower than the mean value of post test EC (4.34).

The group showed a significance level of 0.01 for analytical ( $t = -4.472$ ,  $p = 0.000$ ), and the specific differences in comparison indicate that the mean value of post test CC (3.58) will be significantly lower than the mean value of post test EC (4.36).

The group showed a significance level of 0.01 for systematic ( $t = -4.030$ ,  $p = 0.000$ ), and the specific differences in comparison indicate that the mean value of post test CC (3.65) will be significantly lower than the mean value of post test EC (4.33).

The confidence level of the group showed a significance level of 0.01 ( $t = -3.800$ ,  $p = 0.000$ ), and the specific differences in comparison indicate that the mean value of post test CC

(3.65) will be significantly lower than the mean value of post test EC (4.31).

The group showed a significance level of 0.01 ( $t = -4.255$ ,  $p = 0.000$ ) for good inquiry, and the specific differences in comparison indicate that the mean value of post test CC (3.55) will be significantly lower than the mean value of post test EC (4.31).

The group showed a significant level of 0.01 ( $t = -3.930$ ,  $p = 0.000$ ) in cognitive maturity, and the specific differences in comparison indicate that the mean value of post test CC (3.54) will be significantly lower than the mean value of post test EC (4.23).

In summary, it can be concluded that different groups of samples do not show significant differences in seeking truth for a total of one item. However, group samples show significant differences in six items: openness of thought, analytical, systematic, confident, inquisitive, and cognitive maturity.

**Table 7.** Paired t test of CC before and after teaching

Items	Paired (M±SD)		Mean difference (Paired1-Paired2)	t	p
	Paired1	Paired2			
Truth seeking before Paired after	3.41±0.62	3.52±0.47	-0.12	-0.836	0.409
Open mindedness before Paired after	3.44±0.62	3.59±0.56	-0.15	-0.917	0.366
Analytical before Paired after	3.42±0.58	3.58±0.38	-0.16	-1.210	0.235
Systematic before Paired after	3.44±0.57	3.65±0.47	-0.22	-1.610	0.117
Confident before Paired after	3.48±0.59	3.65±0.47	-0.17	-1.130	0.267
Inquisitive before Paired after	3.39±0.57	3.55±0.50	-0.16	-1.106	0.277
Cognitive maturity before Paired after	3.45±0.67	3.54±0.44	-0.08	-0.606	0.549

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

From the above table, it can be seen that the author used paired t-tests to study the differences in data between the same group before and after the experiment. From the data in the table, it can be seen that there is no significant difference

among the 7 paired data groups, and the numerical difference is very small ( $p > 0.05$ ). A total of 7 paired data sets did not show any differences.

**Table 8.** Paired t test of EC before and after teaching

Items	Paired (M±SD)		Mean difference (Paired1-Paired2)	t	p
	Paired1	Paired2			
Truth seeking before Paired after	3.52±0.56	3.52±0.62	0.00	0.020	0.984
Open mindedness before Paired after	3.62±0.47	4.34±0.84	-0.72	-4.356	0.000**
Analytical before Paired after	3.57±0.46	4.36±0.93	-0.79	-4.377	0.000**
Systematic before Paired after	3.56±0.53	4.33±0.84	-0.77	-4.091	0.000**
Confident before Paired after	3.66±0.46	4.31±0.89	-0.65	-3.931	0.000**
Inquisitive before Paired after	3.54±0.43	4.31±0.89	-0.76	-4.429	0.000**
Cognitive maturity Before Paired after	3.50±0.43	4.23±0.91	-0.73	-4.467	0.000**

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

From the table above, it can be seen that using paired t-test to study the differences in experimental data, it can be seen from the table that there are a total of 7 pairs of paired data, of which 6 pairs of paired data will show differences ( $p < 0.05$ ). Specific analysis shows that:

There is a significant difference at the 0.01 level ( $t = -4.356$ ,  $p = 0.000$ ) between the open mindedness of EC before and after teaching, and specific difference in comparison shows that the mean value of 2 (3.62) will be significantly lower than the mean value of 1.2 (4.34).

There is a significant difference at the 0.01 level between the analysis of EC before and after teaching ( $t = -4.377$ ,  $p = 0.000$ ), and the specific difference in comparison shows that the mean value of 3 (3.57) is significantly lower than the mean value of 1.3 (4.36).

There is a significant difference at the 0.01 level ( $t = -4.091$ ,  $p = 0.000$ ) between the systemic values of EC before and after teaching, and the specific difference in comparison shows that the mean value of 4 (3.56) will be significantly lower than the mean value of 1.4 (4.33).

There is a significant difference at the 0.01 level between the pre-teaching EC confidence and the post teaching EC confidence ( $t = -3.931$ ,  $p = 0.000$ ), and the specific difference in comparison shows that the mean value of 5 (3.66) is significantly lower than the mean value of 1.5 (4.31).

