Introduction – Defining the Question and Scope for Review

The nature of teaching in schools in Eastern and Western countries has been a major theme in cross-country comparative studies in education in the past three decades. Interest in such comparative studies emerged in the 1970s after the International Association for the Evaluation of Educational Achievement (IEA) launched the First International Mathematics Study (FIMS) in 1964 (Husen, 1967). This study showed that the US students scored much lower than students in China (Hong Kong), Japan and Korea. Subsequent large-scale quantitative measurements of student achievement, such as IEA's Second IMS in 1980, and the third, TIMSS, in mid-1990, with a science component added, had consistently revealed the same performance gap between the United States (and other Western countries, such as Germany and Britain) and their counterparts in these East Asian Countries. These large quantitative studies had led researchers to conduct smaller scale research involving qualitative approaches, such as interviews and observation of classroom teaching starting from the early 1980s, for instance, research led by Stevenson and his associates that attempted to identify the contextual factors contributing to the achievement gap. In most cross-cultural comparative studies in education, mathematics and science have been the focus not only because they are more measurable subject areas across different educational systems with different instructional languages but also because they are believed to play more important roles in determining the quality of future work forces for national economic development for the twenty-first century. Given the availability of existing research and space limitation, in this brief review, we refer the Eastern countries to those heavily influenced by Confucian Heritage Culture (CHC)\(^1\), such as China, Japan, Korea, Hong Kong, and Singapore and Western countries mainly to the United States, Germany, Britain and France.

Interest in studying classroom teaching and learning has also been driven by the so-called East Asian learner paradox. Observers of East Asian classrooms
share a common impression – large class size with students sitting in rows of desks facing the teacher and the teacher leading nearly all the classroom activities and doing most of the talking to reticent students (Leung, 1995, p. 301; Paine, 1990, p. 51; Park, 2006). Whole-class instruction instead of group work is used in most of these classrooms. So to Western observers, the teacher in the East Asian classrooms is the “purveyor of authoritarian information” (Stevenson & Stigler, 1992, p. 188) transmitting knowledge to students, the passive recipients, who learn through repetitive practice and rote memorization (Biggs, 1996–1999, p. 46; Huang & Leung, 2004). These settings are in sharp contrast to what is found to be conducive to learning advocated by academics in the West – classroom activities are student-centred; teachers act as facilitators and students actively participate in group work that fosters communicative skills, higher order thinking and collaboration (Biggs, 1996–1999). Yet, in large-scale international tests, students from the former kind of learning environment performed consistently better than students in most Western countries.

Given the task of this chapter and the fact that the literature in the field does, in numerous cases, describe the differences in teaching as Eastern versus Western, we endeavour to go beyond such a dichotomous view of teaching. On the one hand, since there are obvious commonalities across geographically different spaces and often bigger variations within the same region or country, a generalized “Eastern” or “Western” teaching model “is simply too broad to have descriptive validity for the analysis of teaching” (Alexander, 2002, p. 5). On the other hand, the fact that cultural and historical differences have a huge impact on the teaching practices adopted in different countries, even speaking of teaching in the East as a standard activity is misplaced; in a sense there is no such thing as Eastern or Western teaching since countries in the East or the West simply cover so many different cultures, societies, histories that share different values and beliefs (Alexander, 2002; Li, 2003). Differences exist because teaching is deeply embedded in a cultural system and behind key differences in teaching practices lie fundamental differences in the cultural beliefs and values between and among countries in the West and East. Our review also examines such cultural differences wherever necessary.

To organize the review, we choose to view teaching practices as three dynamic interactive phases – the pre-active, the interactive, and the post-active, conceptualized by Philip Jackson (1990). Simply put, they are the planning, teaching, and post teaching activities such as marking student work, a new phase of planning and so on. Our review of the major differences between the teaching practices in Eastern and Western schools is thus along these three phases. Each phase involves key interactive dimensions: for instance, in planning, whether teachers plan lessons individually or with colleagues and what role curriculum materials play in planning; in teaching, what is the nature and types of classroom discourses and how the curriculum materials get used, and classroom activities are structured. After teaching how student homework is marked and used in teaching and how student performance and behavioral conduct is communicated to parents.
Differences in the Pre-Active Planning Phase

