

An Empirical Study on the Correlation between Critical Thinking Ability and L2 Argumentative Writing Competence

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Abstract: Good critical thinking ability not only enables us to comprehensively understand things and make rational judgments, but also enables us to break the routine, think creatively and develop our personality. English argumentative writing is an effective way to cultivate critical thinking ability. This study uses corpus analysis and SPSS to analyze the relationship between students' critical thinking ability and their English essay writing level. The results show that: (1) students as a whole have a tendency towards positive critical thinking; (2) the dimensions of students' critical thinking ability are, in descending order, curiosity, justice, openness, truth-seeking, cognitive maturity, analytical, resilience and confidence; (3) the correlation coefficient is 0.482, which means they are positively correlated. Based on the above findings, some valuable suggestions for optimization of English writing teaching are put forward accordingly.

Keywords: critical thinking ability; argumentative writing; correlation; EFL

1. Introduction

As an important way of conveying information, expressing emotions and communicating, English writing is an important and difficult part of English language education. And critical thinking skills, as an important part of thinking ability, have been valued by education experts at home and abroad as one of the goals to be cultivated in English learning. Second language learner's (L2) writing is influenced by a combination of factors, including their language level and thinking skills. The first is the influence of linguistic factors. L2 writing involves linguistic knowledge such as second language vocabulary, grammar and discourse. In particular, the use of linguistic knowledge has a direct impact on L2 writing. Furthermore, L2 writing must also take into account the role of critical thinking skills such as reasoning, synthesis and evaluation. Writing is the ability to use language to express ideas and to think (Thadphoothon, 2014; Cynthia, 2015). The process of writing requires the involvement of thinking skills in the accurate representation of language, the distillation of themes, the selection of topics and the rational layout of chapters.

However, a review of the literature reveals only a few studies that explore critical thinking skills based on either process-based or product-based approaches to writing. For example, Hayes & Flower (1980), based on a process-based analysis of bilingual writing, argue that the writer's conceptual process consists of three sub-processes: generating ideas, organizing ideas and setting goals, while Li Zhixue (2007) further suggests that the writing process is a cycle of these three sub-processes. Stapleton (2001) by analyzing the establishment, selection and presentation of argument, reasoning and conclusion, as well as the reasoning errors that may be made in the reasoning process, finds that there is no cultural difference in learners' critical skills, but that familiarity with the topic and background knowledge affect the level of writing performance. Wen Qiufang & Liu Runqing (2006) based on the basic aspects of the writing thinking process, established four parameters for assessing the content of essays by analyzing the content of 120 English argumentative essays in four grades of English majors in university, and analyzed students' abstract thinking characteristics accordingly.

The studies above are interesting in inferring the thinking characteristics of writers based mainly on second language writing. However, relatively few studies have explored the impact of critical thinking on second language writing, so the relevance of critical thinking to second language writing needs to be explored. This study uses a combination of qualitative and quantitative research methods to investigate the correlation between students' critical thinking skills and their English writing proficiency, so as to

provide suggestions for the English writing teaching in university, and hopefully to offer some reference for subsequent researches.

2. Literature review

Many scholars believe that the critical thinking ability training of foreign language majors is insufficient in China. In order to change this situation and integrate the cultivation of critical thinking ability into foreign language teaching to improve students' English level, many domestic foreign language researchers try to further investigate students' writing and its relationship with critical thinking ability. Starting from the four basic steps of composition, Wen Qiufang & Liu Runqing (2006) took undergraduates of English majors as the research subjects and analyzed their English argumentative papers. The results show that the subjects have obvious problems in argument clarity, relevance, thoroughness and discourse coherence. Even in the junior and senior students, many do not meet the requirements. Qin Xiaoqing & Wen Qiufang (2007) selected four grades of college students as research subjects. They analyzed five English compositions (20 in total) from each grade. After analyzing the five dimensions of the thinking ability development framework (clarity, relevance, sufficiency, text objectivity and text orderliness), they found that the overall changing trend of students was that grade was positively correlated with students' thinking ability. However, students of different grades have different degrees in these five thinking characteristics.

