

# One Lesson of Training Enhances the Abilities of Critical Thinking in Chinese Teenagers

Ruihao Ge\*

WLSA Shanghai (Fudan) Academy, Shanghai, China

## Abstract

**Critical Thinking (CT) enables people to effectively evaluate situations around them and make optimal decisions in both life and work. However, most teenagers out of Chinese big cities have no way to receive systematic CT trainings in school. It is important and urgent to know whether teenagers' CT abilities could be promoted by simplified CT trainings. This study has investigated CT abilities in a sample of 150 Chinese students from primary and middle schools in two China small cities (Nantong and Haimen) before and after they took a true-CT training lesson, a false-CT training lesson, or a non-CT training lesson. Only the true-CT training effectively increased CT abilities measured by the CRAAP (Currency, Relevance, Authority, Accuracy, Purpose) tests ( $t(38) = 10.394$ ,  $p < 0.001$ ). The results suggest that as short as one lesson of CT training can effectively enhance the CT abilities in Chinese teenagers. The findings and teaching approaches may contribute to increasing the CT abilities in youth worldwide, especially in areas lack of sufficient educational resources.**

## Keywords

**Critical Thinking (CT); Education; China; Small Cities and Rural Areas.**

## 1. Introduction

Critical Thinking (CT) is a way to recognize and evaluate events happening around the world which enables people to make better decisions (Gambrill, 2006) and include less biases (Facione & Facione, 2001; McGuinness, 2013). Also, people possessing the skill of CT are more likely to get better grades and more employed than those do not (Barton & McCully, 2007; Holmes & Clizbe, 1997; National Academy of Sciences, 2005). CT plays a crucial role in the classroom—students implemented with CT skills better can cope with the teachers' paces and ask difficult questions, as well as at workplace—people possess such skills probably increase the efficiency and profits of the companies (Murawski, 2014).

Previous studies indicated that CT plays a crucial role in the Western countries (Richmond, 2007). Rashid and Qaissar (2017) also contributed to the study of role play to promote CT as it found out that role play strategy plays a significant role in CT training in young students based on their experiment in Western classrooms. Also, some studies conveyed the idea that CT is a Western-only concept that only those individuals grow up in the West can apply such skills because their subconsciousness and nature (Atkinson, 1997; Ramanathan & Kaplan, 1996a, 1996b). The studies of the CT application on early education focused mainly about the validity in the West. However, little is known about the effects of CT training in students living in China. Zhang (2016) suggested that higher education curriculum stuck Chinese postgraduates to think critically. Huang (1998) also presented the idea that Chinese graduates who study foreign languages apparently lack CT skills so that they cannot raise proper question and argue in the discussions. While China recently just paid attention to the significance of CT training since the Chinese Ministry of Education issued The National Plan for Medium and Long-term Education Reform and Development in 2010 to prioritize educating students' CT abilities to innovate only

in tertiary education (Pei et.al, 2017). They all pointed to the common issue that the Chinese graduates lack such cognitive skill, disabling them to make good decisions and get better grades, so they paid much attention on the university students and the curriculum in the university. Unfortunately, teenagers out of big China cities haven't reached tertiary education seldom get in touch with the education of CT. In schools, they receive traditional educations that are mainly about the memory of knowledges but not how to use high level cognitive abilities to think about issues in depth. Demographical studies showed that there were 325 million primary, middle and high school students living in rural areas in China (OECD, 2016). This number does not include the students in schools without records in China government which is a lot. So, effective CT training to these students may help to increase their abilities in handling complex problems in real life, and thus may contribute to the development in not only big cities but also small cities and rural areas as well as lower education such as primary or high school in China.

This study aims to investigate the effects of one-lesson CT training in 10-14 year-old students from two small cities in China. To control for the confounding factors, the false-CT training and non-CT training in two control groups of students with matched age and sex are also given. The increased performance in students taking the true-CT training only is hypothesized.

