

行政院國家科學委員會專題研究計畫 成果報告

大學生英語學習與批判思考能力之相關研究：問題初探

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大學生英語學習與批判思考能力之相關研究：問題初探

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摘要

本研究意在探討批判思考教學應用於大學生學習英文為外語的環境下(EFL)之學習效應，其目的為二：其一為瞭解以英文為外語的學生是否可以從英文教授的批判思考教學中受益；其二為瞭解學生的英文程度是否影響其受益程度。

研究樣本為 112 名修習大一必修英文的台北某國立大學大一新生，實驗組 50 名同學在學習英文必修教材的同時，接受批判思考的訓練；而對照組的 62 名同學則在學習同樣教材的情況下，接收傳統的文法單字教學。兩組都施與「康乃爾批判思考測驗乙級」以及中文同等之測驗為前測，而在實驗結束後，再施與後測。

研究結果顯示實驗組在 16 週的學習後，不管在英文或中文的批判思考成績表現上都勝過對照組，特別是他們的英文程度以大學入學英文學測的成績看來，並無顯著的不同。至於學生的英文程度是否影響其對批判思考教學的受益程度，結果顯示英文程度較低的學生受益較大。實驗組與對照組英文程度較低的同學，在實驗初期的英文程度並無顯著差異，但在英文的批判思考後測中實驗組表現卻顯著優於對照組，這個結果證明了即使是英文程度較低的學生仍然能受益於批判思考教學，甚至更有受益潛能。本研究並提出教學的相關建議。

關鍵字：批判思考、英語學習

Abstract

The current study examines the effect of critical thinking instruction on college students in an EFL context. The purpose is twofold: (1) to examine whether EFL students would benefit from learning critical thinking skills taught in English; (2) to understand whether students' English proficiency levels have any bearing on the outcome of such learning.

A total of 112 freshman students who were taking the required Freshman English course in a public university in Taipei, Taiwan were the subjects. The experimental group (N=50) received critical thinking training when learning the required English texts. The control group (N=62) received traditional grammar and vocabulary teaching for the same texts. Both groups were given a pretest that consisted of Cornell Critical Thinking Test, Level Z and the Chinese equivalent test. In the end of the treatment, the same tests were administered to all students as the posttest.

Results show that the experimental group outperformed the control group after the 16-week treatment on both the English and the Chinese critical thinking tests, particularly given the fact that the two groups did not differ significantly on their English proficiency level, as measured by the College Entrance English Exam.

As for students' susceptibility to the critical thinking instruction due to their English proficiency, the treatment effect was most evident on the English low achievers. The lower end of the students in both treatment conditions started out on the same proficiency level, but the experimental group showed significant progress on the English critical thinking test than the control group. The encouraging results demonstrate that students of lower English proficiency are just as capable, if not more, of benefiting from critical thinking teaching. Pedagogical implications and future research are suggested as well.

Key words: critical thinking, EFL teaching

INTRODUCTION

Theorists have debated over the years what constitutes critical thinking. In general, three traditions of theorizing critical thinking can be mentioned (Sternberg, 1986). First, the philosophical tradition, which dates back to ancient Greek times, stresses the requirements of formal logical systems. Its modern spokespersons are Ennis (1962), Lipman, Sharp & Oscanyan (1977), and Paul (1984). The second camp stems from the psychological tradition, which characterizes critical thinking as it is performed under the limitations of the person and the environment. Therefore, comparing the thinking of gifted and normal performers in order to pinpoint how people differ would be a typical way of psychological theorization of the construct. Finally, the third tradition lies in the educational domain, which focuses on the skills needed by children in the classroom for problem solving, decision-making, and concept learning. “The philosophical theories tend to be competence theories specifying what people *can* do; psychological theories tend to be performance theories specifying what people actually do; educational theories are often a mixture of the two.” (Sternberg, 1986) Despite different orientations and approaches to the construct, the agreements on the nature of critical thinking still seem to outweigh the disagreements. That is, construed broadly, critical thinking comprises the effortful, purposive, self-monitoring mental processes that people use to challenge old thinking, consider alternatives, make decisions, and solve problems etc.

The increasing enthusiasm for critical thinking as a goal of education shows no signs of stopping. In 1984, the National Institute of Education recommended that critical thinking be included in the curriculum, making it possible for students to develop these thinking skills and use them effectively in a changing society (Gadzella & Masten, 1998). Paul & Nosich (1991) urged instructional reforms based on a rich, substantive concept of critical thinking and proposed criteria for higher order thinking assessment. In the State of Texas, teachers are demanded to teach critical thinking skills as such that they are required to pass the Texas Assessment of Academic Skills (TAAS) of which critical thinking questions are a crucial part (White & Hargrove, 1996).

