

The Impact of Taoism and Confucianism on Mathematics Teaching and Learning

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Description of the Session

The goal of this session is to engage audiences in an interactive discussion on the impact of Taoism and Confucianism on mathematics teaching and learning. Four research articles investigated important research topics on mathematics classroom teaching in Beijing, Nanjing, Hongzhou, and Shanghai. The principles of Taoism and Confucianism regarding the balance of teaching and learning, learning with understanding, application and connection to the real world, and Confucius Heuristics were applied to examine their impacts on classroom teaching and learning. A variety of research methods were used, including classroom observation, videotaped lesson studies, interviews, and using games and activities with students. The unique feature of this session is the multiple sources of data with an international perspective. The results of these studies have provided insightful implications on the importance of balancing school math and everyday math, on using new approaches to balance mathematics teaching in conceptual understanding, procedural fluency, and application, and on using heuristics method to promote student thinking. In addition, the research findings also addressed how a pragmatic way of reasoning from Chinese students is influenced by Chinese cultural tradition. The findings from these studies contribute a better understanding of the applications of Taoism and Confucianism in teaching and learning.

Introduction

For many centuries, Taoism and Confucianism have had a great impact on the historic and modern education of China. A major principle of Taoism that has inspired educators to balance their approaches to teaching is the harmonic balance of Yin and Yang, leading to methods that fostered “creativity, emotional expression, and personal insight” (Nagel, 1994, p. 125). In addition, Taoism advocated the idea that “application breeds learning” and encouraged classroom teachers to make teaching relevant to their students and have their students see how learning connects to their world (Doerger, 2008). Historically, an inquiry-based teaching was valued in the Chinese education system. According to the Confucian method of teaching, “I [the teacher] will not instruct my students until they have really tried hard but failed to understand” (Cai, 1994, p.107). This addresses a primary goal of teaching: to promote students to explore and understand first before doing practice. Chinese mathematics education has developed various sound teaching approaches under the influence of Taoism and Confucianism.

In the last few decades however, in response to the pressure of the national examinations, the focus of the Chinese mathematics classroom was shown by research to have become “passive transmission” and “rote drilling” (Gu, Huang, & Marton, 2004). Although some researchers argued that Chinese mathematics classroom teaching has actually focused on two basics: Basic knowledge and basic skills (Zhang, Li, & Tang, 2004), one of patterns of the two basics in

classroom teaching is to “ensure plenty of practices is used in teaching. It does not support the idea of understanding first” (p. 195).

In 2000, the Chinese Department of Education instituted reforms in math education (An, 2000), prompting classrooms to shift focus. However, there is scant research detailing the content and effects of these reforms on classroom teaching. It is necessary to examine whether Chinese mathematics teaching is adopting new approaches in classrooms.

The goal of this study is to investigate the features of mathematics classroom teaching in China under the influence of the new reforms and Chinese culture from studying videotapes of classroom teaching. The research questions are: 1) what are the new features of Chinese mathematics classroom teaching? 2) How do these features relate to Chinese culture?

Methodology

Subjects

Four Chinese teachers' video lessons taken from the academic years 2006-2008 from grades 1 to 8 from three regions (Beijing, Nanjing, and Hongzhou) were included in this study. All participants have been teaching for more than three years. The participating teachers' video lessons were chosen with the intention to include diverse teaching styles and regions.

Procedure

The teachers' classroom teaching was videotaped. Each teacher was interviewed for an in-depth study of their thinking and beliefs on classroom teaching, for verification of their actions in teaching, and for understanding the rationales behind their actions. A total of 20 lessons from the four teachers were videotaped.

Data Analysis

This study examined the research questions using both qualitative and quantitative methods. Data analysis used Analytical Model for Studying Classroom Teaching (Powell, et al., 2003) - A sequence of eight interacting, non-linear phases: 1) Videotaping classroom teaching attentively, 2) Discussing and describing the video data, 3) Identifying critical events (moment-by-moment), 4) Transcribing, 5) Coding, 6) Constructing storyline, 7) Review teachers' reflection and lessons, and 8) Composing narrative. Using quantitative methods, coding was also based on analyzing the organization of the mathematics content in terms of the MSA in the lesson -- major components for balanced teaching (California Department of Education, 2006): Models for conceptual understanding (M), strategies for procedural fluency (S), and applications for real world connection (A).

Results and Conclusion

A teaching approach balanced between conceptual understanding, procedural development, and application was identified in all the teachers' lessons. All teachers made use of various models such as pictures, tables, tree diagram, and so on to build both conceptual understanding and connections to the real world applications. About 90% of the lessons started with a concrete model or real world situation that was familiar to the students. About 80% of the lessons ended with the same or different application. Most teachers' teaching patterns are A-M-S-A.

Specifically, the stereotypical type of “passive transmission” and “rote drilling” was seldom observed in these lessons; instead, all teachers engaged students in exploring and constructing their understanding first, and then added different levels of practice.

This study confirmed the pedagogy of balance in teaching espoused by Taoism and also confirmed the Confucian philosophy of learning with understanding. This study suggests that the new features of mathematics teaching in China are not simply transplants from Western methods, but it is rooted in the Chinese cultural tradition. Along with the policy to make national examinations more lax in recent years, the incorporation of Taoist and Confucian educational philosophies is expect to redirect Chinese math education toward an inquiry-based approach.

References

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