In culturally different educational systems the role played by curriculum materials and how teachers use them to plan for classroom teaching differs in important ways. Most East Asian countries rooted in Confucian heritage culture attach great importance to texts. In these countries, textbooks are often written based on carefully developed guidelines and syllabi provided by the ministries of education, thus allowing an alignment with what is covered in teaching and what is tested. In these countries, planning and instruction are closely guided (Cohen & Spillane, 1992). Therefore, these curriculum materials play a significant role in teachers’ work and provide opportunities for teachers to develop the knowledge and skills needed to bring about this alignment. In China, official curriculums and the textbooks are treated “as the source of knowledge, and the teacher, as the presenter of that knowledge” (Chen, 1990; Paine, 1990, p. 51; Wang & Paine, 2003). With provision of careful content analysis and teaching suggestions for each topic or unit in the Teaching Reference Materials accompanying each volume of the textbooks, they have been able to serve as “teachers of teachers” for beginning teachers (Paine, Fang, & Wilson, 2003, p. 54). This supremacy of the text is also found to be prevalent in schools in Japan where lessons are often “unambiguously aimed at transmitting to students the knowledge delineated in the textbooks” (Shimahara & Sakai, 1995, p. 205). Therefore, preparing for lessons, particularly for beginning teachers, involves a substantial amount of time spent on studying the prescribed textbooks and teachers’ manual both individually and with colleagues. For instance, many teachers in China, like those studied by Ma (1999), attributed their having systemic and deep knowledge of school mathematics to “studying teaching materials² intensively (zuanyan jiaocai) when teaching it” (p. 130). In Singapore, many teachers regard textbooks as a primary source of accurate subject matter and pedagogical knowledge (Fan & Gurcharn, 2000). Even in Hong Kong, a British colony for one and half centuries, textbooks still play a dominant role in the process of teaching (Huang & Leung, 2004).

In contrast, in the United States, teachers, particularly the experienced ones, value their autonomy in choosing curriculum materials and regard control by education officials as a threat to their spontaneity in the classroom and their professional autonomy (Ball & Cohen, 1996; Jackson, 1990). While the Chinese and Japanese teachers rely on the textbooks in planning and teaching, the American teachers, from their learning-to-teach years, are expected to develop their own curriculum and have much greater freedom to select materials to use (Paine, 1990; Shimahara & Sakai, 1995). While American teachers might be able to develop stronger competencies in curriculum design over time (Alexander, 2002), their lack of in-depth study of a given curriculum might have also led to their fragmented understanding of content knowledge, such as in elementary mathematics (Ma, 1999). Market-oriented, filled with rich illustrations and covering many topics without building up interconnections and depth, American textbooks are often written without considering teachers as learners when they use the textbooks (Stevenson & Stigler, 1992, pp. 139–141; see also, Ball & Cohen, 1996; Mullis, Martin et al. 2000, 2005). In many ways, the opportunity to learn from using the official curriculum for teachers in the school systems sharing
Confucian Heritage Culture (CHC) is attributed to the widely acknowledged coherent, concise and well-developed textbooks. (Stevenson & Stigler, 1992, pp. 139–141; see also Ma, 1999; Mullis, Martin et al., 2000, 2005).

How well curriculum materials can become tools for teachers in planning and teaching and their effective use also depends on how they are used in the process. Teachers in China and Japan share a long tradition of planning together and observing each other’s lessons, fostered by a culture that values collegiality over individualism. Such a culture of collaboration has enabled teachers to pull together good teaching ideas and resources and form multiple perspectives of the teaching materials and students as learners (Stigler & Stevenson, 1991). For instance, Japanese teachers have a long history of doing lesson study – cycles of activities in which teacher groups, usually by grade level, design, implement and improve together one or more research lessons and seek to make positive changes in instructional practice and student learning (Lewis, 2006; Stigler & Hiebert, 1999).

Such research lessons are collaboratively and carefully planned and taught by one of the teachers with team members observing lessons and taking careful notes on learning processes (Stevenson & Stigler, 1992, p. 160; see also Lewis & Tsuchida, 1998). As a thriving, on-going form of professional development (Fernandez et al., 2003; Yoshida, 1999), it has generated “shareable knowledge” and the development of schools as organizations where teachers can learn and progress together (Hiebert & Stigler, 2000). It is also believed that lesson study contributed to Japan’s shift from “teaching as telling” to “teaching for understanding”, especially at the elementary level, from the 1970s to the 1990s (Lewis & Tsuchida, 1998).