Zhu Xiaomei (2009) also selected English and Chinese compositions of English majors and analyzed the characteristics of critical thinking reflected in their compositions. The results show that even without the interference of language problems, English majors still lack critical thinking when writing compositions in Chinese. The level of critical thinking ability reflected in English composition basically shows a trend of improvement with the increase of grade. When Sun Youzhong (2011) talked about the teaching of writing and the cultivation of critical thinking ability for English majors, he emphasized the relationship between writing and critical thinking ability, and illustrated the importance of improving college students' critical thinking ability through writing with examples. Li Ting (2015) discussed the Construction Countermeasures of critical thinking in English Writing Teaching in China from the aspects of in class and out of class teaching and curriculum, in order to establish a close relationship between writing training and the cultivation of critical thinking, so as to further improve the quality of English writing teaching. Li Yan (2015) expounded the two concepts of critical thinking ability and English writing ability, and called for the introduction of teaching methods to cultivate critical thinking ability in College English writing teaching, in order to essentially improve college students' English writing level.

None of these studies mention the relationship between each dimension of critical thinking ability and writing competence, which is neither detailed nor in-depth. Therefore, this study can make up for some deficiencies of previous studies and enrich the research in related fields.

3. Research questions

- ◇ What is the current situation of L2 learners' critical thinking ability in China?
- ◇ What is the correlation between critical thinking ability and L2 learners' writing competence?
- ◇ What is the correlation between the dimensions of critical thinking ability and the L2 learners' writing?

4. Methodology

4.1 Participants

180 non-English major sophomores (127 female, 53 male) were selected as subjects in Lingnan Normal University in Guangdong, China. They were mainly around 19 years old and the main textbook was *New Horizon College English (Third Edition)*. All of the learners were from the same native language (Chinese). The average years of studying English was ten.

4.2 Instruments

4.2.1 Critical thinking personality tendency questionnaire

This questionnaire is adapted from California Critical Thinking Disposition Inventory (CCTDI). CCTDI scale contains 8 dimensions and 54 questions in total. Because the scale has been used by many researchers for many years, it has good reliability and validity. The total score of the eight dimensions is 320 or more, which is a positive critical thinking personality tendency. That is, the average score of each question in the critical thinking personality tendency scale is equal to or greater than 4, which indicates that the overall critical thinking personality tendency of the subjects is positive.

The specific significance of each dimension of the scale is as follows: ①Analytical means that people can use evidence to analyze problems independently and objectively, and the ability to predict the result or consequence of the event through factual basis. ②Curiosity is an instinct for people to be curious about the unknown. In learning, it refers to the urgency and desire to obtain knowledge and information. This curiosity can be enhanced through training and education. ③Resilience refers to the character and ability that people have perseverance and indomitable will to overcome the difficulties and solve the problems they face. ④Confidence refers to the confidence index that people have a certain ability to do something well or solve a problem. ⑤Truth-seeking refers to people's desire to seek the truth and essence of things. ⑥Cognitive maturity refers to whether people have a comprehensive understanding of things and think carefully about events in life. ⑦Openness refers to people's tolerance and open attitude towards foreign things and different views. ⑧Justice refers to people's conscious standard to judge whether things are morally and legally fair. This is related to the judgment of right and wrong, and is closely related to subjective consciousness.

4.2.2 SPSS

In this study, all the data collected from the questionnaire and writing performance were input and analyzed by SPSS17.0 statistical software.

4.3 Procedures

Firstly, 180 subjects were given the questionnaire of California Critical Thinking Disposition Inventory (CCTDI). They were required to answer 54 questions within 15 minutes in order to investigate their overall critical thinking skills and their abilities in each dimension. In the end, 176 valid questionnaires were returned, with an effective rate of 97.78%.

Secondly, all subjects were asked to write a 120-word argumentative essay on the topic "No smoking in public places?" in 30 minutes, which was then marked by two teachers according to the English argumentative essay marking scheme.

Thirdly, all subjects' scores given by the two teachers were then averaged and entered into SPSS 17.0 for correlation analysis. The evaluation standard of English argumentative papers evaluates English argumentative papers from four aspects: topic examination, intention, layout and expression, which more directly reflect the author's critical thinking ability.

