

# Pedagogical Values: Revealing Mathematics Teachers' Belief and Action in Teaching

Kamirsyah Wahyu<sup>1</sup>, Sri Subarinah<sup>2</sup>, Sofyan Mahfudy<sup>3</sup>, Dwi Ratnasari<sup>4</sup>

*1Faculty of Teacher Training and Education, Universitas Islam Negeri Mataram, Jln. Gajah Mada 100, Mataram, Indonesia*

*2Faculty of Teacher Training and Education, Universitas Mataram, Mataram, Indonesia*

*3Faculty of Teacher Training and Education, Universitas Islam Negeri Mataram, Mataram, Indonesia*

*4Informatics Department, STMIK Bumigora Mataram, Mataram, Indonesia*

**Keywords:** Pedagogical Values, Beliefs, Actions, Mathematics Teaching.

**Abstract:** The current research aimed to identify the pedagogical values (PVs) held by mathematics teachers and then analyze on the factors that affect the PVs enacted in the classroom. It involved ten teachers in *Madrasah* who have been teaching mathematics in the various period, from one year until over five years of experiences. Of three teachers were purposively chosen that satisfy the values criteria to be further observed in classroom teaching and interviewed. The teachers' PVs were identified through communication, dialogue and pedagogical reflections by means of the questionnaire, interview, focus group discussion, and classroom observation. The data was then confronted with the values criteria (choosing, prizing, and acting) to determine the mathematics teachers' PVs. The research found that only two teachers satisfy the criteria, one teacher found difficulties to enact his PVs and the others could not pass through prizing criteria. The research concluded that the PVs held by the mathematics teachers are shaped by the specific need or condition of their students (culturally dependent) and constraints such as values alignment and institutional values can affect the enactment of PVs. The implication for educational program and school context will be discussed.

## 1 INTRODUCTION

Teaching and learning in the classroom involve three primary elements, i.e., teachers, students and content or well-known as didactic triangle (Steinbring, 2005). Each element has its characteristics, e.g., the teachers have in mind what would be done in the classroom to make students understand the subject or content, the students have the views on the subject and expect to learn it in a specific ways so that she/he perceives the subject as the essential part of their classroom experience, and the subject learnt and taught is value-laden. Leu and Wu (2005) asserted that all of them are not value-free. In fact, they are value-carriers

Value is another affective and sociocultural construct which becomes a crucial yet neglected aspect of mathematics education. There are not many researches on values for the last decade in mathematics education (Seah & Peng, 2012). Bishop (1991) shed

light on how the cultural aspects of teachers and students contribute to mathematics learning. Research projects such as VAMP (Values and Mathematics Projects), VIMT (Values in Mathematics Teaching), and Third Wave Project (Seah & Wong, 2012) were further effort to understand the significance of values in mathematics teaching and learning. The projects revealed that what teachers and students valued in mathematics and its teaching support the mathematics learning. The researches (e.g., Kalogeropoulos & Bishop, 2017; Seah & Andersson, 2015a) showed that values alignment in mathematics classroom help students' engagement in learning. When students valued achievement in mathematics learning, despite their negative feeling toward the subject, it gives them a sense of will and determination to work better in mathematics (Seah, 2016; Zhang, Barkatsas, Law, Leu, & Seah, 2016). The values students possessed in mathematics learning might be an alternative reason why students in Mainland China, Hong Kong, and

Taiwan scored better in the international assessment like PISA.

The classification of values by Bishop (2008); mathematical values, mathematics educational values, and general educational ascertain mathematics educators especially teachers that inculcating values in mathematics teaching is highly possible. For example, persistence is one of the mathematical educational values (Clarkson, Bishop, FitzSimons, & Seah, 2000). Mathematics teachers have the chance to develop students' persistence, for example, in problem-solving. Teaching values is in accordance with the agenda of values or character education echoed in many countries such as Indonesia.