In China, team work is institutionalized, such as by traditional school-level Teaching Research Groups and grade-level Lesson Preparation Groups in every school, and opportunities to share in these groups socialize new teachers into “a community that shares a common body of knowledge and speaks a common language” (Paine, 1990, p. 75; Paine, Fang & Wilson, 2003). In China, Japan, and South Korea, teachers teach a relatively light load and sit together in the school common staffrooms by the subject matter or grade level they teach. Such physical arrangements provide them opportunities to learn from other teachers and engage in collective analysis of their daily practice (Fang, Hooghart, Song, & Choi, 2003). The workplace culture promotes “personal and professional support to teachers carrying out complex and demanding jobs” (Paine, 1990, p. 75). It also allows them to refine their craft together and engage in continuous and gradual improvement of planning and teaching. As a consequence, mathematics teachers in China and Japan have a deeper understanding of the content knowledge and produce coherent and well-structured lessons (Ma, 1999; Stigler & Hiebert, 1999).

Individualism, independence and professional autonomy is highly valued in many Western countries. Under individualism, teaching is perceived as an “expression of individual personality” (Lortie, 1975, p. 240) and there is a belief that good teachers are born not made. A full load of teaching duties and “the cellular organization of schools constrain(s) the amount and type of interchange (between colleagues); beginning teachers spend most of their time physically apart from colleagues” (Lortie, 1975, p. 72). US teachers value independence and their decision-making power over schedule, curriculum and classroom management (Alexander, 2002; Stevenson &
Teaching behind closed doors for long hours, teachers do not develop “a common technical vocabulary” (Lortie, 1975, p. 73) to talk about teaching or to know what effective teaching entails (Fernandez, Cannon, & Chokshi, 2003). Therefore, in planning and teaching, “(E)ach teacher must laboriously construct ways of perceiving and interpreting what is significant” (p. 73) and neither do they “have a means of successfully sharing such knowledge with one another” (Stigler & Hiebert, 1999, p. 12). Currently, the United States is attempting to improve the long-standing problem by engaging teachers in collaborative planning and studying student work as part of school reform initiatives (Cobb, McClain, Lamberg, & Dean, 2003; Elmore & Burney, 1999).

Differences in the Interactive Phase of Classroom Teaching

We indicated earlier that in the planning phase, there are remarkable differences between schools in the Eastern and Western countries in the role played by the curriculum materials, organization of teachers’ work and continued teacher learning in the workplace. However, as far as the interactive phase of classroom teaching is concerned, such Eastern and Western differences are not so clear-cut at all.

Structure of Teaching Activities and Teacher–Student Interactions

Comparing school teaching between the East and West, the distinction is drawn culturally rather than geographically. Instructional practices bear culturally distinguishable features, such as the differences noted above in planning, designing and using curriculum in Eastern and Western countries. Across CHC countries, the central position of curriculum and text in teaching and culture of collegiality yield highly structured lesson activities when teachers carefully plan their lessons and possess stronger teacher curriculum knowledge. The lesson structures and role of text in the Western countries, such as United States, Britain, and Germany, share key similar features of their own as well (Stigler & Hiebert, 1999). Yet, France and Hong Kong are two cases straddle somewhere between these two Western-Eastern comparison groups.

Paine (1990) observed that teachers in China, regardless of grade level and subject matter, generally began class with a review and inspection of students’ knowledge of the text and the previous day’s work; they then would present new material directly from the text. After this, they pose questions or exercises for students to “firm up” their knowledge. They end the class by assigning homework (p. 52). The teacher leads or guides the whole class by performing to students in a highly structured way: it starts as the teacher, like a solo musician, walks into the classroom and announces the beginning of the lesson after the bell rings and it ends when the teacher announces “class is over” when the bell rings again and all students stand up saying goodbye to the teacher who then walks out of the classroom. An excellent teacher is one who can
get “the feel of the audience” by reaching the whole class, with his or her “virtuoso performance accomplished through mastery of technical knowledge of the text and the teaching aesthetic” (p. 54).

These rituals and patterned classroom activities are echoed by Stevenson and Stigler (1992) in their studies of elementary classrooms in Beijing, Taipei and Sendai, Japan around the same period of time. Through more than 800 hours of classroom observations in these three cities as well as those in Minneapolis and Chicago, they were struck by the structured and interconnected events used by the teachers towards the same goal in each individual lesson in these East Asian classrooms. To them, these lessons are characterized by “coherence”; like good stories, they share “an introduction, a conclusion, and a consistent theme” (p. 177). In comparison, they found that many of the US math lessons covered more topics in a lesson and the frequent shifts between topics led to a lack of coherence. Even for the lessons with rich activities focusing on one topic, the US teachers often failed to make explicit the connections between the activities, leading to students not perceiving the meaning of the lessons from the discrete activities. Prolonged and unassisted seatwork and frequent disruptions caused by attending administrative tasks also posed threats to the coherence of the American elementary mathematics lessons.