5. Results and Discussion

5.1 Analysis of critical thinking ability questionnaire

Table 1 Descriptive Statistics of Critical Thinking Ability and Its Dimensions

	N	Min.	Max.	Mean.	S.D.
Analytical	176	17.00	38.00	3.84	6.11
Curiosity	176	10.00	36.00	4.41	5.12
Resilience	176	8.00	34.00	3.62	4.83
Confidence	176	10.00	41.00	3.55	4.82
Truth-seeking	176	18.00	40.00	3.89	6.13
Cognitive Maturity	176	18.00	46.00	3.85	8.48
Openness	176	18.00	40.00	4.31	4.65
Justice	176	14.00	36.00	4.38	4.05
Total	176	155.00	265.00	4.00	21.67

From the statistical analysis of the questionnaire survey data of CCTDI, it can be seen that the average

of each question of subjects' critical thinking ability is $4.0071 > 4$, so they have a positive critical thinking personality tendency as a whole. In addition, according to the average score, the scores of each dimension from high to low are Curiosity, Justice, Openness, Truth-seeking, Cognitive Maturity, Analytical, Resilience and Confidence. The average score of curiosity dimension was 4.4113, which was higher than other dimensions. It can be seen that college students have strong ability in this aspect of thinking ability, and their acquisition of knowledge and information is more urgent and active. Justice takes the second place, which is strong and closely distributed (see Table 1 for details). This ranking is roughly in line with the thinking development characteristics of college students.

5.2 Correlation between critical thinking ability and English argumentative writing level

According to the results of critical thinking ability and English argumentative writing, there is a positive correlation. Therefore, Pearson correlation analysis can be used to test the degree and direction of correlation between them. The results are shown in Figure 1 the scatter diagram of English argumentative writing and the overall level of critical thinking ability.

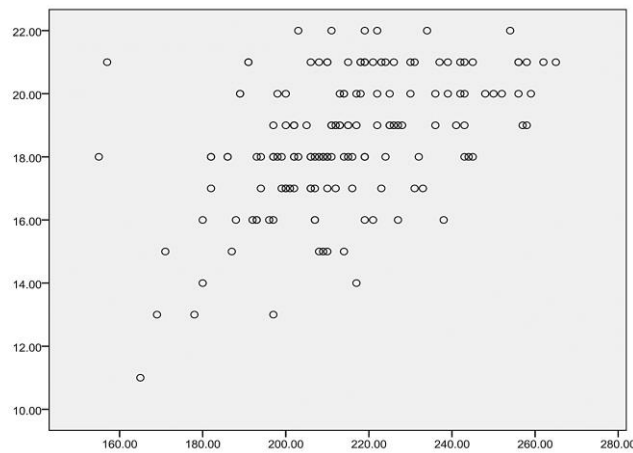


Figure 1 Scatter diagram of the English argumentative writing and overall critical thinking ability

From Pearson correlation analysis, we can find that the correlation between English argumentative writing and overall critical thinking ability is 0.482, and the significant level is 0.000, indicating a positive correlation between the two (see Table 2 for details).

Table 2 Correlation between English Argumentative Writing and Overall Critical Thinking Ability

		Writing Performance	Overall Critical Thinking Ability
Writing performance	Pearson correlation	1	.482**
	Sig.		.000
Overall Critical Thinking Ability	Pearson correlation	.482**	1
	Sig.	.000	

5.3 Correlation between dimensions of critical thinking ability and English argumentative writing

In order to further examine the predictive effect of the three dimensions of analysis, cognitive maturity and truth-seeking on the level of English essay writing and the strength of their predictive power, the author conducted a multiple regression analysis using the stepwise entry method. The table of input/removed variables in Table 5.3 shows that all three variables—Analytical, Cognitive Maturity and Truth-seeking—entered the regression equation model. This indicates that the regression equations were statistically significant, the three models explained a certain amount of variance in “writing level”.