## 2. Methods

### 2.1. Participants

A total number of 150 children (10-14 years old) from two elementary and middle schools in the city Haimen and the city Nantong, Jiangsu Province, China, volunteer to participate in the study. 32 participants are excluded from following analyses due to: 1) do not carefully and honestly filled the two questionnaires at the beginning and the end (e.g. randomly answer the questionnaire with no logical reason); 2) fail to focus on the content of the class (e.g. laughed for most of the class); 3) get more than 39 points in the pre-questionnaire (proven they had some CT training before). Handedness is measured with Edinburgh Handedness Questionnaire (1971). There are three levels of economic status based on family income (Chinese Yuan) per month: Low Class: < 7k; Middle Class: 7k~ 25k; High Class: > 25k. No one reports history of psychological and neurological disorders, and no one reports taking any medication during the last three weeks before participation. The participants receive course credits if they successfully complete the corresponding lesson. Both the participants and their guardians give written informed consents. The study protocol is approved by the local ethical committees. Demographic information including sex, age, handedness, religion, and economic status are listed in Table 1.

### 2.2. Lessons

The participants from each city are divided into age-and sex-matched 3 groups to receive different lessons: 1) the group receives actual CT training (true-CT); 2) the control group receives training unrelated to CT (non-CT); 3) the control group receives CT unrelated training with a false belief that they receive CT training (false-CT). The participants in the true-CT group are given the lesson that guides them to experience and use other perspectives to think about current recreational news that they were familiar with. The auxiliary tool is the source evaluation sheet CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose) acquired from the library of Benedictine University (J. Hopkins, August, 2015).

The non-CT groups receive the lesson in which the teachers use Chinese traditional class book and teach about a prose in it called Chun (Spring) written by Ziqing Zhu, a renowned Chinese essayist. The false-CT group is given the lesson with the same topic of the true-CT group, but only some recreational discussions without the guidance of thinking in other perspectives. The recreational discussions include imitating the behaviors in the news and arbitrary comments

on the news. All contents used in the experiment are in Chinese, and the Chinese version of the CRAAP sheet and those relative contents are provided in supplementary materials.

**Table 1.** Demographic information

	Sex (Male/Female)	Handedness (Left/Right)	Economic Status (High/middle/low)	Age (Years)	Total
Nantong	29/49	2/76	13/61/4	12.87±1.43	78
Haimen	28/12	2/38	5/32/3	12.75±1.22	40
Total	55/63	4/114	18/93/7	12.83±1.36	118

### 2.3. Questionnaire

A questionnaire is utilized to examine the CT abilities before and after the training lesson. The questionnaire measures the feelings, beliefs, experiences, perceptions, or attitudes of individuals (Bryman, 2001). It is crucial to use questionnaire in this scenario since the participants will be more comfortable to share what are truly in their minds because they will feel safer without the worrying about dignity and self-image (Farmer, 2006).

The questionnaire includes two currently popular recreational news that the participants are asked to make free responses. Rubric for the free responses of the questionnaires is adapted from the CRAAP test, Currency, Relevance, Authority, Accuracy, Purpose. (e.g., does the participant think about the perspective of currency of this news) The score ranges from 0 points to 5 points in each category (full point 50). (See Appendix A) The pre-training and post-training questionnaires are graded afterwards together randomly to avoid graders' bias.