When comparing secondary mathematics lessons in Beijing, Hong Kong and London in the late 1980s, Leung (1995) found that lessons were structured in Beijing and unstructured in London, with Hong Kong, a mixture of both. He noted that whole-class instruction was common to Beijing and Hong Kong and seat work was more common and much longer in London. During whole-class instruction, teachers in Beijing explained concepts in length to students and those in Hong Kong mostly demonstrated solutions of mathematics problems while teachers in London spent time discussing mathematics with students. Seatwork in Beijing and Hong Kong was about practicing skills just learned and in London, seatwork with occasional assistance from the teachers, could be the major part of lessons since students were often learning different things at different pace during class time. The Beijing lessons were highly on task with no external interruption while those in Hong Kong and London contained “off-task” incidents such as late arrival of teachers and early dismissal of classes to allow students to “pack away”. More than half of the London lessons Leung observed also had occasions when the teacher was doing some administrative work while students were not working at all. London teachers were more likely to be seen maintaining discipline than Hong Kong and Beijing teachers. Leung also found that while Beijing teachers seemed thoroughly prepared for their lessons, Hong Kong and London teachers were “making extemporaneous decisions in their teaching either in using examples or in the next step to take” (pp. 301–305).

In their preparatory work aimed at informing the survey design for TIMSS, William Schmidt and a group of researchers from six countries (1996) conducted 120 classroom observations in France, Japan, Norway, Spain, Switzerland, and the US from 1991 to 1993. The observations were aimed at describing the mathematics and science classrooms and identifying key instructional elements. The findings from the available international comparative studies on curriculum and classroom practices, such as role of the textbooks, coherence of lessons and structure of
classroom activities, were used to inform the development of a research framework called Characteristic Pedagogical Flow (CPF) to capture CPF cross-nationally. They also drew on the research trend that examined the importance of subject matter and teacher beliefs of subject matter in shaping the organization of classroom activities. The framework examined three key attributes – content representation and complexity, content presentation, and the nature of classroom discourse. Their observations described the characteristic pedagogies in several European countries. However, as discussed later on issues around research methodology, there are limitations in using such observations to help frame large-scale cross-cultural quantitative studies of curriculum and instructional practices, such as TIMSS.

Interestingly, Schmidt and the research group, with researchers from the countries involved in the study (1996), found that among the four European countries, lessons in Norway and Switzerland, very much like those in London, had a large proportion of seatwork in which students could work on different things at different paces. Teachers did not spend much time explaining concepts or topics but questioned students on whether they understood something and used student responses to move the lessons on. Although textbooks and other resource materials were used extensively by both teachers and students, unlike East Asian countries, they were not used for instruction but as a major subject matter resource. Teachers in both countries seemed to “avoid being considered as subject matter experts” (p. 97, 101); instead, they monitored and assisted student seatwork so students were more explicitly involved with the subject matter than teachers. In many ways, mathematics lessons in Norway, Switzerland and London were described as student-centred and unstructured containing many “barely related or indiscernibly-related topics” (p. 97, 101), a pattern also found in the United States by Stevenson and Stigler (1992).

