



# The Cultivation of Students' Logical Thinking in Chinese Primary School Mathematics Education

Huang Mingjing<sup>1</sup>, Feng Yidi<sup>2</sup>

<sup>1</sup>Program Pedagogic, Indonesia University of Education, Indonesia

<sup>2</sup>South China Agriculture University, China

[kikihmjing@gmail.com](mailto:kikihmjing@gmail.com)

---

## ABSTRACT

---

**Keywords:**

Mathematics;  
China;  
Logic;  
Students.

Mathematics is a subject that studies concepts such as quantity, structure and space and their changes. From a certain point of view, it belongs to a kind of formal science. Mathematics develops from counting, calculating, measuring, and observing the shape and motion of objects using abstraction and logical reasoning. Logical thinking ability refers to the ability to analyze, generalize, synthesize and judge reasoning problems, which is mainly manifested in mathematics. Therefore, mathematics education plays an important role in the cultivation of primary school students' logical thinking. The goal of this paper is to understand how mathematics education in primary schools in China fosters logical thinking in students. This paper adopts the method of qualitative research and conducts research through literature research and comparative analysis. The author will analyse the aspects of educational mode, educational content and educational tools, etc. To explore how Chinese primary school mathematics curriculum develops students' logical think. Logic training is a long-term process. Therefore, China has done very detailed training in primary school students' logical thinking. This is especially reflected in primary school mathematics education, including mathematics classroom teaching content, teaching methods and teaching strategies.

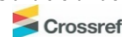


**Article History:**

Received: 29-07-2022  
Revised : 08-08-2022  
Accepted: 12-08-2022  
Online : 21-08-2022



This is an open access article under the **CC-BY-SA** license



<https://doi.org/10.31764/ijeca.v5i2.10204>

---

----- ◆ -----

## A. INTRODUCTION

According to the Chinese Journal of Social Sciences, logic is a loanword derived from ancient Greek, and originally meant "words" or "speech", that is, the result of reasoning expressed in words or language. Later, the meaning of "thinking" or "reasoning" was derived. The ancient Greeks believed that this logic (logos), which is the law of all things in the universe, is the absolute criterion and the basis of all human beings (Lugo Bustillos et al., 2019). In ancient China, logic was also known as "Neo", the study of principles, and the study of names. In 1902, Yan Fu translated 《Müller's Mingxue》, paraphrasing it as "Mingxue" and transliterating it as "logic". Since then, China has continued to use the term logic. Logic is a branch of philosophy. As a science, it studies the ability to think directly, accurately and regularly. Science here refers to the cognitive ability of reason, and skill refers to the ability of the mind to put knowledge into action.

Logic education is very important in China today when quality education is respected. In the Western cultural tradition, logic education has a long history. As early as the Middle Ages, the science of logic has been set as the core curriculum of European universities. In 1974, UNESCO listed logic as the second of the seven basic disciplines under the "General Principles of Knowledge" (Johnson & Koszowy, 2018). As one of the seven basic disciplines listed by UNESCO, logic is highly valued in Western countries (Zacharopoulos et al., 2021). According to the compulsory education curriculum plan issued by the Ministry of Education of the People's Republic of China in 2022, we can clearly see that there are currently no courses dedicated to teaching logic science in primary schools in China, but this does not mean that China does not attach importance to the cultivation of logical thinking in primary school students. At present, the way to cultivate students' logical thinking ability in China is mainly to cultivate students' rational thinking through training of various subjects offered in primary schools, and it is evident in mathematics subjects. In 2022, the Ministry of Education of the People's Republic of China revised the mathematics curriculum standards for compulsory education, which mentioned in the curriculum objectives that the mathematics curriculum should cultivate students' core literacy, one of which is to cultivate students' critical thinking, and to form strong arguments, organized and logical thinking quality, cultivate scientific attitude and rational spirit. Therefore, mathematics education is very important for the cultivation of primary school students' logical thinking ability. The logical thinking ability of primary school students is in its infancy, and it is the best period to cultivate mathematical intelligence. In China, primary school education lasts for six years, so the performance of primary school students' logical thinking ability at different stages is also different. By studying and analyzing how Chinese primary school students develop their logical thinking ability in mathematics education, it is beneficial to other countries as a reference, and it is also beneficial to the improvement of compulsory education in China, especially the primary school curriculum.