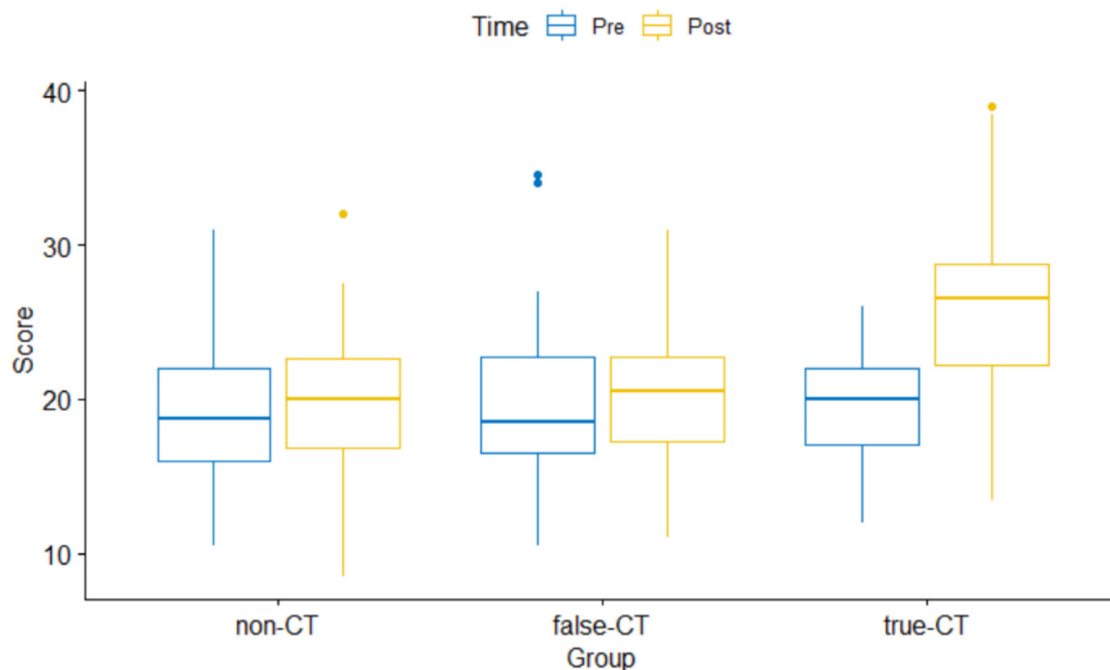
### 2.4. Statistical Analysis

A 3 (Group: non-CT, false-CT, and true-CT) by 2 (Time: Pre- and Post-learning) mixed ANOVA model is applied to investigate the CT performance. Post hoc analyses are utilized to examine the temporal differences of CT performance within each group if the interaction between Group and Time are statistically significant. Bonferroni method is employed to correct for the number of multiple comparisons. All analyses are conducted using the RStudio (ver. 1.3.1037) software and the *rstatix* package.

## 3. Results

### 3.1. CT Performance

There is a significant main effect of Group ( $F(115, 2) = 5.468, p = 0.005$ ) and a significant main effect of Time ( $F(115, 1) = 69.007, p < 0.001$ ). More importantly, the significant Group x Time interaction ( $F(115, 2) = 68.947, p < 0.001$ ) indicates that the temporal differences of CT performance are different across groups. As shown in Fig. 1, post hoc analyses indicate a significantly higher CT performance post-learning than pre-learning in the true-CT group only (mean±SD: Pre, 19.3±3.8; Post, 26.2±6.3;  $t(38) = 10.394, p < 0.001$ ), but not in the non-CT (Pre, 19.7±4.8; Post, 19.2±5.1;  $t(39) = -1.457, p = 0.153$ ) and false-CT (Pre, 19.7±5.3; Post, 20.1±4.4;  $t(38) = 1.057, p = 0.297$ ) groups.



**Figure 1.** Box plot of CT performance

A significantly higher CT performance was found post-training than pre-training in the true-CT group only (mean±SD: Pre, 19.3±3.8; Post, 26.2±6.3;  $t(38) = 10.394$ ,  $p < 0.001$ ), but not in the non-CT (Pre, 19.7±4.8; Post, 19.2±5.1;  $t(39) = -1.457$ ,  $p = 0.153$ ) and false-CT (Pre, 19.7±5.3; Post, 20.1±4.4;  $t(38) = 1.057$ ,  $p = 0.297$ ) groups.

### 3.2. Discussion

In this study, the effectiveness of CT learning on the teenagers in China has been examined. Consistent with the a priori hypothesis, it shows a significantly higher CT performance post-learning than pre-learning in the true-CT group but not in the non-CT and false-CT groups. This result clearly indicates that the CT learning can effectively equip students around 10-14 years old in China with CT skills and interests. To the best of our knowledge, it is the first study to uncover the validity of the CT learning on Chinese teenagers, especially those in small cities who probably never get in touch with any CT learnings. The study methods and findings may contribute to the application of CT learning in Chinese traditional education system to improve students' CT abilities. Such findings and teaching approaches may also contribute to increasing the CT abilities in youth worldwide, especially in areas lack of sufficient educational resources. Taking a closer look at the participants' responses, it is understandable that before they receive the learning courses, the students behave in a similar manner. For instance, when they were asked to analyze a piece of recreational news, they almost simultaneously answered in the way of: through the behavior of something, it vividly shows the lack of social interaction skill of the people or the love for life from the person in the news. This phenomenon may be due to the curriculum design in Chinese education system that requires the students to rate memorization and repeated drilling (Pei et al., 2017). Moreover, the parents who would like their children to be "haywire genius" (Camarata, 2017) may also contribute to this phenomenon by making their children to be wired from an early to memorize and retrieve facts on demand but not to think or resign. Eventually, children's ability to habituate on CT is hindered (Flores et al., 2012). Fortunately, the findings of this essay suggest that the CT learning in Chinese middle school students can promote the skills of reasoning and logical thoughts that play important roles in real life.