In France and Spain, however, similar to lessons in East Asian classrooms described earlier, “teaching was strongly directed by the teacher” and had “a heavy reliance on teacher expertise” (Schmidt et al., 1996, p. 91) in both mathematics and science lessons. In these two countries the lessons “focused strongly on content and emphasized theoretical justification for mathematical procedures and scientific rules” (p. 91, 99) in which the content was more complex. Similar to the East Asian countries, the instructional language was both precise and formal. In terms of lesson structure, there is also much resemblance. The lessons usually began with review of homework or previous content followed by careful demonstration or exposition of the new material or concepts and development of relationships of the concepts or principles. In the French math classrooms, during exposition, teachers also asked students pointed questions and used a very traditional “elicitation-response-feedback” to develop the topic. Similar to Japan and China, use of the blackboard was “an integral part of the teacher’s lesson presentation, particularly in mathematics” (p. 92). Like many East Asian countries, homework was seriously treated and beginning the lessons with review of homework played a role in developing new content. These findings about classrooms in France in both literacy and numeracy were corroborated by Alexander (2000) in his five-country comparative studies on culture and pedagogy. Therefore, there is no typical European classroom teaching given the remarkable differences among the countries compared above.
These studies were able to capture the broader patterns of curriculum and classroom pedagogies, but they are inadequate to pinpoint the real differences of pedagogical elements or their dynamic interactions that give rise to the higher academic achievements of the East Asian students. For instance, Stigler and Hiebert (1999) adopted a similar framework in analyzing TIMSS video study of 8th grade mathematics lessons in Japan, Germany and the United States. The findings they reported in Teaching Gap largely reconfirmed those earlier ones regarding the images of classroom teaching in these countries albeit in finer detail. However, by analyzing a series of lessons taught on the same topic, the video study was able to move beyond to examine variations in Japanese mathematics teaching. Earlier studies described Japanese mathematics classrooms unanimously as a student-centred model of teaching, mostly at the elementary level. Yet, as pointed out by Stigler and Hiebert, at the secondary level, “(t)eacher telling and student memorizing” (p. 48) were also common activities. As they pointed out further, from the view that teaching is a cultural system, these activities are purposeful in leading towards the goal of a lesson – teachers used them to prepare students to learn or perform subsequent activities in the same lesson or upcoming lessons. For instance, the mathematics rules or principles the teacher lectured on and then asked students to recite and memorize were used subsequently in doing a geometry proof problem in the same lesson and a following one.

Beneath the Teaching Discourse – The Puzzle of the East Asian Learner Paradox

As mentioned in the opening section, many Western researchers have been motivated to study classrooms in East Asian schools to unravel the East Asian learner paradox – how students in teacher-dominated and often crowded classrooms could excel in the academic achievements measured in the large scale cross-country comparative studies. Early studies found that teachers in both China (Paine, 1990) and Japan (Lewis, 1995) are expected both to teach knowledge and educate the person, in other words, educating both hearts and minds of children. To do this, love of children and appealing to them with the aesthetic beauty of teaching are emphasized. Yet, in studying mathematics teaching, more fine-grained analysis on classroom discourse and culturally-relevant lenses are needed to make meaning of the teaching and learning that occurs in the classrooms. More recently, researchers, who consider themselves insiders of the teaching systems and culture (Fan et al., 2004), have unravelled some qualitative attributes embedded in the curriculum design (such as teaching problems used) and pedagogy of East Asian classrooms that could help explain how learners acquired their understanding in the teacher-dominated classrooms. They argued that the content and the pedagogies utilized in the classrooms involved different levels and types of variations made by the curriculum designers and teachers. These variations could enable students to discern critical dimensions in the content of learning. This is in line with the observation that mathematics teaching in East Asian countries is coherent, well-structured and focused on content, such as with fewer problems explained around a consistent theme or concept.
Recently researchers of East Asian classrooms used variation theory, an indigenous theory about mathematics teaching developed by Gu (1994) and simultaneously Ference Marton (Marton & Booth, 1997), a Swedish scholar, has led to major findings through analysis of the curriculum, problems used in teaching, and the instructional discourse of the teacher. These more concrete analyses of what such variations could entail and how they lead students to discern the critical aspects of the concept under exploration are reported in the book, *How Chinese learn mathematics: Perspectives from insiders* (2004), edited and written by Fan (based in Singapore) and other mathematics scholars in China and elsewhere.

In the mathematics curriculum materials in China, there are explicit illustrations of how to use variations in designing problems for classroom teaching and student practice. For instance, in the *Teachers’ Reference Material* (TRM) (similar to Teachers’ Manuals) for 2nd semester, 7th grade (1996) in Shanghai, on the topic of geometric proofs concerning “congruence of triangles”, it proposes two typical methods of variation in designing geometry instructional problems and student exercises: “stretching the head” and “stretching the foot” (p. 47). The former is used to diversify a problem to derive more practice opportunities for students by changing the given conditions or the problem context while keeping the same the rest of the problem. The later diversifies a problem by changing between and among what is to be proven and what is given for students to apply and distinguish different uses of a proposition or theorem from varying perspectives. The TRM suggests that using these kinds of practice should reduce the difficulty faced by students in learning geometry proofs (Fang, 2005).

