

# A Comparison of Chinese and Australian Early Childhood Mathematics

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**Abstract:** *In the 21<sup>st</sup> century mathematics proficiency is synonymous with a numerate citizenry. In the past few decades young children's ability to reason mathematically and develop mathematical proficiencies has been recognised. This paper explores the history of early childhood mathematics (ECME) that may explicate differences in Chinese and Australian contexts. Results of this review established that China and Australia are diametrically positioned in ECME. Influencing each countries philosophies and practices are their cultural beliefs. ECME in China and Australia must be culturally sustainable to achieve excellent outcomes for young children. Ongoing critique and review is necessary to ensure that ECME is meeting the needs of all teachers and children in their particular context. China and Australia with their rich contrasting philosophies can assist each other in their journeys to create exemplary ECME for the 21<sup>st</sup> century.*

**Keywords:** culture, early childhood mathematics education (ECME), historical perspectives

## 1. Introduction

Mathematics proficiency is synonymous with a numerate citizenry. In the 21<sup>st</sup> century the vast majority of occupations require sophisticated mathematics skills. With an increased demand for STEM (science, technology, engineering and mathematics) related knowledge in the global work market, the role of education has become paramount (National Mathematics Advisory Panel [NMAP], 2008). In recent years, the importance the prior-to-school years have on young children and their mathematics development has been acknowledged. In fact, longitudinal research indicates that prior-to-school mathematical performance or achievement is associated with school mathematical achievement and future career options (e.g., Shaw, Nelson, & Shen, 2001). Thus, governments and organisations worldwide are espousing the importance of early childhood mathematics education. In the 21<sup>st</sup> century, central to China and Australia is the premise that the early years of life are fundamental to lifelong learning and the development of mathematical proficiencies. This paper will compare Chinese and Australian historical perspectives of ECME.

## 2. Chinese and Australian historical perspectives of early childhood mathematics

In all parts of the world, throughout history there have been conflicting views about the type of mathematical experiences that should be provided to young children prior-to-school.

In China, the history of ECME education has been influenced by three individual cultural times. There is evidence, as early as the 16th century that education centred on the "Six Arts": Rites, Music, Archery, Chariot-Riding, History, and Mathematics and catered for the development of the elite. Historically, in the Chinese Confucius education tradition, mathematics (and other subjects e.g. language) have been distinct learning components of the early childhood classrooms in China. In the last century, early childhood education was heavily influenced by the Soviet model of learning. This model promoted teacher-centred and subject based, group-orientated learning which incorporated mathematics learning from an early age. The attention to knowledge and the systemization of mathematics has been an outstanding aspect of Chinese schools and prior-to-school environments. However, the trend was challenged by western models of early learning that espoused play based individualised learning. Teachers were encouraged to engage children in 'educational activities' as opposed to 'lessons' (Gu, 2006). Mathematics was no longer a subject individually addressed by teachers but integrated into daily events. In contemporary China, prior-to-school classrooms are still transforming. Chinese educators are now grappling with shifting pedagogical practices to model play based

individualised learning. Tensions still exist between traditional and modern Chinese cultures of subject-based, teacher-centred, and child and society centred models which do not emphasise mathematics curriculum.

In contrast, for the best part of the last century society, Western countries such as Australia held bleak views on the learning abilities of young children, which reinforced the argument for limited or no mathematics instruction in early childhood. The nature of early childhood curriculum espoused an integrated and holistic approach to learning that downplayed ‘academics’ and specific subject content knowledge (Ginsburg and Amit, 2008). Society “long viewed young children and mathematics education like water and oil, as things that do not mix” (Baroody, Lai and Mix, 2006, p.187). Thorndike (1922) suggested that young children were so mathematically inept that “little is gained by [doing] arithmetic before grade 2, though there are many arithmetic facts that can [be memorized by rote] in grade 1” (p. 198). It is acknowledged that some theorists did advance the notion that younger children were capable of complex mathematical thought (Baroody, Lai & Mix, 2006). Froebel and Montessori incorporated rich mathematical experiences into their early childhood programs and these practices were adopted by Australian early childhood teachers. However, in the 1800s and early 1900s, social theories contested such views and ultimately they were obscured (Balfanz, 1999). More recently the Organisation for Economic Co-operation and Development (OECD) has also advocated that programs for young children should focus on children’s overall development. However, there are contradictory notions advocating the need for evidence based mathematics curriculum for young children. In Western contexts it is now acknowledged that young children develop powerful mathematical knowledge, skills and dispositions (e.g., Baroody, 2000) prior to school and that ECME is necessary. In China the place of mathematics and subject specific learning appears reversed to the Australian concentration on subject-specific mathematics learning (see Figure 1).