Brown (1997) suggested that if we do not offer the students any thinkable things, something meaningful, adequate and serious, the students would never develop thinking skills at all. It is thus crucial for us to offer education through meaningful CT questions for the children. Rashid and Qaisar (2017) emphasized the strategy of role play to promote CT, meaning that if the students get to interact with the environment more, their motivation on CT engagement will be increased. As this study also proves here that if the students start knowing of using the proper way to interact with the circumstances around them, they can be more efficiently to engage their CT skills. Kuhn (1999) believed that the children have already had enough foundation for CT skills, as when they culminate, they can gradually gain the ability to distinguish (e.g., the differences between thinking a dog and actually perceiving a dog (Estes, Wellman, & Woolley, 1989), then to combine people's desire and psychology to the actions (Wellman & Gelman 1998). As a result, as educators, they need to help the children actualize such abilities by offering CT learning lessons.

These results should be taken into account when considering whether to apply CT learning on the teenagers in China, and the experiment confirmed the answer as a yes. Students must possess the 21st century skill (CT) to succeed as effective citizens, workers and leaders (Partnership for 21st Century Skill) while the lack of encouragement of CT in school curriculum and classroom activities will cease the students possess any of the CT skills (Roberts 2015). If the educational system lacks well-developed CT skills, there would be catastrophes in the workforce, too (Flores et al. 2010). Therefore, the CT learning should be applied in the educational system.

In addition, there are also some other noticeable effects of the city size and sexuality of the students that also contribute to the difference. In true-CT groups, the scores of students in city of Haimen increase conspicuously less than those in Nantong, as well as the females increase more than males, so further study is needed to address more on the effects of the sexuality.

### 3.3. Limitation

Though the significant difference is considerable, but this research still has some limitations. The generalizability of the results is limited by the number of cities the research relies on, which some of the cities in even more rural areas, the students in there might have a hard time to accept the CT learning since they might not even possess enough literacy or they lack self-confidence or self-esteem (Rashid & Qaisar, 2017). Also, the reliability of this data is impacted by the subjectivity of the experimenters since it was the experimenters who graded the pre and post tests; however, this has already been reduced by mixing the tests together and then grading. The self-fulfilling prophecy which when the students expect the positive results occur leading the positive results to occur (Biggs, 2013) is eliminated because there are no significant differences in the false-CT groups. Further research is needed to establish more on the correlation on the regional effects and sexuality's effects.

## 4. Conclusion

In conclusion, this study has already successfully presented the positive associations between the CT training on 10-14-year-old Chinese students in small cities and their CT performance, proven that the CT training can be applied in youth in small cities in China.

## References

- [1] Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly*, 31(1), 71-94.
- [2] Barton, K., & McCully, A. (2007). Teaching controversial issues where controversial issues really matter. *Teaching History*, 127, 13-19.