Values and beliefs are closely related to affective constructs (Lim & Kor, 2012). However, the difference is not always made clear (Bishop, Seah, & Chin, 2003). Hart (1989) defined beliefs as certain types of judgments about a set of objects. "Teaching mathematics is about explaining rules or formulas" is one example of beliefs about mathematics pedagogy (McLeod, 1992). Halstead and Taylor (2000) defined values as "...principles and fundamentals convictions which act as general guides to behavior, enduring beliefs about what is worthwhile..." (p.3). Values represent a more internalized form of affect. It is the deep affective qualities (Bishop et al., 2003). Kluckhohn (1962) asserted that values differ from beliefs "...by the commitment to action in situations involving alternatives" (p.432). P. Clarkson and Bishop (1999) stated that values are beliefs in action. Raths, Harmin, and Simon (1987) concluded that a belief evolves into value when it includes choosing, prizing, and acting. If a teacher valued teaching mathematics is just about explaining the rules or formulas, then it will be his/her typical way of instruction in the classroom.

Researching values give alternative perspective in improving mathematics learning since it deals with beliefs in action held the teachers or what a worthwhile for the students in learning mathematics. Prior researched on values have analyzed teachers' planned and espoused values (Lim & Ernest, 1997), teachers' intended and implemented values (Bishop et al., 2003), values as pedagogical identities (Chin, 2002; Chin & Lin, 2000), tools used to access students' and teachers' values in mathematics pedagogy (Dede, 2006, 2011), values related to effective mathematics lessons (Seah & Wong, 2012), and alignment of values in mathematics classroom (Kalogeropoulos & Bishop, 2017; Seah & Andersson, 2015a).

Chin (2002) and colleagues investigated values in mathematics teaching. Chin and Lin (2000) focused on identifying and interpreting pedagogical values of mathematics teachers. Values were conceived as

"...teachers' pedagogical identities which reveal principles of each teacher's choice and judgments concerning the importance of using certain pedagogical identities in her/his classroom teaching mathematics..." (p.91).

The prior researches (Chin, 2002; Chin, Leu, & Lin, 2001; Chin & Lin, 2000; Leu & Wu, 2005, 2006) on pedagogical values have not analyzed how students valued mathematics and its learning (mathematics learning) and institutional values affect the teachers to enact their values in teaching mathematics. The current research attempted to fill the gap, analyzing the two factors that affect mathematics teachers' pedagogical values enacted in the classroom. We defined pedagogical values in this research as the personal conviction of teacher's thought, choices, and action concerning the importance of specific pedagogical identities in teaching mathematics. It is about feeling, beliefs, and action of teachers in teaching mathematics. Pedagogical identities here mean typical ways teachers deliver his/her mathematics instruction. The criteria of values, i.e., choosing, prizing, and acting by Raths et al. (1987) will be used to examine the pedagogical values.

The research used values clarification for data analysis to answer two questions, i.e., what PVs held by mathematics teachers? And how students valued on mathematics learning and institutional values affect mathematics teachers when enacting their PVs in the classroom? The current research strengthens the prior research on values in general and contributes to understanding the pedagogical values of mathematics teachers and its practice in the classroom in specific. Understanding teachers' PVs is the crucial step to formulate actions in improving mathematics teaching and learning. In practices, mathematics teacher education and the development program for in-service mathematics teacher especially in Indonesia could consider not only pedagogical/content knowledge but also the clarification and refinement of pedagogical values.

## 2 METHODS

This research used descriptive qualitative approach to identify and analyze mathematics teachers' PVs. The subjects, ten mathematics teachers, were given a questionnaire, interview, and focus group discussion. The three methods are parts of dialogue, communication and pedagogical reflections as critical activities in the process of value clarification (Chin et al., 2001). We used value clarification (Chin & Lin, 2001) to identify and document teachers' PVs. Values criteria (choosing, prizing, and acting) by Raths

et al. (1987) was utilized to examine the PVs. The methods used in this research can be summarized in Table 1.