In Taiwan, many committed scholars have devoted time and expertise promoting the essence of critical thinking in educational practices and have undertaken the arduous tasks of developing and validating the Chinese versions of various critical thinking assessment tools. As early as in 1986, 黃堅厚等 (民 75) revised the Watson-Glaser Critical Thinking Appraisal. In 1991, 毛連塏、劉燦梁、陳麗華 (民 80) revised the Cornell Critical Thinking Test, Level Z (CCT-Z) into a 34-item, Chinese version test and validated it against a sample of 1803 college students from 7 colleges and universities in Taiwan. Also among the forerunners are 吳靜吉、葉玉珠 (民 81) who developed the revision of Cornell Critical Thinking Test, Level X (CCT-X) aimed at elementary and secondary schoolers. Over the years, ample research studies have employed the assessment tools to investigate various dimensions of critical thinking demonstrated by

our local students in a variety of contexts (劉燦樑、林珊如、陳麗華, 民 79 ; 陳蜜桃, 民 82 ; 洪久賢等, 民 84、85 ; 陳儀璇, 民 85 ; 鄭英耀、黃正鵠, 民 85 ; 鄭英耀、葉玉珠, 民 87 ; 葉玉珠、葉碧玲, 民 89).

Few studies, however, addressed the issue of critical thinking instruction in the language learning classrooms. 張玉成 (民 81) examined the effects of critical thinking instructions on 4th-graders' learning of Mandarin as well as their thinking patterns over a four-month period. They found positive effects in general and concluded that teacher's questioning technique in language arts classes can foster students' critical thinking abilities. 蔡明秀 (民 86), on the other hand, explored to what extent college students accepted the idea of critical thinking teaching in the English class. The results indicated that student attitude towards the critical thinking instruction was negative despite initial interests. These sporadic studies have suggested not so much as mixed results but insufficient groundwork, which thereby demands more empirical studies to be conducted.

PURPOSE OF THE STUDY

The current study attempts to employ critical thinking instruction in the Freshman English classroom. The purpose is twofold: (1) to examine whether students' thinking patterns would benefit from the critical thinking training; (2) to understand whether students' English proficiency levels have any bearing on their susceptibility to the training.

SIGNIFICANCE OF THE STUDY

Because of the limited prior research addressing the link between critical thinking and EFL learning in Taiwan, the current study is aiming at uncovering hidden issues than reaching definitive conclusions. The experimental design promises empirical evidence of the effect of critical thinking instruction. Also, the contrast between high proficiency students and low proficiency students in learning how to think critically will help identify those who are able to benefit most from the instruction. More importantly, these data will shed light on whether/how to teach critical thinking skills to students of different English proficiency levels.

METHOD

Participants

A total of 112 freshman students, 34 males and 78 females, from a public university in northern Taiwan were recruited as the participants. Participants were from four intact classes taking the year-long College English course as a requirement. Fifty of the 112 students were in the experimental group, 62 in the control group. Due to the course registration policy of College English, however, both the experimental group and the control group consisted of students who had stayed with the instructor, the researcher herself, for a whole school year (32 weeks) or for a semester only (16 weeks). Table 1 shows a distribution of participants by gender, treatment, length of treatment, and academic major.

Table 1
Distribution of participants by gender, treatment, length of treatment, and academic major

Variable	Level	Treatment	
		Experimental	Control
Gender	Male	15	19
	Female	35	43
	Total	50	62
Length of treatment	16 weeks	30	54
	32 weeks	20	8
	Total	50	62
Academic major	Liberal Arts	30	
	Law	9	
	Science	7	
	Education	4	
	Business		62
	Total	50	62

Instruments

- (1) The original Cornell Critical Thinking Test, Level Z;
- (2) 批判思考測驗第一級(葉玉珠, 2003)
- (3) 批判思考態度量表(鄭英耀、葉玉珠, 民 87);

Procedure

Two freshman classes taking the required College English course from the researcher were randomly designated as the experimental group and the control group. In the beginning of the semester, both groups received a pretest, which consisted of the English Cornell Critical Thinking Test, Level Z and the Chinese 批判思考測驗第一級 (葉玉珠, 2003). The two tests were spaced apart a few days in order to prevent fatigue or recalls of similar items. At the end of the semester – a 16-week treatment period, both groups were given the same two tests as the posttest. Students of both classes went through course registration procedures to sign up for the researcher’s classes in the following semester. Returning students as well as new students were mixed in both treatment and control groups. New students were given the pretest while the returning students were engaged in other course relevant tasks. The returning students, as a result, will have experienced a total of 32 weeks of treatment by the end of the second semester.

