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The Mathematical Evaluation of Instructional Strategies in the Classroom: Findings from Research Done in a Leading Chinese Educational Community

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Abstract

Considering the, "Due to the political climate in China until the 1980s, there have been few studies on how kids learned mathematics. Second, studies on how students learnt mathematics have been restricted since the 1960s (Wong, 1998; Leung, 1992), despite interest from Western scholars in understanding the causes for Chinese students' remarkable success in mathematics. Despite the fact that many Chinese math teachers have attended a wide range of international conferences in recent years, few studies on Chinese mathematics education, especially those involving students from Mainland China, have been published in foreign journals. Math lessons in Shanghai, a contemporary metropolis with strong links to Chinese culture, and those in Hong Kong, which has always been under the twin influence of long-inherited Chinese culture and imported Western values, are intriguing to compare and contrast on both a theoretical and practical level. Stigler and Hiebert (1999) argue that the act of teaching is culturally significant. The current study has the potential to shed insight on Chinese mathematics pedagogy, in addition to adding to a better understanding of mathematics classroom instruction in the two places "helpful. In a reiteration of the variation theory of education, "which has just recently been applied to studies of classroom teaching but whose original focus was on the learning process. There has never been an attempt like this before at a nationwide survey of math education in China. This idea will be enriched when its use is expanded into formal education settings. A comprehensive understanding of the practises in Hong Kong and Shanghai mathematics classrooms will be an excellent resource for the implementation of the reforms in the two cities, where "a number" of modifications have been "adopted in mathematics education "cities.

Keyword: Chinese Mathematics Pedagogy, Theory of Education

INTRODUCTION

The territory of Hong "Kong is situated in China's south-east. Six and a half million people live in an area measuring one square kilometre in size. Per capita GDP in 1999 was 183,000 HKD, or 23,000 USD, at market prices.

People's Republic of China (PRC) government-affiliated city Shanghai is one of the country's major cities. The Long River Delta empties into the East Sea, where it is situated. A total of 13 million people live in an area of around 6,000 square kilometres, making up nearly 1% of China's total population. The GDP per capita in 1999 was 3,600 USD, or 30,000 RMB at current market values.

Free, nine-year public schooling is available to all children in Hong Kong, starting at the age of six. It consists of six years of elementary school and three years of junior high school. Next comes the six-year senior secondary school phase, followed by a year of preparation for university. Grade 9 is the final year of compulsory education for most pupils, and only a tiny percentage of those students will complete their education by passing the Hong Kong Certificate of Education Examination (HKCEE). In order to apply to Hong Kong's universities, students must pass the Hong" Kong Advanced Level or Advanced Supplementary Level Examinations, which are only available to those who have done well in the HKCEE.

Children in Shanghai "begin formal education at the age of six. They will be required to attend school for nine years. There are two types of education: public and private. Primary, middle, and high school are divided into three distinct" levels: "5-4-3," "5-4-2," and "5-4-1." The "6-3"3" system, which covers six years of elementary, three years of junior high school, and three years of high "school, is another option. For elementary school enrollment since the mid-1980s, the neighbourhood approach has been used. Students are advanced to the secondary level using the same approach. That implies that there is no public test for elementary and junior secondary school admissions. During the last year of obligatory school, pupils are required to take a public test to assess their ability. Students will be placed in several types of senior secondary schools based on the results of this test, including the comprehensive senior secondary (which includes normal and key" schools), and vocational schools. a) The Shanghai "Certificate of Senior Secondary is a public test that students must take after completing three years of high school. The Entrance Test for University is another public examination that students must pass if they wish to" continue their education at a university.

LITERATURE REVIEW

East Asian pupils "consistently exceed their Western counterparts in math (Beaton et al, 1996; Husen, 1967; Lapointe as al., 1992; Mullis et al 1997, 2000; Robitaille., 1989; Stevenson et al, 1992;. 1993). For example, in the Third International Mathematical and Science Study (TIMSS), Singaporean, Korean, Japanese, and Hong Kongan students in primary and secondary schools took the top four places in mathematics achievement (Beaton et al 1996; Mullis et al 1997). Chinese pupils outperformed their Western counterparts in mathematics even though the country did not participate in TIMSS. As an example, in the 1992 IEAP Mathematics Study, Chinese students were placed first worldwide (Lapointe et al, 1992).

International Math Olympiad champions" since 1990: They've won every year since 1990 (Wong, 1998).