Gu (1994) believed that such variations in teaching problems and student exercises are different ways to manipulate instructional and practice problems in order to enhance their “pedagogical functions or values” (p. 138). He found that majority of the basic exercises in secondary mathematics textbooks and student workbooks in Shanghai could be modified in appropriate ways to serve a greater number of pedagogical purposes. Such modifications would reduce the difficulty in geometric proofs by building a gradual slope of difficulty, dispersing the level of difficulty, and providing “different levels of students with more effective practice and develop their independent thinking ability” (p. 138). Since one major purpose of practice by variation is to facilitate the students in learning the fundamental properties of a math topic, such variations are expected to develop students’ ability to understand a fundamental mathematical idea from multiple perspectives. Such variations are not only found in the curriculum and teaching of geometric proofs but also in student workbooks. For experienced mathematics teachers, they often use variations in choosing or designing demonstration problems, explaining the problems, and assigning student homework (Fang, 2005; Gu, Huang, & Marton, 2004; Huang & Leung, 2004).

In teaching, this kind of variation is similar to what Cai (1995) and Hashimoto (1987) identified as “the one-problem-multiple-changes (OPMC) instructional approach” “regularly used in Chinese and Japanese classrooms” (Cai, 1995, p. 23). They attributed the success of current instruction in these countries to this OPMC instructional approach. According to Gu et al. (2004), there are two fundamental uses of variations in classroom teaching leading to students’ seeing and experiencing
for discernment. One is varying a set of the integral elements of a concept in the demonstration problems to enable students to “see” them and develop a thorough understanding of the concept (Marton & Booth, 1997; Wong, 2004); the other is creating variations in the instructional procedures to develop basic mathematical skills. In terms of the roles they play for and during instruction, the two types of variation are also called “conceptual variation” and “procedural variation” respectively (Gu, 1994; Gu et al., 2004).

Huang and Leung (2004) conducted detailed comparisons of video-taped mathematics lessons between Hong Kong (from the TIMSS 1999 Video Study) and Shanghai classrooms on the topic of Pythagorean Theorem. Their study illustrated both similarities and differences in using variations in teaching the topic as well as the underlying cultural ramifications. To the authors, “the most impressive findings are the students’ active involvement in tackling mathematics content and solving mathematical problems under teachers’ skillful guidance in a large class, which is not easy for Westerners to understand …” (p. 378). They observed that although the lessons in the two cities used different methods in introducing and verifying the theorem, they both demonstrated a strong emphasis on exploring the topic and on instruction and practice with variations that could account for high level student involvement and achievement (p. 368).

In the lessons from both cities, teachers used two different ways to vary the problems for instruction and student practice: explicit and implicit variations. The former refers to observable and concrete variations made in prototype problems in terms of numerical values, orientations of figures and explicit conditions while the later refers to variations made at more abstract and logical level in the prototype problems in terms of changes in parameter, subtle changes of certain conditions, and changes of contexts or solution strategies. They found that Hong Kong teachers tended to use explicit variations to help students experience the critical features of the topic visually and concretely. Shanghai teachers, however, tended to use implicit variations to enable students to discern the critical features of the topic in more abstract ways. The authors associated the tendency to use implicit variations in teaching with a Chinese saying, “remaining essentially the same despite all apparent changes” – a traditional Chinese way of thinking and observing nature and society (Huang & Leung, 2004, p. 371; Wong, 2004, pp. 520–521). In terms of student learning, this means that students master the knowledge and skills through practice with extensive internal variations in the exercises regardless of the change of contexts. As the authors further noted, the differences between the two cities in teaching the same topic imply different cultural impact on teachers’ views and beliefs about mathematics and mathematics teaching. Although Hong Kong teachers still share traditional ways of thinking and use variations to engage students, they have been influenced by more recent Western philosophy that learning can be made more meaningful to students if concrete manipulatives or models are used in teaching while Chinese teachers have held a constant belief that students learn critical thinking and logical reasoning through abstract representation (Huang & Leung, 2004, pp. 371, 375).

Rich variations in instruction and practice were also found in Korean mathematics lessons. Park (2006) studied the 7th grade math lessons in three sampled schools in Seoul and he drew attention to one particular kind of variation – a “systematic”
and “continuous” variation leading students to understand the concept. Aimed to help different learners in the classrooms understand a key concept, the teachers were found to start the lessons with a simple basic equation, diagram or situation and made variations in one aspect of the problem at a time. As the instructions went on, they continued to induce variations in other aspects of the problem until the teachers’ targeted forms were reached (pp. 158–160). He found such variations not only used in the lessons in all three cities but also in the exercises given to students. Through systematic use of such teacher-initiated variations, students were closely guided to explore the mathematics by experiencing them from different dimensions (p. 161).