The subjects teach mathematics in Islamic-based schools called *Madrasah* (secondary school level). Public schools are somewhat different from *Madrasah*<sup>1</sup> mainly regarding number and kinds of subjects but both apply the same national curriculum. In *Madrasah*, there are additional subjects about Islam. Students in *Madrasah* have more subjects than in public schools. The nature of *Madrasah* related to mathematics teaching will be elaborated in the discussion section.

The indicators of each value criteria are as follow (Chin et al., 2001):

- a. Choosing; one’s free will to choose, choosing from alternatives, and choosing by thoughtful consideration
- b. Prizing; being happy with the choice or affirm the choice to others
- c. Acting; repeated practices which form a pattern of teaching

Table 1: Summary of research methods

Criteria of PVs	Data collection
<i>Choosing</i>	Questionnaire and interview ( <i>Pedagogic reflection</i> )
<i>Prizing</i>	Interview ( <i>Dialogue and communication</i> )
<i>Acting</i>	Questionnaire, interview, and classroom observation ( <i>Dialogue, communication, and pedagogic reflection</i> )

The questionnaire aimed to document teachers’ choices in teaching mathematics. It is a semi-open questionnaire consists of several questions. Two of them are *what are the important things to teach in mathematics classrooms?* And *how do you typically teach mathematics?* The teachers are encouraged to write their answer if they disagree with the options. The two questions are very crucial to identify teachers’ choices of given alternatives. The last item of the questionnaire asked teachers to reflect on their teaching experiences. They are required to explain how they teach mathematics which represents his/her identities or typical ways of teaching. This question aims to reveal teachers’ action after choosing the alternatives.

The interview attempted to confirm teachers’ answers (*choices*) in the questionnaire and examine how teachers *prize* their PVs. The result of interview and

questionnaire are used to choose three teachers purposively. The selected teachers showed consistent PVs through their *choosing* (in questionnaire and interview), *prizing* (in the interview), and *acting* (in the questionnaire when writing a pedagogical reflection on his/her typical ways of teaching mathematics and interview). We interviewed the teachers in two focus group discussion (FGD). We argued that FGD can be communal pedagogic reflections where dialogue and communication between researcher team and teachers flexibly take place. It also aimed to examine the consistency of teachers PVs. We then have in-dept interview and classroom observation with the three teachers to further understand their PVs and analyze factors that can be constraints in classroom practices.

### 3 RESULTS

*What are the important things to teach in mathematics classroom?*

The subjects had varied answers to the question, but none of them give alternatives out of the given options. In the interview, some teachers answered differently to what they have chosen in the questionnaire. The summary of teachers’ choices and answers are presented in Table 2 (*Choosing* column). The ten teachers are coded as MT<sub>1</sub> to MT<sub>10</sub>.

*How do you typically teach mathematics?*

For the question, we did not provide any options in the questionnaire. The teachers were required to write his/her typical ways of teaching mathematics. We believe that teachers’ responses are heavily based on their experiences in teaching mathematics. Thus, what they wrote is his/her identities in practice. Then interview was administered to validate the responses. Table 2 (*Acting* column) shows the result of questionnaire and interview.

Drawing from the results of questionnaire and interview, the mathematics teachers’ PVs will be categorized based on consistency in *choosing*, *prizing* and *acting*. Consistent means that teachers’ responses are in accordance with the indicators of the three criteria of pedagogical values or otherwise. Based on Table 2, it is found that two teachers satisfy the indicators. One teacher is inconsistent in her response to interview. One teacher is inconsistent with the 1<sup>st</sup> and 2<sup>nd</sup> question. The other six teachers could not prize their choices and action. They were not aware of having the PVs by their explanation in the interview. In fact, it was challenging to examine what teachers prize.

organization and mostly apply boarding system.