The experimental treatment—critical thinking instruction—consisted of techniques suggested by various prior studies, including Palincsar & Brown’s (1984) well-documented technique of **reciprocal teaching**, and **SQ3R** (survey, question, read, recite, review) suggested by Adams, Carnine, & Gersten (1982). King (1992, 1994) conducted a series of studies that clearly demonstrate the value of **reciprocal peer questioning** in which learners learn to pose thoughtful questions and then take turns answering. King also devised a series of generic questions, which can be used with modifications in almost any context. The table below shows some of the generic questions:

Guiding Thought-Provoking Questioning	
Generic questions	Specific thinking skills induced
<i>What is a new example of...?</i>	Application
<i>How could ... be used to...?</i>	Application
<i>What would happen if...?</i>	Prediction/hypothesizing
<i>How does ... tie in with what we learned before?</i>	Activation of prior knowledge
<i>How are ... and ... similar/different?</i>	Comparison-contrast
<i>What evidence is there to support your answer?</i>	Provision of evidence
<i>How do you think ... would see the issue of...?</i>	Taking other perspectives
<i>What are some possible solutions to the problem of ...?</i>	Synthesis of ideas

Excerpt from *Thought and Knowledge: An introduction to critical thinking* by Halpern (2003)

Students of the experimental groups were engaged in group discussions to share, brainstorm, and question ideas from one another so as to enhance their comprehension of the texts as well as their thinking skills.

Data analysis

A series of T-tests were performed to examine the effects of the treatment condition on participants' critical thinking ability measured by the English and the Chinese versions of the Critical Thinking Test, as well as on participants' critical thinking orientation.

RESULTS AND DISCUSSION

Preliminary analyses

T-tests were performed to determine the comparability of the English proficiency level between the experimental group and the control group. Students of experimental group did not differ significantly ($t_{(95)} = -.91, p = .365$) from those of the control group on the College Entrance English Exam, a rather standardized measure of English proficiency. Also, students of both groups were rank-ordered, within their treatment group, from the highest to the lowest according to their College Entrance English Exam scores. The top 30% of each group were named "High proficiency group," whereas the bottom 30% named "Low proficiency group." Table 2 displays the means, standard deviations, *t*-test statistics of the English proficiency grouping.

Table 2

Means, standard deviations, and *t*-statistics of College Entrance English Exam for the English proficiency grouping by treatment group

English Proficiency	Treatment	N	Mean	S.D.	T-test
High (top 30%)	Experimental	21	74.9	4.7	$t_{(39)} = -2.2,$ $p < .05$
	Control	20	77.6	3.4	
Low (bottom 30%)	Experimental	20	59.8	7.8	$t_{(38)} = .02,$ $p = .98$
	Control	20	59.7	5.3	

According to the *t*-statistics, the English high achievers from the experimental group started out a bit short on the College Entrance English Exam and were significantly outperformed by their control counterparts. The English low achievers of both conditions, however, were not significantly different from each other on their English proficiency level.

Primary analyses

Male students and female students, regardless of their treatment condition, did not perform significantly different on either the Chinese progress ($t_{(104)} = .986, p = .326$) or the English progress ($t_{(104)} = 1.055, p = .294$), indicating that gender did not play a critical role in the development of students' critical thinking ability. Having ruled out the gender effect, which often exerts power behind the scenes for many experimental studies, we now turn to the treatment effect. Table 3 shows the means and standard deviations for the Critical Thinking pre- and post- tests by treatment condition.

Table 3

Means and standard deviations for the Critical Thinking pre- and post-tests by treatment group

Treatment	Chinese critical thinking test				English critical thinking test			
	pre-test		post-test		pre-test		post-test	
	M	SD	M	SD	M	SD	M	SD
Experimental	14.5	2.4	15.3	2.4	8.5	2.4	9.6	2.6
Control	14.2	2.5	13.8	2.7	8.6	2.1	8.7	2.2

The experimental group did not differ from the control group on either the Chinese Critical Thinking pre-test ($t_{(110)} = .765, p = .446$) or the English pre-test ($t_{(109)} = -.19, p = .85$). The progress made between the pre-test and post-test, however, was significantly different. Two new variables, named *Chinese progress* and *English progress*, were computed to indicate the progress made between the Chinese pre- and post-tests and the English pre- and post-tests. The experimental group outperformed the control group on the Chinese progress ($t_{(104)} = 2.0, p = .045$) as well as on the English progress ($t_{(104)} = 2.1, p = .039$).

