

COMPLETION REPORT

Understanding Values in Mathematics Education: A Comparative Study in China, Hong Kong and Japan

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The academic success of East Asian students, in particular in the subject of mathematics, has brought to the attention of sociologists and educationalists worldwide since the 1980s. It is found that high attainment may be much more closely linked to cultural values than to specific mathematics teaching practices. As the deep affective qualities, values in mathematics education are tools that members of cultural groups use to define the relative importance of different attributes of mathematics and mathematics teaching. They can promote positive cognitive and affective development in mathematics classrooms, while not all teachers and students are aware of them.

In this study, by the use of classroom observations and deep interviews, we investigated what values relating to mathematics and mathematics learning are associated with students and teachers in Mainland China, Hong Kong and Japan within reform-oriented classroom environment and why these values are emphasized in each cultural context. The preliminary results showed that in general, what students and teacher valued in mathematics teaching has some differences among three regions. Chinese mainland teachers are struggling between traditional teaching and constructivist teaching. On the hand, they emphasize students' mathematics thinking, reasoning skills and communication skills; on the other hand, they attach more importance to students' acquisition of knowledge and skills, performance in tests and exams. Experienced teachers are more able to achieve the balance in these two aspects. Their students can actively involve in solving mathematical problems and doing exercises, though in many cases they feel boring. They prefer to solve problems by themselves or external tools (e.g., software) instead of seeking help from their teachers. Hong Kong teachers try to use some methods to stimulate students' motivation to learn, promote their engagements, and enhance their positive attitudes towards mathematics while mastering knowledge and skills. The majority of students enjoy this kind of classroom environment whatever he/she is good or not good at mathematics. Compared with the other two regions, Japanese mathematics teacher pays more attention to the development and presentation of students' mathematical thinking. Students are accustomed to such a classroom environment and they actively engage into the activities, but how well they know the level of mathematical knowledge is not yet clear. Former research show many students value information and communication technology (ICT) in their mathematics learning, however ICT is not always adopted in the classroom teaching. These findings can reflect the impact of the new curriculum reforms in different places on mathematics classroom. It is also found that there are different focuses of teachers and students in mathematics teaching in the three places.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

1. Zhang, Q. P. (2017, June). Affect in mathematics education: How beliefs and values influence mathematics teaching. Presented at the Graduate School for International Development and Cooperation, 7 June, Hiroshima University, Japan.
2. Zhang, Q. P., Yeung, W. Y., & Cheung, S. P. (2017, November). Using picture books to enhance students' mathematics learning in primary school. Paper presented at the World Association of Lesson Studies International Conference 2017 (WALS 2017). 24-27 November, Nagoya University, Japan.
3. Zhang, Q. P., Baba, T., Li, X., & Seah, W. T. (2017, December). What we value in mathematics education: From WiFi to WhyFI. Research Seminar, Faculty of Education, The Chinese University of Hong Kong, 6 December, Hong Kong.
4. Zhang, Q. P., Yeung, W. Y., & Cheung, S. P. (2018, May). Enhancing students' strategy flexibility in learning mathematics through school-based picture books. In Hsieh, F.-J. (Ed.) Proceedings of the 8th ICMI-East Asia Regional Conference on Mathematics Education (Vol 2, pp. 472-483). Taipei, Taiwan: EARCOME.
5. Zhang, Q. P. (2018, July). What is important in mathematics learning: Perspective from the Chinese mainland students. In E. Bergqvist, M. Österholm, C. Granberg, & L. Sumpter (Eds.). Proceedings of the 42nd Conference of the International Group for the Psychology of Mathematics Education (Vol. 5, p. 198). Umeå, Sweden: PME

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

1. Zhang, Q. P. (2017). Teaching mathematics through problem solving: Inspirations from geometrical problem (In Chinese). *Mathematics Teaching*, 8, 1-4, 18.
2. Zhang, Q. P. (2018). Developing students' problem solving skills: What mathematical activities tell us (In Chinese). *Curriculum, Teaching Material and Method*, 38(1), 97-102.
3. Wang, W., & Zhang, Q. P. (2018, submitted). Counter-examples in junior secondary geometry teaching: Implications from the criterion rules of congruent triangles. *Journal of mathematics (China)*.

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)

Zhang, Q. P. (In preparation, 2019). Values in mathematics learning from the Chinese Mainland students' perspectives. In P. C. Clark, W. T. Seah & J. S. Pang (Eds.) *Values and valuing and mathematics education*. Germany: Springer.