In contrast to what "Western studies have discovered to be favourable to learning, a high class size, an examination-oriented curriculum, and teacher-centered teaching techniques were identified in East Asia (Biggs, 1994; Leung, 1995, 2001; Morris, 1985; Morris etaLf 1996; Wong, 1998,2000). A number of scholars have been drawn to investigate the causes for East Asian students' higher arithmetic scores (Garden, 1987; Lapointe& Co., 1992; Lee, 1998); Leung, 1995; Schmidt et al. 1997; Stigler & Stigler, 1992; Stevenson & Stigler, 1993; Watkins & Biggs, 1996). Some believe that kids' academic success or failure is linked to issues such as cultural values and curricula. According to Stevenson and Lee (1992), in East Asia, the social and cultural norms of emphasising education, attributing" success to effort, and family engagement in children's academic activities all contribute to pupils' exceptional academic performance.

Furthermore, TIMSS "statistics suggest that East Asian countries have more centralised and unified mathematics syllabuses, textbooks, and exams than Western countries (Schmidt et al., 1999). While textbooks in the United States were not" only 'a mile broad and an inch deep' but also prone to "redundancy and revision, in East Asia, textbook publishers have adhered to the syllabuses (Schmidt et al 1999, p.56). A 1999 study by Ma revealed that Chinese teachers often obtained 10 to 12 years of formal schooling, including teacher training, but US teachers typically received 16 to 18 years of formal schooling. The efficiency of instruction was suggested to be inversely related to the intellectual level of the instructor. According to Ma's (1999) findings, although though Chinese math instructors got less training, they were more knowledgeable about the topic and were able to implement successful teaching approaches. There has recently been a demand by Leung (2001) for a quest for an East Asian identity in mathematics education based on a large body of literature, stressing various dichotomies between East Asia and the West in characteristics and values Mathematical education in many cultural traditions" is currently the focus of the International Commission of Mathematical Instruction (ICMI) Committee.

Graf and Leung (2000) "conducted a comparative analysis of East Asia and the West. To fully grasp why East Asian children perform so well in mathematics, it is clear that the aforementioned research are essential. Comparative studies on how math is taught in classrooms across East Asia and the West have been overlooked in the past. Both teachers and classroom environments are seen to have an essential role in helping students create their mathematical conceptions (Cobb, 1994, quoted in Lee, 1998) When it comes to studying the teaching of mathematics in different cultures, researchers have made significant efforts to include students from China (Stevenson &" Stigler, 1992; Leung, 1992; Hiebert, 1999; the ongoing TIMSS-R Video Study), but these studies have often excluded Chinese students in Mainland China.

As a result, the results and "descriptions of math classes in the classrooms of students from Mainland China have been discordant in a few studies. According to Paine (1990) and Morris, et al. (1996), Chinese students were negative learners. Lee (1998) and Mok and Morris (2001)

on the other hand concluded that Chinese students were positive learners. Even some research have shown that Chinese instructors favoured a constructive approach to learning and problem-solving procedures (Lee, 1998; Stevenson &" Stigler, 1992). Many additional findings (Morris et al. 1996; Paine, 1990) were in disagreement with this point.

Statement of the Problem

In most research to "date, the organisation of the lesson, classroom interaction (Leung, 1995; Stevenson and Stigler, 1992; Stevenson, 1995), and general classroom characteristics have been overlooked; the qualitative qualities linked to teaching have always been ignored. Many studies have not examined how teachers handle a single topic and its associated topics in a math course. To understand what happened in a math classroom, the researcher believes it is necessary to look at how teachers approach certain mathematical ideas qualitatively. It may also give insight on the peculiarities of Chinese mathematical education. Considering that classroom teaching is more complicated than first thought, it is possible to study the complexity and messiness of classroom teaching from a variety of viewpoints and paradigms. The researcher uses the following two methods to narrow the scope of this study. Pythagorean Theorem was chosen as the focus of the course and all of the lectures were based on this topic (see Chapter 4 for details). One method for analysing classroom instruction was to apply a theoretical framework known as the variation theory of learning (Bowden and Marton, 1998; Marton and Booth, 1997). As a result of this hypothesis, children can never learn to identify anything without first encountering a certain pattern of variation. Using a sample of eight-grade arithmetic" courses on Pythagoras, we were able to draw conclusions.

Using a theoretical lens, the "researcher in Hong Kong and Shanghai is trying to delve deep into several aspects of mathematics education. The following are some of the factors that influenced the researcher's decision to focus on lessons from two distinct cities: We can now examine Hong Kong's mathematics education from an international viewpoint thanks to the TIMSS series, including the TIMSS-R and the TIMSS-R Video Study projects. An abundance of data has been supplied by the TIMSS-R Video Analyze, in particular, to study the Hong Kong mathematics classroom. The researcher used a set of criteria to choose data from the TIMSS-R Video Study to represent Hong Kong in the current study. There are studies on Shanghai's mathematics education (such as Ma, Gu, and Paine, 2002) that might serve as a starting point for this research. As Hong Kong was a British colony for more than 150 years, the educational system has been shaped by this period of British rule in every facet of life. Since nearly all of Hong Kong's population" is Chinese, it has never lost its cultural ties to "China (Census and Statistics Dept., Hong Kong, 1997). For cultural value, Hong Kong is described as an international metropolis that brings together the traditions of China and the West. According to Beaton et al. (1996), and Mullis et al. (1997), students in Hong Kong believe that mathematics and mathematics learning are distinct from those in the West. Compared to London teachers, Hong Kong teachers have a distinct perspective on the above concerns (Leung,1992), yet it is unexpected that" Hong Kong teachers have similar opinions on these difficulties with teachers in Beijing.