There is a significant difference at the 0.01 level ( $t = -4.429$ ,  $p = 0.000$ ) between the inquiry of EC before and after teaching, and the specific difference in comparison shows that the mean value of 6 (3.54) is significantly lower than the mean value of 1.6 (4.31).

There is a significant difference at the 0.01 level ( $t = -4.467$ ,  $p = 0.000$ ) between the pre-teaching EC's cognitive maturity and post-teaching EC's cognitive maturity, and the specific differences in comparison indicate that the mean value of 7 (3.50) is significantly lower than the mean value of 1.7 (4.23). Out of a total of 7 paired data sets, 6 of them will show differences.

#### 3.1.4. Discussion on the Independent Sample T-test and Paired T-test

In the data processing process, the author conducted independent sample t-tests on pre-teaching EC and CC, as well as post-teaching EC and CC, respectively. According to the data in Tables 5, the author found that the P-values of pre teaching CC and EC were all greater than 0.5 in each

dimension, indicating that there was no difference between the two classes in seven dimensions. This data analysis laid the foundation for the experiment. However, according to the data in Tables 6, various indicators changed significantly after teaching. There are significant differences in open mindedness, analytical, systematic, confidential, inquisitive, and cognitive maturity between the two classes, with only the dimension of truth seeking showing little significant change. It can be seen that, while maintaining variables, teaching has a positive impact on students' critical thinking ability.

In order to further explore whether CBI and ordinary teaching methods have an impact on students' critical thinking ability, the author conducted paired sample t-tests on CC before and after teaching and EC before and after teaching, respectively. According to Tables 7, it can be seen that CC before and after teaching has no differences in the seven dimensions of critical thinking ability, indicating that ordinary teaching methods cannot have a positive impact on students' critical thinking ability. However, According to Tables 8, it can be seen that there is much difference in EC before and after teaching, except for the truth seeking dimension. There are differences in other dimensions, and the data after teaching is significantly larger than before teaching. This indicates that the CBI used in the experimental class can have a positive impact on students' critical thinking ability. However, for the constancy of the truth seeking dimension values, The author believes that it is possible that the teaching duration of CBI is still relatively short and cannot fully influence each dimension, and pursuing true rationality is a human thinking mode, not a dimension that can be quickly obtained through skills like analytical thinking.

In summary, from the above data, it can be seen that CBI has a positive impact on students' critical thinking ability, while ordinary teaching methods have little impact on students' critical thinking ability.

### 3.2. Results and Data Analysis of the Reading Test

After eleven weeks of teaching by teachers, a reading test is conducted. The most important thing is that the premise of the reading test is that there is a significant difference in the critical thinking ability between the experimental group students and the control group students. This is because the purpose of the reading test is to further explore the impact of

CBI on specific critical thinking skills. In order to ensure the reliability and validity of the test paper, the author selected the reading section of the 2016 graduate entrance English exam as the test paper and made some reasonable adaptations. The test paper consists of 24 questions, of which twenty are multiple-choice questions and four are adapted open-ended question answering questions. By analyzing the reading scores of the two classes after teaching, The author can further

explore the impact of CBI on specific critical thinking skills in reading.

### 3.2.1. Descriptive Analysis of the Reading Test

In order to understand the impact of CBI on students' specific critical thinking skills in reading, the author conducted a descriptive analysis of the reading tests of two classes. The specific data analysis is as follows.

**Table 9.** Descriptive analysis of the CC

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Analysis	33	0.000	4.000	1.636	0.929	1.333
Application	33	0.000	3.429	1.766	0.850	1.714
Reasoning	33	0.571	3.429	1.714	0.728	1.714
Evaluation	33	1.000	2.750	1.644	0.380	1.500
Total score	33	25.000	60.000	40.758	8.821	41.000

According to table 9, the mean scores of analysis (M=1.636; Std.=0.929), application (M=1.766, Std.=1.714), reasoning (M=1.714, Std.=1.714) and evaluation (M=1.644, Std.=1.500) are below 2.00. Also, the mean of the total score is 40.758. It is worth noting that the first three dimensions are

all multiple-choice questions, and only the evaluation dimension is a question answering question. The average score of the four dimensions is below three points, indicating that students are not proficient in reading skills.

**Table 10.** Descriptive analysis of the EC

Items	N of samples	Min	Max	Mean	Std. Deviation	Median
Analysis	33	0.667	3.333	1.960	0.881	2.000
Application	33	0.571	3.429	2.147	0.700	2.286
Reasoning	33	0.571	3.429	2.078	0.726	2.286
Evaluation	33	1.500	3.500	2.515	0.552	2.500
Total score	33	33.000	71.000	51.394	8.463	50.000

According to table 10, the mean scores of evaluations (M=2.515; Std.=0.552), application (M=2.147, Std.=0.700), reasoning (M=2.078, Std.=0.726) are higher than 2.00, while the mean scores of analyses is 1.960. Also, the mean of the total score is 51.394. Compared to Table 3-11, the experimental class showed significant improvement in scores

for analysis, application, reasoning, and evaluation skills, especially evaluation. This indicates that CBI not only improves students' critical thinking ability but also has a positive impact on their reading skills.

