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Thematic Issue on Values and Valuing in Mathematics Education: Revisiting Mathematics Education From Cultural Perspectives

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In school mathematics, there always exist the 3Ws questions for every mathematics teacher: *WHY* should we learn mathematics, *WHAT* kinds of mathematics should we learn, and *HOW* to learn mathematics. There are no common answers for each of these three questions, probably because each person has their own understandings of the 3Ws. A possible explanation for the uncertain solution is that mathematics is considered as a cultural phenomenon.

To understand such a cultural phenomenon, we may first need to know the relationship between culture and mathematics. In the book *Evolution of Culture*, White (1959) argued that “the functions of culture are to relate man to his environment on the one hand, and to relate man to man, on the other” (p. 8). He divided the components of culture into four categories: ideological, sociological, sentimental, and technological. Among them, the technological factor means “manufacture and use of tools and implements, which is the basic one and determines the form and content of the social, philosophical, and sentimental factors” (p. 19).

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In this context, mathematics is conceived as a cultural product. Learning mathematics is inseparable from the connection with the external environment, and teaching mathematics is also inseparable from the interaction between people. Wilder (1978) tried to explain the evolution of mathematical concepts from the standpoint of an anthropologist, rather than that of a mathematician. He pointed out mathematics was viewed as a cultural phenomenon: “those people who do mathematics—the ‘mathematicians’—are not only the professors of cultural element known as mathematics but, when taken as a group in their own right, so to speak, can be considered as the bearers of a culture in this case mathematics” (p. 26). If we bring such a cultural phenomenon to mathematics education, there are some special focus or inspirations for teaching and learning. In his classical book *Mathematical enculturation: A cultural perspective on mathematics education*, Alan Bishop proposed five principles to look for in the education of mathematical enculturators, namely:

- It should develop a broad understanding of mathematics as a cultural phenomenon.
- It should develop a deep understanding of the values of mathematical culture.
- It should improve their competence in, and understanding of, the symbolic technology of mathematics.
- It should develop their knowledge and understanding of the technical level of mathematical culture.
- It should develop a strong metaconcept of the mathematical enculturation process generally (Bishop, 1988, p. 175).

Since then, research on values in mathematics education developed. Actually, at that time, the construct of values has been studied in multiple disciplines, such as anthropology, sociology, education, philosophy, and psychology. According to Rokeach (1973), “values, more than any other, is the core concept across all the social sciences. It is the main dependent variable in the study of culture, society, and personality, and the main independent variable in the study of social attitudes and behavior” (p. ix). Hence, values could be regarded as a personal construct and also a sociocultural construct. When we take in account the social interaction with the environment and other people, we may examine what we value or what are our values, and how we value or how to value. Thus, value can be thought of as a product that individuals hold, and also as a process that individuals embrace convictions which are of importance and worth personally. The process may thus be called valuing. More recently Seah (2019) conceptualized values as a conative variable, thus separating it from cognition and affect. He further explained conation as a bridge between cognition and affect on the one hand, and behavior on the other.

There is a saying that “you can’t understand someone until you’ve walked a mile in their shoes.” So, if we want to value others or understand other peoples’ values, there is no better way

than to examine the relevant values and valuing in their own cultural contexts. This is precisely the theme in this Special Issue, in which all the articles featured aim to explore values and valuing in mathematics education within different cultural contexts. Indeed, the research participants featured in this issue represent a diverse group, such as teachers and students in Australia, Pasifika learners in New Zealand, primary and secondary students in Korea and in Chinese mainland. Viewed together, the research findings situated in different cultures contribute to the rich tapestry of knowledge and understandings we are developing with regard to values and valuing in mathematics teaching and learning.