## **B. METHODS**

The research design used in this research is qualitative research. Qualitative research is the way that researchers use to define or deal with problems. The specific purpose is to deeply study the specific characteristics or behavior of the object and further explore the causes. As explained by Basrowi and Suwandi (Suwandi, 2008) revealed that "Qualitative methodology as a research procedure that produces descriptive data in the form of written or spoken words from people and observed behavior". The research object is the fifth grade students of Nanbu Primary School in Qingyuan City, Guangdong Province. By observing students' classroom performance and teachers' teaching, learn how mathematics education in primary schools in China cultivates students' logical thinking. In addition, this study will draw conclusions through extensive literature research and the use of appropriate statistical methods to collect and analyze data. The data in this study were obtained through interviews and questionnaires.

## **C. RESULT AND DISCUSSION**

With the development of the economy and the improvement of the level of science and technology, China has now reached a new height in science and technology, culture, ecology, etc., especially in education. In 2021, China promulgated the Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the Vision for 2035 (Guo et al., 2018). This outline clearly states that the improvement of national quality should be placed in a prominent and important position, and a high-quality education

system and an all-round and full-cycle health system should be built. In order to build a high-quality education system and implement quality education, China has made efforts in all aspects. Therefore, elementary school mathematics education has also ushered in a big change. Primary mathematics focuses more on cultivating students' critical thinking, creativity, conceptual inquiry, and mathematical reasoning abilities and the ability to use mathematics to build, develop and solve problems in daily life, mathematics or other situations. Therefore, in the field of primary school mathematics education, there are certain requirements for primary school mathematics textbooks, teaching forms and teaching methods for primary school mathematics teachers. This research takes the fifth grade mathematics course of Nanbu Primary School in Qingyuan City as an example to understand and analyze how mathematics teachers cultivate students' logical thinking ability in the classroom (Ma, 2020).

With the continuous advancement of basic education curriculum reform, Chinese education has paid more and more attention to "quality education". Quality education refers to an educational model that aims to improve the quality of the educated in all aspects. In January 2005, the Chinese Ministry of Education announced six key tasks for education reform and development, one of which is to comprehensively promote quality education. Logic education is an important part of quality education. Over the years, in order to improve the students' logical thinking, the mathematics teachers of Nanbu Primary School in Qingyuan City have made many improvements in the classroom (Norton & Zhang, 2018).

### **1. Enrich the content of mathematics classroom teaching and cultivate students' thinking ability**

Mathematics has the most basic connection with our life. The training of thinking logic promotes us to analyze and solve problems from a more three-dimensional perspective when thinking about problems. The mathematics teachers of Nanbu Primary School in Qingyuan City have changed the previous inertial teaching mode. They are no longer limited to the content of textbooks, but have improved the interest of mathematics classrooms in various ways (Yan et al., 2020). In the process of preparing the teaching content of the course, the mathematics teachers of the fifth grade of the school combine the knowledge points with the hotspots that students are interested in life, so as to attract the students' attention. In addition, teachers will let students learn mathematical knowledge by playing games with students, and cultivate students' ability to think rationally (Swetz, 2020).