Shanghai is one of "China's most technologically advanced metropolises. Since the adoption of reform and the opening of the Western door in 1978, Shanghai has become a modern Chinese metropolis in terms of its population, political and economic institutions, yet it nevertheless has a distinct Chinese flavour. The Shanghai case may be used to examine aspects of teaching in mainland China by contrasting the methods used in Hong Kong and Shanghai's classrooms. In addition, A global perspective may be acquired by examining the Hong Kong situation. It is hoped that this study would help students in China better grasp the classroom environment. The third factor is that Hong Kong is a well-developed international metropolis, whereas Shanghai is one of China's most modern cities on the continent. As a result, when it comes to school finances and infrastructure, Hong Kong and Shanghai are comparable. Finally, the researcher takes" feasibility into account.

Objective of the Study

- To get an "understanding of the patterns of variance experienced by students in Hong Kong and Shanghai's mathematics" classrooms.

Research Questions

- What are "the patterns of variance for students to experience the object of learning similar and different in Hong Kong and Shanghai's mathematics" classrooms?

RESEARCH METHODOLOGY

According to Koehler "and Grouws(1992), not only is education more difficult than was previously believed, but it is also becoming more complex with time. The complexity and messiness of classroom instruction may be investigated from a variety of academic viewpoints and frameworks of inquiry (Teppo, 1998). Others, such as Fennema and Franke (1992), Ma (1999), Aguirre and Speer (2000), and Thompson (1992), prefer to look at the link between teaching practise and teacher variables such as topic and pedagogical knowledge and beliefs (Fennema & Franke, 1992; Ma, 1999). Following in the footsteps of this stream, Schoenfeld (2000) produced a more complete model of classroom teaching that addressed the link between instructors' knowledge, aims, and beliefs, as well as the decision-making and action done by teachers. Many studies, on the other hand, are solely concerned with teaching practise in general (Koehler & Grouws, 1992; Cobb & Whitenack, 1996; TIMSS-R Video Study). This legacy has" been carried on by the TIMSS-R Video Study, which has made a significant contribution to the understanding of cross-cultural classroom education in mathematics and science.

RESEARCH DESIG

Instead of being a "space where the instructor just performs planned regular tasks, the classroom is a place where many different aspects interact with one another. The relationship between students and the teacher has a significant impact on how a class proceeds and if it is effective (Tsui, 1995). From a variety of viewpoints, there has been a lengthy tradition of investigating classrooms for quite some time. An observation instrument with preset categories

in coding classroom data is typically employed in earlier classroom research, which focused mainly on quantitative approaches 72. More recent research has emphasized qualitative approaches that are concerned with the interrelationship between the teaching and learning processes in the classroom, rather than" quantitative ones.

DATA ANALYSIS

TRVS "Once transcribed, cassettes will be sent to a laboratory for further analysis. After the recordings have been digitised and stored in a multimedia database, they will be merged with scanned files of supplementary materials like instructor and student surveys. Time codes will link the transcribed courses to the appropriate films in the multimedia database as soon as the movies are digitised. Bilingual mathematics educators who are native English speakers will then transcribe the classroom exchanges between the instructor and pupils. To ensure a high degree of coding reliability, we will conduct extensive testing of inter-rater reliability of codes across coders. vPrism, a multimedia database system, allows coders instantaneous access to both the video and the linked text. This facilitates the acquisition of crucial background "use in decoding the transcript (Stigler, 1998).

CONCLUSION

So far as I can tell, "Exploratory activities, justification exercises, and a wide range of exercises are emphasised in larger Chinese classrooms, and teachers pay particular attention to how these strategies might best engage their students in the learning process. Therefore, it is proposed that the difficulty of Chinese mathematics instruction be examined once more. It was also shown that research into Chinese mathematics education is complicated by variances between Hong Kong and Mainland China "because to the differences between Hong Kong and Mainland China, should be done with caution.

LIMITATIONS OF THE STUDY

There are various "limitations to this study, including the fact that it will only be conducted on a small scale owing to financial and time constraints. As a result, the researcher's previous experience and theoretical framework may" have an impact on the objectivity of analysis and interpretation in the current study.

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