<sup>1</sup> There are two kinds of *Madrasah* in Indonesia, public and private *Madrasah*. Both are managed under the Ministry of Religious Affairs. Private *Madrasah* is managed by community-based

We examined it through their reasonable explanation for the choices and action in the interview.

Table 2 shows that only two teachers (MT<sub>5</sub>, MT<sub>7</sub>) satisfy the criteria of pedagogical values. MT<sub>5</sub> has over five years of experiences in teaching mathematics. She currently teaches in public *Madrasah*. MT<sub>7</sub> is a junior teacher with a year experience. He teaches mathematics in *Madrasah* with boarding system. He also graduated from Islamic boarding school (Junior and senior high school level).

One teacher (MT<sub>8</sub>) could prize his choice for what importance in teaching mathematics. However, MT<sub>8</sub> had a different answer on what he typically did in the classroom. MT<sub>8</sub> teaches mathematics in private *Madrasah*. In the interview, MT<sub>8</sub> posed interesting explanation why he could not enact what he valued in

mathematics teaching. MT<sub>8</sub> explained that some constraints related to students' values and institutional values. In addition to the reasons, we decided to include MT<sub>8</sub> as the third subject to be observed in classroom teachings.

The classroom observation was done in one session with each teacher following by interview. It aimed to confirm the results of questionnaire and interview. For MT<sub>8</sub>, we wanted to identify further what he called as constraints in enacting PVs.

The classroom observation showed that MT<sub>7</sub> utilized Islamic inheritance context (*Faraid*) to learn fractions. He confirmed in the interview that "it is important to relate mathematics topic with Islamic context since students valued mathematics as only set

Table 2: Summary of subjects' responses in questionnaire and interview

Subjects	Choosing		Prizing	Acting	
	Questionnaire	Interview	Interview	Questionnaire	Interview
MT <sub>1</sub>	A set of formulas and its solution, mathematics concepts	Inculcation of values such as honesty	MT <sub>1</sub> did not choose inculcation of values in the questionnaire.	Using learning tools made from Delphi 7	Explain the topic, give an example and exercises
MT <sub>2</sub>	A set of formulas and its solution, mathematics concepts, the application of mathematics in daily life, skill to solve mathematics problems	Arithmetic skills, algebra, and concepts	No prizing in the interview	Explain the topic related to daily life, give an example and drill, ask some students to write their answers on the white-board	Similar to questionnaire
MT <sub>3</sub> MT <sub>4</sub> MT <sub>6</sub> MT <sub>9</sub>	Mathematics concepts, the application of mathematics in daily life	Mathematics concepts	No prizing in the interview	Explain the topic, give worked example and exercises	Similar to questionnaire
MT <sub>5</sub>	Mathematics concepts, the application of mathematics in daily life, inculcation of values	Mathematics concepts, the application of mathematics in daily life, inculcation of values	Able to confirm her choice to others	Explain the concept, relate the topic to daily life, inculcating the values	Similar to questionnaire
MT <sub>7</sub>	Mathematics concepts, the application of mathematics in daily life	Mathematics concepts, the application of mathematics in daily life	Able to confirm his choice to others	Explain the concept, relate the topic to daily life (Islamic context)	Similar to questionnaire
MT <sub>8</sub>	The application of mathematics in daily life	The application of mathematics in daily life	Able to confirm his choice to others	Explain the topic, give worked example and exercises	Similar to questionnaire

Subjects	Choosing		Prizing	Acting	
	Questionnaire	Interview	Interview	Questionnaire	Interview
MT <sub>10</sub>	A set of formulas and its solution	A set of formulas and its solution	Unable to confirm her choice in the	Explain the topic, give worked example and exercises	Similar to questionnaire

of rules and nothing deals with daily life, and one of the main reasons their parent sent their children here is to learn religious teachings." He added that "I want to show them that mathematics is not what they know. And through the context, we can discuss the concept of fraction and its operations."