### **2. Teaching students in accordance with their aptitude and cultivating students' enthusiasm**

According to the nine-year compulsory education primary school mathematics teaching syllabus issued by China's Ministry of Education. With the continuous improvement of the entry threshold for primary school teachers in China, the quality of teachers has also improved. In today's Chinese primary school teachers, in teaching mathematics courses, they constantly use some novel teaching methods, combined with rich teaching content, to diversify students' thinking, and through step-by-step guidance, it is easier for students to grasp knowledge points and diversify students' logical thinking (Sun & He, 2020). At present, many Chinese primary school math teachers adopt different teaching methods according to different teaching contents and different students' needs in the teaching process to keep students fresh, so as to mobilize students' enthusiasm for learning, exercise students' logical thinking ability, and let students learn more active thinking. Mathematics teachers in Nanbu Primary School are well aware of the importance

of logical thinking in mathematics. Therefore, teachers play a guiding role in the classroom, allowing students to play a leading role and guiding students to play their role in a relaxed atmosphere. Teachers no longer blindly output mathematical knowledge to students, but combine teaching content according to students' needs and receptive ability, so as to comprehensively improve students' independent thinking ability and logical thinking ability (Zhao et al., 2017).

### **3. Using Multimedia Teaching Equipment to Improve Teaching Quality**

Primary schools in China have fully introduced multimedia teaching equipment, which is conducive to the teaching of abstract content by primary school mathematics teachers. According to the Digital China Development Report, by the end of 2020, the Internet access rate of Chinese primary and secondary schools (including teaching points) has increased from 79.37% at the end of 2016 to 100%, and 98.35% of primary and secondary schools already have multimedia classrooms. (Ruziyeva et al., 2020) Advanced multimedia teaching equipment has the ability to turn abstract into concrete in the teaching process, which promotes the improvement of education and teaching level and the improvement of students' comprehensive quality. In Nanbu Primary School, every classroom has been equipped with multimedia teaching equipment. The teachers are able to use multimedia equipment proficiently and combine teaching content with multimedia (Purwanti et al., 2021). Through new media teaching, teachers can display more vivid pictures in front of students, which improves students' comprehension ability. Multimedia equipment can vividly convey teaching content to students, students will take the initiative to think about the problem, and teachers will also get a unique teaching effect (Xie et al., 2020).

### **4. Improve the teaching evaluation system**

In addition to the above teaching methods, the school also improves the logical thinking ability of primary school students by improving the teaching evaluation system. At present, Nnabu primary school have incorporated the cultivation of students' logical thinking into the new teaching evaluation system, re-established the teaching system, and allowed students to propose their own teaching methods, teaching students according to their aptitude, and then focusing on cultivating students' logical thinking ability and improving students' comprehensive quality (Prasetyono & Hariyono, 2020). In addition, the school also cultivates students' logical thinking ability through home-school cooperation, and parents will also evaluate teachers' teaching work. The school will hold a home-school meeting every semester. The purpose is to strengthen the connection between the school and parents, and allow parents to evaluate teachers' teaching work, including teachers' cultivation of students' logical thinking ability in the teaching field.

## **D. CONCLUSION AND SUGGESTIONS**

Chinese primary school mathematics teachers have adopted a variety of teaching methods, and have made changes in teaching methods and teaching content, which fully mobilized students' enthusiasm for learning, stimulated students' interest in mathematics, and effectively exercised students' logical thinking (Amelia & Harahap, 2021). Ability to enable students to develop independently. In the teaching process, it is very important to cultivate students' logical thinking ability. Schools should regard students as the main body of education, carry out a series of training for students' personal abilities, and teach students according to their aptitude according to the actual situation. Students able to have space for independent thinking, and gradually acquire logical thinking ability through practical inquiry (Sun, 2018).

## ACKNOWLEDGEMENT

Thanks to my school, the Indonesia University of Education, for giving me the opportunity to study pedagogy in depth, so that I can publish this journal; I also thank the teachers and friends who helped me for this journal.