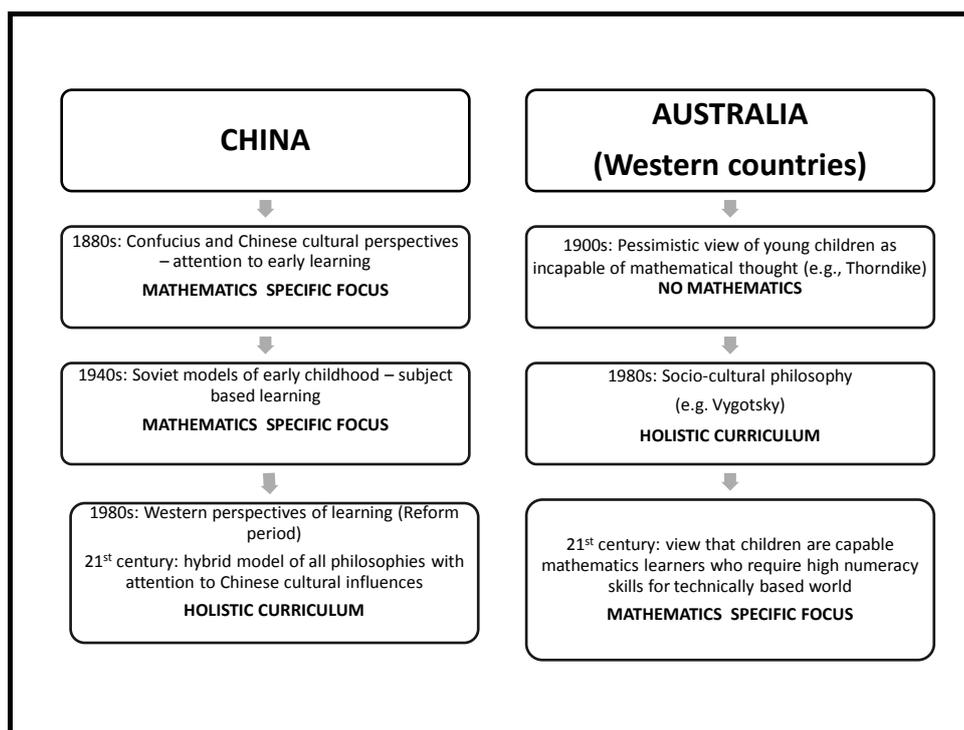


Figure 1. Comparison of Australian and Chinese early childhood mathematics education histories.

### 3. Conclusion

China and Australia are two perfect examples of diametrically positioned ECME. Currently, teachers in China are encouraged to integrate mathematics holistically and teachers in Australia are required to teach subject-specific mathematics. Yet, at other junctures in history these views were reversed. Chinese teachers attended to mathematics learning using structured methods and Australian early childhood teachers concentrated on developing young children socially and emotionally. Currently, on the surface level Australian systems appear to be addressing ECME more

rigorously. Yet, research evidence indicates that Chinese children outperform many Western countries in mathematics achievement tests as demonstrated in PISA and TIMSS (Mullis, Martin, & Foy, 2008; OECD, 2009). There is also evidence that before Chinese children begin formal schooling, they are more mathematically proficient than children from Western countries (Ginsburg et al, 2006).

In order for ECME to flourish in each country and support young children's developing proficiencies it must be contextually significant. ECME must respect and align with the cultural beliefs of the community. But, this is not to advocate languishing in familiarity and history. Ongoing critique is necessary to ensure that ECME is meeting the needs of children in their particular context within the 21<sup>st</sup> century. Considering the widespread global demand for a numerate citizenry and STEM related occupations the ongoing development and refinement of culturally sustainable ECME must be promoted. China and Australia with their rich contrasting philosophies can assist each other in their journeys to create exemplary ECME for 21<sup>st</sup> century.

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