Given the fact that both treatment groups were on equal footing to begin the experiment, as shown by the insignificant difference at pre-test and their similar English proficiency levels at the English Entrance Exam, the significant progress they made over time has proven the effect of the critical thinking instruction. Also, the experimental group was able to outperform the control group on both the Chinese version and the English version of the post-test, indicating that they had improved their overall thinking skills as a result of the instruction.

As for the contrasts between the experimental and the control groups by students' English proficiency levels, details are shown in Table 4.

Table 4

Means for Critical thinking pre-test, post-test, and progress by treatment and English proficiency group

English proficiency	Treatment	Chinese version			English version		
		Pre-test	Post –test	Progress	Pre-test	Post-test	Progress
High	Experimental	15.1	15.0	-.14	9.5	10.1	.52
	Control	14.1	13.7	-.53	8.5	8.4	-.11
Low	Experimental	14.1	15.9	1.79	8.2	9.6	1.7
	Control	13.7	13.6	.44	8.8	8.4	-.5

The high proficiency students of the experimental condition did not differ significantly from their control counterparts on either the Chinese pre-test ($t_{(39)} = 1.36, p = .181$) or the English pre-test ($t_{(39)} = 1.38, p = .175$). After a 16-week period of treatment, the English high achievers of the experimental group did not perform significantly better than their control counterparts on either the Chinese progress ($t_{(38)} = .419, p = .677$) or the English progress ($t_{(38)} = .632, p = .531$). Their performance on the English post-test, however, was statistically significance at $\alpha = .05$ ($t_{(38)} = 2.14, p = .039$).

Despite a significant difference at the English post-test between the two treatment groups, the difference between the pre- and the post-test within each group was not big enough to reach significance. Nevertheless, an increase of group mean (from 9.5 up to 10.1) for the experimental group is a positive sign compared to a decrease of group mean (from 8.5 down to 8.4) for the control group. Furthermore, notice that in the preliminary analyses, the high proficiency students of the control group had a significantly higher score of the College Entrance English Exam than the experimental group. This advantage of the control group, however, did not place them ahead of the experimental group on either the English pre- or the post-test. By the end of the experiment, this advantage seemed to even out as the two groups approached equal terms, thus indirectly proving that thinking skills can still grow despite disadvantageous language skills.

As for the contrasts for the low proficiency students of both groups, the experimental group did not differ from their control counterparts on either the Chinese pre-test ($t_{(38)} = .478, p = .635$) or the English pre-test ($t_{(38)} = -.881, p = .384$). The progress they made over the 16-week treatment period was in general positive. Although they did not show any better performance than their control counterparts on the Chinese progress ($t_{(35)} = 1.618, p = .115$), they significantly outperformed those of the control group on the English progress ($t_{(35)} = 2.229, p = .032$). These results are particularly encouraging in that students of lower English proficiency can still benefit from critical thinking instruction taught in English. The insignificant difference on the Chinese

progress may have been due to the ceiling effect of a high pre-test performance.

Finally, regarding the effect of different treatment terms, the 32-week experimental students did not perform significantly better than the 16-week experimental subjects on either the Chinese progress ($t_{(46)} = .87, p = .388$) or the English progress ($t_{(46)} = .54, p = .593$). However, an overall increase of the group means from pre-test to post-test on both the Chinese progress (an increased group mean from .50 to 1.2) and on the English progress (an increased group mean from 1.07 to 1.5) is promising. The fact that a lengthened treatment term did not yield significantly better performance may be attributed to overdue feedback on students' pre- or post-test performance or to other personal factors which may have caused them to become disengaged during the process.

CONCLUSION

The current study allows a pioneer investigation into the ill-documented critical thinking instruction in teaching English as a foreign language in Taiwan. The intervention of critical thinking teaching has demonstrated an effect on students' thinking patterns, as shown by the outperforming experimental group over control group on both the Chinese and the English versions of the Critical Thinking Test. Moreover, the experimental treatment has boosted significant growth of critical thinking skills on students of lower English proficiency. This carries promise that critical thinking teaching should benefit even the low-achieving English learners. The pedagogical implication is far-reaching in that the EFL teachers in Taiwan or elsewhere should view their students as competent potential critical thinkers, regardless of their language proficiency, and thus spare no efforts in implementing the critical thinking teaching in their classrooms.

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