## REFERENCES

- Amelia, D. P., & Harahap, A. (2021). Application of Interactive Multimedia-Based Mathematics Learning Media to Increase Students' Interest in Learning. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 4(2). <https://doi.org/10.33258/birci.v4i2.2040>
- Guo, Y., A. Silver, E., & Yang, Z. (2018). The Latest Characteristics of Mathematics Education Reform of Compulsory Education Stage in China. *American Journal of Educational Research*, 6(9). <https://doi.org/10.12691/education-6-9-11>
- Johnson, R. H., & Koszowy, M. (2018). Logical Culture as a Common Ground for the Lvov-Warsaw School and the Informal Logic Initiative. *Studies in Logic, Grammar and Rhetoric*, 55(1). <https://doi.org/10.2478/slgr-2018-0035>
- Lugo Bustillos, J. K., Vilchez Hurtado, O., & Romero Alvarez, L. J. (2019). Didactics and development of mathematical logical thinking. A hermeneutical approach from the initial education stage. *LOGOS CIENCIA \& TECNOLOGIA*, 11(3).
- Ma, L. (2020). Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States. In *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*. <https://doi.org/10.4324/9781003009443>
- Norton, S., & Zhang, Q. (2018). Primary mathematics teacher education in Australia and China: What might we learn from each other? *Journal of Mathematics Teacher Education*, 21(3). <https://doi.org/10.1007/s10857-016-9359-6>
- Prasetyono, R. N., & Hariyono, R. C. S. (2020). Development of flipbook using web learning to improve logical thinking ability in logic gate. *International Journal of Advanced Computer Science and Applications*, 11(1). <https://doi.org/10.14569/ijacsa.2020.0110143>
- Purwanti, Mardiyana, & Indriati, D. (2021). The Development of Interactive Multimedia Based on Mathematics to Increase the Mathematical Connection Ability in Probability Learning. *IOP Conference Series: Earth and Environmental Science*, 1808(1). <https://doi.org/10.1088/1742-6596/1808/1/012047>
- Ruziyeva, Z. S., Kurbonova, S. N., & Saidova, G. E. (2020). Technology for the development of logical thinking in students in primary school. In *Journal of Critical Reviews* (Vol. 7, Issue 6). <https://doi.org/10.31838/jcr.07.06.88>
- Sun, X., & He, W. (2020). *Realistic Mathematics Education in the Chinese Context—Some Personal Reflections*. [https://doi.org/10.1007/978-3-030-20223-1\\_10](https://doi.org/10.1007/978-3-030-20223-1_10)
- SUN, Z.-Q. (2018). The Resurrection and Construction of Logic Education in the Reformation of Chinese Education. *DEStech Transactions on Social Science, Education and Human Science, icaem*. <https://doi.org/10.12783/dtssehs/icaem2017/19086>
- Suwandi, B. dan. (2008). Memahami Penelitian Kualitatif. Jakarta: Rineka Cipta Bungin. *Journal of Chemical Information and Modeling*, 53(9).
- Swetz, F. (2020). Mathematics Education: The People's Republic of China. *The Mathematics Teacher*, 66(2). <https://doi.org/10.5951/mt.66.2.0113>
- Xie, C., Cheung, A. C. K., Lau, W. W. F., & Slavin, R. E. (2020). The Effects of Computer-Assisted Instruction on Mathematics Achievement in Mainland China: A Meta-Analysis. *International Journal of Educational Research*, 102. <https://doi.org/10.1016/j.ijer.2020.101565>
- Yan, Y., Suyue, X., & Ma, J. (2020). Curriculum system of the philosophy of mathematics education for normal students. *Mathematics Teaching-Research Journal*, 12(2).
- Zacharopoulos, G., Sella, F., & Kadosh, R. C. (2021). The impact of a lack of mathematical education on brain development and future attainment. *Proceedings of the National Academy of*

*Sciences of the United States of America*, 118(24).  
<https://doi.org/10.1073/pnas.2013155118>

Zhao, X., van den Heuvel-Panhuizen, M., & Veldhuis, M. (2017). Classroom assessment in the eyes of Chinese primary mathematics teachers: A review of teacher-written papers. *Studies in Educational Evaluation*, 52. <https://doi.org/10.1016/j.stueduc.2016.12.002>