MT<sub>5</sub> does understand the capability of her students in mathematics. He said that "Only two or three students could understand what I explain without relating to their familiar context. My students do often ask me about the use of mathematics for them. So, I try to connect mathematics topics with something they are familiar with." MT<sub>7</sub> asked students to bring snacks or plastics used for snacks to learn about *netto*, *bruto* (net weight), and *tara* (the difference of *netto* and *bruto*). MT<sub>5</sub> frequently emphasize to her students that no matter what you do and get in mathematics, the important one is you must be honest when you do your task.

Unlike MT<sub>5</sub> and MT<sub>7</sub>, MT<sub>8</sub> had a somewhat difficult condition of teaching. In the observation, MT<sub>8</sub> started the lesson by explaining integers with the number line, scaffold students to make number line, ask students to place integers onto number line, give examples of operating integers and give exercise. MT<sub>8</sub> told us that "I have tried bringing daily life or context in my mathematics lesson. However, my students could not get involved in that. They showed lack of motivation in learning. Exercises or homework given were not accomplished. What an important thing for them is not to learn mathematics but reciting and memorizing the Qur'an."

In the schools, there is informal 'consensus' amongst students (not all) that nothing important than learning the religion. Religion could save you in this world and the later. The 'consensus' is also directly or indirectly influenced by the other teachers (non-mathematics). This condition also has been experienced by MT<sub>7</sub> while he was in *Madrasah*. MT<sub>7</sub> told that "a great student was not a student who master the general subject like mathematics or science but a student who was able to memorize the Qur'an. So, mostly students followed that way of thinking."

## 4 DISCUSSIONS

In this part, we will analyze the level of value clarification of MT<sub>5</sub> and MT<sub>7</sub> (Chin et al., 2001), constraints that MT<sub>8</sub> had relating to what students valued on mathematics learning or the notion of values alignment (Kalogeropoulos & Bishop, 2017; Seah & Andersson, 2015a, 2015b) and institutional values (Bishop, 2008). In the last, we are going to discuss the implication of the findings related to educational program and schools' context.

For MT<sub>5</sub>, connecting mathematics with students' familiar context to show the application of mathematics in daily life and inculcation of values are important things to teach in the mathematics classroom. In the interview, MT<sub>5</sub> explained the ability and need of her students in learning mathematics. In this case, she expressed her pleasure in those ways of teaching mathematics and convinced the researchers and the other teachers about her choices and actions in the classroom. For MT<sub>7</sub>, introducing mathematics concepts through Islamic context is the important thing in teaching mathematics. He argued in the interview that "using Islamic context to learn mathematics concepts is the way to convince my students that mathematics is not just a set of rules and formulas."

What MT<sub>5</sub> and MT<sub>7</sub> chose in the questionnaire, prized in the interview, and acted in classroom observation shows that they are aware of having the PVs. Within that awareness of the importance of such values, they communicate them in the classroom with the students and others in the interview. For example, MT<sub>7</sub> used the context of *Faraid* to teach fractions and MT<sub>5</sub> showed the use of mathematics through the snack plastics. Both are not just the pedagogical value carrier but value communicator.

The teacher who is aware of her/his values and able to communicate it has a high level of value clarification. The level of value clarification determines the improvement that teacher can make in teaching mathematics (Chin et al., 2001). However, the current research did not further identify the changes that MT<sub>5</sub> and MT<sub>7</sub> make referring to their level of value clarification.

The PVs held by MT<sub>5</sub> is affected by her students' ability and need. When her students learned

mathematics better by connecting to their familiar contexts, MT<sub>5</sub> found that way of teaching is important. So, did MT<sub>7</sub>, when his students valued mathematics as just a set of rules and formulas, he used the context of *Faraid* to teach fractions. This finding implies that mathematics learning is a social-cultural activity that involves close interaction between the teachers and the students (Lim & Kor, 2012). A teacher may hold various importance pedagogical identities in teaching mathematics but only what he/she enact in the classroom consistently which accommodate what they valued become his/her PVs.