Differences in the Post-Active Phase of Continued Teaching Work

Obviously the three phases of teaching – pre-active phase of planning, interactive phase of classroom instruction and the post-interactive phase of continued teaching work are closely interrelated. From a curriculum perspective, it encompasses the intended, enacted, and lived curriculum experienced by students. For instance, designs of variations, such as those illustrated above, exist not only in the official curriculum, the demonstration problems for instruction and student practice given in the official textbooks and student workbooks but also in those selected or designed by teachers. Teachers engage in a cycle of pedagogical reasoning and action that starts with comprehending and transforming the curriculum and ends with comprehending and reflecting on their own pedagogical actions in and outside the classroom (Shulman, 1987). It is only by viewing classroom practices and student learning via such systems thinking (Biggs, 1996–1999, pp. 50–52; Stigler & Hiebert, 1999) that the teacher-dominated large classroom of active student involvement can be understood. As Biggs argued, “the fact that CHC classrooms produce outcomes that compare as well or better than those in the West, and that they are stable, suggests that a working equilibrium has indeed been struck” (p. 53).

From the systems view, culture shapes and is shaped by the organization of teaching and roles of teaching tools and ways of knowledge building. Take homework and how it is used in teaching and learning as an example to illustrate this interrelationship in different education systems. As discussed earlier, Schmidt et al. (1996) found that homework in the well-structured math classrooms in France was not only used for students to consolidate learning but to inform teachers on their teaching and student learning. Therefore, errors in student work were also used as part of teaching and learning in France. When a student error is openly criticized and explained by a teacher, it “is not frowned upon in France as it would probably be in England” and thus a teacher in England would “typically go to enormous lengths to protect children” from “lowering of self-esteem” (Broadfoot, 2003, p. 124). So in British and US classrooms, errors are not typically used in teaching and homework is treated mainly as a disciplinary tool (Leinhardt, 1990) and to complete it is a student’s own responsibility. Therefore, Schmidt et al. (1996) found that the US teachers’ use of homework was little related to formal teaching or getting information about student learning;
Homework use in China, however, is an institutionalized tool to connect teaching and learning, work of teachers and students. Traditionally marking student work and explaining errors and tutoring students on their homework have remained part of teachers’ expected teaching work. Fang’s (2005) case study of an experienced 8th grade math teacher and her colleagues in a middle school in Shanghai showed that they taught 2–3 periods of 40-minute lessons per day and spent the non-teaching hours marking student work, talking with colleagues about problems they encountered during marking, tutoring individual students on their homework to inform their teaching.

One could argue that such a way of using homework and how variations have been attempted as an instructional practice as well as the common expository style of teaching all result from the examination culture in East Asian countries. Huang and Leung (2004, p. 371) pointed out that the long tradition of examination culture might explain the importance of practice and its role in mathematics teaching. In order to avoid repetition of questions used in the test papers, teachers and test makers have to do their best to design questions with variations for teaching a concept and practice to consolidate student learning. On the one hand, the examination culture in East Asian countries has created a closely coupled system (Cohen, 1987) in which teachers and schools are highly accountable for student achievement. On the other hand, the examination-driven system does add pressure for teachers and stress to students who are under the burden of numerous repetitions and memorizations.

**Conclusion**

In conclusion, via this brief review, we highlight three major findings. First, viewed broadly, big differences do exist between East Asian countries influenced by Confucian Heritage culture (CHC) and quite a number of Western countries in terms of the role of the curriculum in planning, teaching and post-teaching activities, the structure of classroom activities, and teacher-student interaction. Yet such differences cannot overshadow nuances in the cases of similarities (such as France and Spain’s emphasis on content and their highly structured mathematics teaching) as well as cases of within culture differences (such as Hong Kong with both CHC and Western influence on its classroom teaching). Second, culture does play a huge role in explaining such differences as well as similarities. The importance of conformity to “text” in the CHC countries and screening and promotion through examinations have organized the work of teachers around studying the text, carefully explaining it, crafting variations for students to practice and monitoring students closely to ensure that they get it right. To cope, teachers hold each other accountable by collectively examining their practice and student learning. In Western schools, however, under the ethos of independence and individualism, more visible in the Unites States, Germany and Britain, teaching is an expression of individual style and classroom activities are more for students to explore with less teacher explanation. Although the differences are not clear-cut between teaching in the Asian schools and Western schools, the
CHC teaching with variations does stand out on its own. Third, the research framework guiding large-scale international studies on education cannot reveal the curriculum and pedagogical elements that lead to differences in student performances. More fine-grained discourse analysis and a systematic view of teaching is needed to better able to explain student success with the content of learning.