The article by Seah et al. (2021) highlighted the roles that individuals play in the development and applications of mathematics. In the process of growing up and of maturation, we will always be more or less influenced by different people. Their words or actions directly or indirectly affect our views, decisions, and/or behavior. These people may be our teachers, parents, or the main characters in books that you haven't seen before. Yet they act as our mentors in one way or another, and in so doing, shape our thinking and influence our attitudes or behavior. Thus, through their article here, Seah et al. aimed to highlight our respective journeys of learning mathematics, how we meet these mentors, and how they can affect our values and valuing choices in mathematics education.

Two articles in this Special Issue are related to Australian teachers and students' values. In Kalogeropoulos et al.'s (2021) article, they extended their former findings of four-value alignment strategies to introduce a fifth strategy. The new strategy involved teachers being able to recognize their own values and clearly communicate these values to students. Another Australian research reported in this Special Issue was one conducted by Hill et al. (2021). With a focus on promoting students' sense of well-being in mathematics learning, the article examined Australian secondary students' values and well-being in mathematics education. The researchers had earlier established that well-being is values dependent. This article then argued that to promote students' well-being, teachers could develop students' values in learning or doing mathematics.

The increase in social mobility has changed people's living environments and also affected the diversity of students in the classroom. In this context, Hunter's (2021) article focused on a group of Pasifika learners in New Zealand. She examined Pasifika secondary students' understanding of mathematics educational values and their reasons for rating values at different levels of importance. There was an intersection between Pasifika students' cultural values and their mathematics educational values. The results provided one window to understand how diverse cultural values can influence classroom interactions.

While East Asian students are widely known to outperform their peers elsewhere in many international assessments, in particular in the subject of mathematics, their affective states (such as confidence and interest in mathematics) are relatively lower in the same assessments. Using the

WIFI questionnaire, Pang and Seah's (2021) article provided some explanations of the low affect–high achievement paradox among Korean students from the perspective of mathematics educational values. By using the same questionnaire, Tang et al.'s (2021) article examined the Chinese mainland students' value structure in mathematics learning across primary, junior secondary, and senior secondary levels. The transition between different grades reflects the variations among students' values. In particular, the examination pressure has become a catalyst for value change.

Each society has its own unique culture, which is also reflected in the school education through curriculum material. Mathematics education in a country will be influenced by the tradition of education and school mathematics, and the tradition of education is related to the country's culture (Leung et al., 2006). Hence, values in mathematics education are not only held by teachers or students but embodied in learning materials. Based on different mathematical modeling perspectives, Dede et al.'s (2021) article explored the mathematical values, mathematics educational values, and educational values involved in mathematical modeling tasks in different countries (e.g., Brazil, Germany, U.K., and U.S.). These modeling tasks involved interaction among human subjects, mathematics, and the real world. Values that were expressed through these tasks reflected the characteristics of the cultures.

Following these articles, two commentaries (Fan, 2021; Pinto, 2021) summarized all the featured research from different perspectives. Considering Fan and Pinto's own background, it is another cultural dialogue between their views of values in mathematics education and educational research. Through their respective reflections, readers would no doubt identify some future directions in the field of values research. In fact, Seah et al. also reminded readers toward the end of their article of the need to pay attention to the humanness of the mathematics discipline in the current era of Industrial Revolution 4.0.

This Special Issue was conceptualized before all aspects of our world as we know it was confronted by the COVID-19 pandemic. Writing this Editorial now in 2021, we would like to advocate for more focus on the changed and unchanged factors influencing mathematics education post-COVID-19, not least from the values/valuing approach. For example, it was said that information and communication technology would have fundamental influences on mathematics education and might reduce the differences between cultural traditions (Leung et al., 2006). Instead, as we witnessed and experienced during the pandemic, might digital learning technologies actually have widened the learning opportunity gaps within and among these cultural traditions instead? How might what teachers and students value in mathematics teaching and learning been re-assessed and refined as a result of home-based, online learning modes? How might the roles of values in developing and maintaining students' well-being—and that of teachers too—become more significant as the world lives through the pandemic? To answer these and other related questions, we believe readers could find valuable stimulants and inspirations from the articles in this issue and explore them in their future research.


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