Although implementing similar national curriculum, public schools are slightly different from *Madrasah* in Indonesia. The difference is not only about the number and kind of subject but also the emphasis that the schools put on what the students should achieve. For example, in some *Madrasah* with boarding system, mathematics is less important than reciting and memorizing the Qur'an. A model student is a student who knows lots of religious teachings. So, each student wants to be in that position. This condition is what MT<sub>7</sub> experienced when he was in *Madrasah* and MT<sub>8</sub> was facing in his school. Unfortunately, we did not find any researches which empirically explain that condition in Indonesia. Bishop (2008) called this as institutional values. He asserted that the values that institutions have contributed to the development of mathematical thinking in the different group of students.

MT<sub>8</sub> argued that such 'doctrine' in the level of institution affect the way students perceived other subjects like mathematics. He found his students have less willingness to learn mathematics since it is less important. However, we need further research to explore how institutional values affect students' value. What students valued on mathematics classroom differ from what the teacher valued is one of the causes of students (dis)engagement in learning mathematics (Kalogeropoulos & Bishop, 2017; Seah & Andersson, 2015a, 2015b). In this research, we did not document students' values to validate what MT<sub>8</sub> underwent in his practices.

In some scenes of the FGD, we discussed the possibility of inculcating values in teaching mathematics. All teachers agreed that through mathematics teaching, values could be taught. The teachers also showed similar response about teaching values in the questionnaire. However, they did not have any idea how to teach values and the values they know are limited to general education values. For example, MT<sub>5</sub> inculcated honesty through direct speech in the class, not as a part of mathematics activities.

The findings along with the status quo of institutional values held by some *Madrasah* which affect the PVs of MT<sub>8</sub> should be a concern by the mathematics educators and the policymakers to support the improvement of mathematics teaching and learning. The further efforts especially researches on the pedagogical values should be taken as they could support the program of character education. We argued that, based on the findings of the current research, mathematics teacher education and the development of in-service mathematics teacher programs should take values issues into account (Chin, 2006). The research on pedagogical values could be extended to other subjects in specific and educational context in general, e.g. school context (Husu & Tirri, 2007).

## 5 CONCLUSIONS

The research found that only two of the ten teachers fulfill the values criteria. What teachers think and feel as the worth in teaching mathematics falls onto the beliefs. The two teachers have quite similar PVs regarding the use of context in teaching mathematics to show their students that mathematics relates to their daily life. However, they have a different situation which develops their PVs. The first is students' limited ability in mathematics, and there is a need to facilitate the ability by bringing daily contexts in mathematics teaching. The second is that the students valued mathematics is just a set of rules and does not deal with daily life. In this case, the mathematics teachers' PVs are built on the adjustment of students' condition such as the ability in mathematics and the values they have. Whether or not the teachers enact his/, her PVs is affected by constraints such as what the students valued on mathematics learning and institutional values. The existence of constraints closely relates to the context of the institution (*Madrasah*). Further research is needed to thoroughly examine how students' values on mathematics and its learning, institutional values and the enactment of teachers' values relate one another.

## ACKNOWLEDGEMENTS

We would like to acknowledge LP2M Universitas Islam Negeri (UIN) Mataram for funding the program and mathematics teachers who are willing to participate in the interview actively, classroom observation and accomplish the questionnaire.