From Pearson correlation analysis, we can find that among the eight dimensions, only three dimensions have a statistically significant correlation with the level of English argumentative writing. These three dimensions are analytical, cognitive maturity and truth-seeking (details in Table 3). Among them, the correlation between cognitive maturity and writing level is the highest, reaching 0.477. This shows that students' cognitive ability and the depth and breadth of thinking have a great impact on their writing. The second is Truth-seeking, and the degree of correlation is 0.416. Surprisingly, the Analytical is the lowest among the three, which is 0.348. As for the rest five dimensions, there is no significant correlation between them and the level of English argumentative writing.

Table 3 Correlation between argumentative writing and dimensions of critical thinking skills

		Analytical	Curiosity	Resilience	Confidence	Truth-seeking	Cognitive maturity	Openness	Justice
Writing level	Pearson Correlation	.348**	.078	.015	.147	.416**	.477**	.011	.118
	Sig.	.000	.333	.856	.067	.000	.000	.888	.141
	N	176	176	176	176	176	176	176	176

5.4 Discussion

From the data analysis above, we know that there is a positive correlation between critical thinking ability and English argumentative writing level, and only three of its eight dimensions are related to English argumentative writing level.

First, the process of topic examination is the process of the author's understanding and judging. Therefore, the more thorough the author's understanding of the topic, the more accurate the judgment of the relationship between concepts, the less likely the composition will deviate from the topic. This aspect obviously involves two dimensions of critical thinking ability, namely Analytical ability and Cognitive Maturity. Higher cognitive maturity can help the author better understand the meaning of the topic, while better analytical can enable the author to quickly figure out the writing ideas and judge the relationship between concepts. Through the comparison of the performance of students with high and low critical thinking ability in the examination process, we can find that the differences caused by critical thinking ability have an impact on English argumentative writing ability from the very beginning.

Second, intention. As we all know, intention is the most important phase in the writing process, and it is also the easiest to improve the writing quality. According to the results of the first step, the author establishes the central argument and sub arguments of the article on the basis of summarizing his/her existing materials. In this phase, Truth-seeking and Cognitive Maturity are particularly important. Truth seeking refers to people's tendency to seek the truth and essence of things, and cognitive maturity is a measure of whether people have a comprehensive and thoughtful understanding of things. The views put forward by the author in the article are often his perception or conclusion after his deep thinking on some social phenomena in daily life. Therefore, the author's truth-seeking and cognitive maturity directly determine the level of his/her intention. The reason analytical is further confirmed by the interview results of grouped students with high and low critical thinking ability. It can be seen from the writing test that the students with high critical thinking ability often think and summarize news and events in life, so they can write more arguments than the students with low critical thinking ability, so they can further choose more persuasive arguments. This also directly reflects the impact of their cognitive maturity and truth-seeking ability on their English argumentative writing level. Relatively speaking, students with low critical thinking ability can only think of what to write, and have no time to take into account the persuasiveness and rationality of their views.

Third, organization planning. When the author plans the structure, s/he often takes the central argument and sub argument as the starting point of thinking, and determines the relationship between the whole and parts through analysis and comparison, appropriate synthesis and classification and rigorous reasoning. Obviously, this step requires the author to make full use of his/her analytical ability, which is related to his analytical level. From the results, it can be found that the students in the proficient group have accumulated more sub arguments in the intention phase, so they can spare the power to sort each argument to improve the persuasiveness of the composition. In addition, they also combined with the general argument to further analyze how to expand the sub argument, which will make the article more persuasive. Due to the differences in logical awareness and analytical, the level of critical thinking ability has an impact on the writing level of English argumentative papers.

Fourth, expression. When delivering viewpoints, the author should discuss paragraph by paragraph according to the overall organization. If an argument wants to be expressed convincingly, it must have rigorous reasoning logic and persuasive arguments. This requires the depth and breadth of the author's thinking, proper reasoning methods and sufficient arguments. It can be seen that the author's analytical ability, cognitive ability and truth seeking degree are very important in this process. The logical reasoning process of arranging arguments requires the author's analytical ability, while the persuasion of arguments requires the author to think deeply about the arguments. In fact, this phase is closely related to the previous phases. When discussing "no more smoking in public places", s/he first explained that smoking affects personal health, then discussed that smoking affects family health, and finally explained that smoking affects the environment. In this way, the scope of smoking influence is from specific to general, which is more convincing.