One should also be aware that current research that compares teaching in Eastern and Western schools has focused largely on mathematics and science, except for the monumental work of Alexander (2000) who compared the literacy and numeracy practices of five countries (France, Indian, Russian, England and America/Michigan) by conducting both macro- and micro-level analyses. What would the picture of teaching be like if the subject of teaching is a native language or social studies? Meanwhile, culture does have an impact on teaching; yet, most of the literature on teaching in the East focus primarily on countries sharing a Confucian heritage and an examination culture; for other countries in the East sharing different heritage cultures, such as Thailand, a Buddhist country or Malaysia, an Islamic one, we have little data. How would the pattern appear if data were available? With that said, through East-West comparisons, we do provide opportunities to learn from each other in improving schooling and student learning. For instance, while education reformers in the West are paying more attention to content or deepening the content, the East is looking at how to involve students more actively in teaching and learning and how to relate learning to the real world situations. With globalization, different countries have come to a consensus as to what knowledge and skills should be taught in schools (such as critical thinking, learning how to learn) and how they should be taught (such as group work and project work) (Tatto, 2007). It remains to be seen if globalization will also lead to shared pedagogies.

Biographical Notes

Yanping Fang is an assistant professor at the Centre for Research in Pedagogy and Practice (CRPP), National Institute of Education, Nanyang Technological University, Singapore. She received her PhD in Curriculum, Teaching and Education Policy at College of Education, Michigan State University. Her research has been focused on teacher learning and teacher development from international comparative perspectives. At CRPP, she’s principal investigator of several intervention and research projects including piloting and sustaining lesson study in Singapore and mathematical problem solving in Singapore Classrooms with a current component to develop web-based video cases for professional learning of mathematics teachers. Besides research, she is also teaching masters and doctoral level courses and supervising students at both levels.

S. Gopinathan is currently Head of the Centre for Research in Pedagogy and Practice at Singapore’s National Institute of Education. In a career spanning over three decades, he has been involved in teacher education in Singapore and has served on numerous Ministry of Education review committees. He has served as a consultant to the World Bank, UNESCO, the Commonwealth of Learning. He has written
and lectured extensively on education reform, language in education issues, higher education and in teacher education. His papers and edited volumes are key references for students of education in Singapore and comparative education internationally. He is founding editor of the *Singapore Journal of Education* and currently co-edits the *Asia Pacific Journal of Education*.

**Notes**

1. Wong (2004) distinguished between Confucian heritage culture which dates back to Confucius’ days and the examination culture which started to prosper in the Ming Dynasty as a screening tool for positions in the bureaucracy. Wong believed that in explaining excellent academic results of CHC students, the “examination culture” has a greater impact on achievement orientation than Confucianism.

2. In China, the teaching materials used by teachers studied by Ma (1999) and Paine, Fang & Wilson (2003) include National Curriculum Outline that spells out goals of mathematics education and standards and hours of teaching for major topics by grade levels. The Teacher Reference Material (written for teachers only) of each textbook volume provides content analysis by units and lessons, comparisons of major changes between the older and current version of the topic, analysis of student learning difficulties and teaching suggestions. Teachers and students use the same textbooks and student workbooks are closely aligned with daily teaching which are assigned as homework after teaching, collected after students’ completion on the following day and marked immediately by teachers as part of teachers’ daily work.

3. For instance, Paine, Fang & Wilson (2003) found that mathematics teachers in Shanghai shared planning and teaching ideas frequently in terms of what constitutes the “important, difficult- and hinge points” of teaching a topic, concept or a chapter.

4. Singapore’s mathematics classroom teaching is also heavily guided by a centralized curriculum and textbooks and is teacher-dominated (according to findings from studies done recently by Centre of Research on Pedagogies and Practices, National Institute of Education, Singapore). Yet, its colonial history under Britain and recent influence by the United States have had clear bearing on how teachers’ work is organized. Teachers sit in their common staffroom, yet their heavy load of teaching deprives them of opportunities to develop collegiality as workplace resources for learning. Current reform aims to build up teacher collaboration in examining their teaching practice.

**Reference**