### 3.2.2. Independent Sample T-test for the Reading Test

**Table 11.** Independent t test

	Group (Mean±Std. Deviation)		<i>t</i>	<i>p</i>
	CC ( <i>n</i> =33)	EC ( <i>n</i> =33)		
Analysis	1.64±0.93	1.96±0.88	-1.450	0.152
Application	1.77±0.85	2.15±0.70	-1.988	0.051
Reasoning	1.71±0.73	2.08±0.73	-2.031	0.046*
Evaluation	1.64±0.38	2.52±0.55	-7.468	0.000**
Total score	40.76±8.82	51.39±8.46	-4.998	0.000**

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

From the above table, it can be seen that t-test (also known as independent sample t-test) was used to study the differences between groups in Analysis, Application, Reasoning, Evaluation, and Total score for a total of 5 items. From the table, it can be seen that there is no significant difference ( $p > 0.05$ ) between the experimental group and the control group in terms of Analysis and Application ability, which means that the experimental group and the control group maintain consistency in Analysis and Application ability. In addition, the samples from different groups showed significant differences ( $p < 0.05$ ) in terms of Reasoning, Evaluation, and Total score, indicating that there are differences in Reasoning, Evaluation, and Total score among samples from different groups. Specific analysis shows that:

The group showed a significance level of 0.05 for Reasoning ( $t = -2.031$ ,  $p = 0.046$ ), and specific differences in

comparison indicate that the mean value of CC (1.71) will be significantly lower than the mean value of EC (2.08).

The group showed a significance level of 0.01 for Evaluation ( $t = -7.468$ ,  $p = 0.000$ ), and specific differences in comparison indicate that the mean value of CC (1.64) will be significantly lower than the mean value of EC (2.52).

The group showed a significance level of 0.01 for the Total score ( $t = -4.998$ ,  $p = 0.000$ ), and specific differences in comparison indicate that the mean value of CC (40.76) will be significantly lower than the mean value of EC (51.39).

In summary, it can be concluded that different group samples do not show significant differences in Analysis and Application, while group samples show significant differences in Reasoning, Evaluation, and Total score.

### 3.2.3. Discussion on the Reading Test

Through descriptive analysis of the data, it is found that the

average scores of various skills in the control class were lower than those in the experimental class, especially at the evaluation level. This indicates that the improvement of critical thinking ability has some impact on students' reading skills. At the same time, it conducted independent sample t-tests on the data of the two classes to understand the significant differences in skills between the two classes. According to Tables 11, there is no significant differences at the analysis and application levels, but significant differences at the reasoning and evaluation levels. This indicates that CBI has a greater impact on reasoning and evaluation skills, while its impact on analysis and application skills is not significant. For this situation, it speculates that the implementation time of CBI is relatively short and cannot significantly improve every aspect of reading skills within a semester. Secondly, compared to reasoning and evaluation, analysis and application skills focus more on the details of reading texts rather than thinking patterns, which may also be the reason for this situation.

#### 4. Conclusion

The research concludes three main points regarding the intersection of Content-Based Instruction (CBI) and critical thinking in university-level English reading courses.

First, it has been observed that students' critical thinking skills are generally low to average, a situation attributed largely to traditional teaching methods which prioritize language knowledge over deep reading and analytical capabilities. These methods enhance vocabulary but do little to promote the analytical skills necessary for comprehensive reading and thinking.

Second, implementing CBI has shown a positive impact on enhancing students' critical thinking abilities. Within the CBI framework, teachers encourage independent problem identification and bolster student interaction, shifting the focus from mere language acquisition to substantial content engagement. This approach not only boosts students' motivation and cognitive maturity but also strengthens their ability to analyze text logic, enhancing their logical and systematic thinking over time.

Third, CBI has specifically improved students' critical thinking skills pertinent to reading. While critical thinking pertains to broader, macro-level cognitive abilities, the reading skills targeted by CBI are more micro-level and skill-specific, encompassing observable and controllable elements such as text analysis and theme identification. Continuous teacher guidance helps students form robust connections with

text content, fostering a deeper understanding of cultural contexts and sharpening their reasoning and evaluative skills, which are crucial during reading assessments.

Overall, CBI proves effective in cultivating critical thinking by emphasizing content understanding and analysis over rote language learning, thus preparing students better for complex intellectual engagements.

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