In summary, this study has the following major findings: ①College students as a whole have positive thinking ability and personality tendency. In addition, each dimension of their critical thinking ability from high to low is curiosity, justice, openness, truth-seeking, cognitive maturity, analytical, resilience and confidence. ②From the data, the correlation coefficient between students' critical thinking ability and their English writing level is 0.482, that is, there is a positive correlation between them. At the same time, the data also show that among the eight dimensions of critical thinking ability, there is a certain relationship and positive correlation between analytical, truth-seeking and cognitive maturity and students' English argumentative writing level. The correlation coefficients between them are 0.348, 0.416 and 0.477 respectively, while there is no significant correlation between the other five dimensions and students' English argumentative writing level. ③Students' practice of critical thinking skills was found to be inadequate. Although they are aware of the value of critical thinking skills, yet they do not do enough training. Moreover, the results revealed that, apart from critical thinking skills, other factors also had an impact on the students' English essay writing, such as their home learning environment, social experiences and learning strategies. These findings have implications for EFL researchers to further explore students' critical thinking skills and improve their English writing.

6. Conclusion and implications

6.1 Implications for in-class English writing teaching

It can be seen from the research that college students obviously have a certain understanding of the importance of critical thinking ability, but they have not formed awareness and implemented it. Therefore, EFL teachers should shoulder the responsibility of guiding students and helping them improve their critical thinking ability. Teachers are aware of the importance of critical thinking ability for English writing, but few of them really implement and take practical action. Therefore, in practical teaching, teachers should implement it into specific actions. For example, at the beginning of writing class, the topic is introduced through videos and pictures, so that students have curiosity and thirst for knowledge about the topic. Then let the students brainstorm and analyze the topic during the discussion, so as to promote them to think deeply about the topic. When students make an outline, teachers can organize group discussion, so that students can have a better understanding of the layout of argumentative essays.

In fact, cultivating students' critical thinking ability is not only reflected in English writing class, but also runs through the whole process of foreign language teaching. In reading class, teachers may also pay attention to giving students the opportunity to express their views. For example, when explaining the text, the teacher can take out a sentence separately and let the students speak out their different understandings of the sentence or paraphrase it with their own words. Plus, after teaching the whole text, the teacher can ask the students to stand opposite the author's views. This can not only promote students to learn and study the writing ideas of reading discourse, but also stimulate their reverse thinking and exercise their critical thinking ability. Teachers can also train students' particular dimensions of critical thinking ability to help shape students' all-round critical thinking ability. For example, the subjects in this research generally have low level of toughness and confidence. In view of this, teachers should increase some frustration training for students, temper their will and cultivate their resilience. Furthermore, we should also organize various activities to strengthen students' sense of achievement in learning, so that they can directly witness their progresses, and carry out more practice and competition projects, so as to enhance students' confidence.

6.2 Implications for extracurricular activities

Outside the English class, colleges can set up optional courses to directly train students' critical thinking ability. As mentioned in the literature review, out of the importance of critical thinking ability, western educators not only emphasize the combination of critical thinking ability training with specific disciplines, but also advocate setting up separate courses of critical thinking ability. In recent years, many colleges and universities in China have also set up relevant courses, but they are still not enough. For college students who are in the crucial period of adult development, the cultivation and training of critical thinking ability is extremely important. Therefore, it is necessary to reform the curriculum, appropriately increase the courses for training logical thinking, focus on training thinking ability and improve students' analytical competence.

In order to provide more opportunities for students, schools and teachers should strive to organize some extracurricular practical activities to train students' thinking ability. The forms of activities can be

diversified, such as debate contest, speech contest, Model United Nations, etc. In addition, when guiding the development of student associations, schools can also encourage students to try in this regard. Students hope that schools and teachers can give them more opportunities to exercise their critical thinking ability. Through the joint efforts of schools and teachers, we may help students consciously improve their critical thinking ability in the long run.

Acknowledgement

This research is funded by “A Study on the Correlation between Critical Thinking Ability and L2 Writing Competence” of Humanistic and Social Science Research Project in Lingnan Normal University (Project No.:WY1903).

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