- [3] Bryman, A. (2001). *Social research method*. Oxford: Oxford University Press.
- [4] Brown, A. (1997). Transforming schools into communities of thinking and learning about serious matters. *American Psychologist*, 52, 399-413.
- [5] Camarata, Stephen. The Emerging Crisis in Critical Thinking. 21 Mar. 2017, [www.psychologytoday.com/us/blog/the-intuitive-parent/201703/the-emerging-crisis-in-critical-thinking](http://www.psychologytoday.com/us/blog/the-intuitive-parent/201703/the-emerging-crisis-in-critical-thinking).
- [6] Estes, D., Wellman, H., & Woolley, J. (1989). Children's understanding of mental phenomena. In H. Reese (Ed.), *Advances in Child development and behaviour* (pp. 41-87). New York: Academic Press.
- [7] Facione, Noreen C., and Peter A. Facione. "Analyzing Explanations for Seemingly Irrational Choices." *International Journal of Applied Philosophy*, vol. 15, no. 2, 2001, pp. 267-286., doi.org/ 10.5840 /ijap200115217.
- [8] Farmer, L. S. J. ( 2006). What is questioning?. Paper presented at conference in world library and Information Congress: on questioning. Seoul, Korea. Retrieved from <http://www.ifla.org/Vifla72/index.htm>.
- [9] FLORES, KEVIN L., et al. "Deficient Critical Thinking Skills among College Graduates: Implications for Leadership." *Educational Philosophy and Theory*, vol. 44, no. 2, 2012, pp. 212-230., doi: 10.1111/j.1469-5812.2010.00672.x.
- [10] Gambrill, Eileen. "Evidence-Based Practice and Policy: Choices Ahead." *Research on Social Work Practise*, vol. 16, no. 3, May 2006, pp. 338-357, doi:10.1177/1049731505284205.
- [11] Huang, Y. (1998). On the critical thinking deficiency. *Foreign Languages and Their Teaching*, (7),1.
- [12] Holmes, J., & Clizbe, E. (1997). Facing the 21st century. *Business Education Forum*, 52(1), 33-35.
- [13] Kuhn, Deanna. "A Developmental Model of Critical Thinking." *Educational Researcher*, vol. 28, no. 2, 1999, pp. 16-46. JSTOR, [www.jstor.org/stable/1177186](http://www.jstor.org/stable/1177186).
- [14] Kurpiel, Sarah. *Evaluating Sources: The CRAAP Test*, [researchguides.ben.edu/source-evaluation](http://researchguides.ben.edu/source-evaluation).
- [15] McGuinness, Carol. "Teaching thinking: Learning how to think." *Psychological Society* (2013).
- [16] Murawski, Linda M. "Critical Thinking in the Classroom...and Beyond." *Journal of Learning in Higher Education*, vol. 10, no. 1, 2014, pp. 25-30.
- [17] National Academy of Sciences. (2005). *National Academy of Engineering Institute of Medicine Rising above the gathering storm: Energising and employing America for a brighter economic future*. In Committee on prospering in the global economy for the 21st century Washington, DC.
- [18] OECD. (2016). *EDUCATION IN CHINA. Partnership for 21st Century Skills, 'P21 mission statement'*. Available at [www.p21.org/about-us/our-mission](http://www.p21.org/about-us/our-mission).
- [19] Pei, Zhengwei, et al. "Critical Thinking and Argumentative Writing: Inspecting the Association among EFL Learners in China." *English Language Teaching*, vol. 10, no. 10, 2017, p. 31., doi:10.5539/elt.v10n10p31.
- [20] Ramanathan, V., & Kaplan, R. B. (1996a). Some problematic "channels" in the teaching of critical thinking in current L1 composition textbooks: Implications for L2 student-writers. *Issues in Applied Linguistics*, 7(2), 225-249.
- [21] Ramanathan, V., & Kaplan, R. B. (1996b). Audience and voice in current L1 composition texts: Some implications for ESL student writers. *Journal of Second Language Writing*, 5(1), 21-34.
- [22] Richmond, Jonathan E.D. "Bringing Critical Thinking to the Education of Developing Country Professionals." *International Education Journal*, 8(1), no. ISSN 1443-1475, 2007, pp. 1-29., files.eric.ed.gov/fulltext/EJ841627.pdf.
- [23] Roberts, Margaret. "Critical Thinking and Global Learning." *Teaching Geography*, vol. 40, no. 2, 2015, pp. 55-59. JSTOR, [www.jstor.org/stable/26383090](http://www.jstor.org/stable/26383090).
- [24] Wellman, H., & Gelman, S. (1998). Knowledge acquisition in foundational domains.
- [25] In W. Damon (Series Ed.), D. Kuhn, & R. Siegler (Vol. Eds.), *Handbook of child psychology: Vol. 2. Cognition, language, and perception* (5th ed., pp. 523-574). New York: Wiley.
- [26] Zhang, Tao. "Why Do Chinese Postgraduates Struggle with Critical Thinking? Some Clues from the Higher Education Curriculum in China." *Journal of Further and Higher Education*, vol. 41, no. 6, 2016, pp. 857-871., doi:10.1080/0309877x.2016.1206857.