## REFERENCES

- Bishop, A. (1991). *Mathematical enculturation: A cultural perspective on mathematics education* (Vol. 6): Springer Science & Business Media.
- Bishop, A. (2008). Teachers' mathematical values for developing mathematical thinking in classrooms: Theory, research and policy. *The Mathematics Educator*, 11(1/2), 79-88.
- Bishop, A., Seah, W. T., & Chin, C. (2003). Values in mathematics teaching—The hidden persuaders? In *Second international handbook of mathematics education* (pp. 717-765): Springer.
- Chin, C. (2002). *Researching mathematics teachers' pedagogical values: A synthesis of the three Taiwanese studies*. Paper presented at the 2nd East Asia Regional Conference on Mathematics Education and 9th Southeast Asian Conference on Mathematics Education.
- Chin, C. (2006). Conceptualising pedagogical values and identities in teacher development: A comparison of Taiwanese and Australian mathematics teachers. In F. K. S. Leung, K. D. Graf, & F. J. Lopez-Real (Eds.), *Mathematics Education in Different Cultural Traditions—A Comparative Study of East Asia and the West* (Vol. 9, pp. 537-547). Boston, MA: Springer.
- Chin, C., Leu, Y.-C., & Lin, F.-L. (2001). Pedagogical values, mathematics teaching, and teacher education: Case studies of two experienced teachers. In F.-L. Lin & T. J. Cooney (Eds.), *Making sense of mathematics teacher education* (pp. 247-269): Springer.
- Chin, C., & Lin, F.-L. (2000). A case study of a mathematics teacher's pedagogical values: Use of a methodological framework of interpretation and reflection. *Proceedings of the National Science Council*, 10(2), 90-101.
- Chin, C., & Lin, F.-L. (2001). *Mathematics teacher's pedagogical value clarification and its relationship to classroom teaching*. Paper presented at the Proceedings of the National Science Council Republic of China, Part D: Mathematics Science and Technology Education.
- Clarkson, P., & Bishop, A. (1999). *Values and mathematics education*. Paper presented at the 51st Conference of the International Commission for the Study and Improvement of Mathematics Education, University College, UK.
- Clarkson, P., Bishop, A., FitzSimons, G., & Seah, W. T. (2000). *Challenges and constraints in researching values*. Paper presented at the Proceedings of the twenty-third annual conference of the Mathematics Education Research Group of Australasia Incorporated held at Fremantle, Western Australia.
- Dede, Y. (2006). Mathematics Educational Values of College Students' towards Function Concept. *Eurasia Journal of Mathematics, Science & Technology Education*, 2(1), 82-102.
- Dede, Y. (2011). Mathematics education values questionnaire for Turkish preservice mathematics teachers: Design, validation, and results. *International Journal of Science and Mathematics Education*, 9(3), 603-626.
- Halstead, J. M., & Taylor, M. J. (2000). *The development of values, attitudes and personal qualities: A review of recent research*: National Foundation for Educational Research Slough.
- Hart, L. E. (1989). Describing the affective domain: Saying what we mean. In D. B. McLeod & V. Adams (Eds.), *Affect and mathematical problem solving* (pp. 37-45). New York: Springer.
- Husu, J., & Tirri, K. (2007). Developing whole school pedagogical values—A case of going through the ethos of “good schooling”. *Teaching and Teacher Education*, 23(4), 390-401.
- Kalogeropoulos, P., & Bishop, A. J. (2017). *What is the role of value alignment in engaging mathematics learners?* Paper presented at the 9th International conference of Mathematics Education and Society, Volos, Greece: University of Thessaly.
- Kluckhohn, C. (1962). Values and value-orientations in the theory of action: An exploration in In T. Parsons & E. A. Shils (Eds.), *Toward a general theory of action* (pp. 388-433). New York: Harper and Row.
- Leu, Y.-C., & Wu, C.-J. (2005). *Investigation on an elementary teacher's mathematics pedagogical values through her approach to students' errors*. Paper presented at the 29th Annual Conference of the International Group for the Psychology of Mathematics Education, Melbourne, Australia.
- Leu, Y.-C., & Wu, C.-J. (2006). The origins of pupils' awareness of teachers' mathematics pedagogical values: Confucianism and Buddhism-driven. In F. K. S. Leung, K. D. Graf, & F. J. Lopez-Real (Eds.), *Mathematics*

- Education in Different Cultural Traditions-A Comparative Study of East Asia and the West* (Vol. 9, pp. 139-152). Boston, MA: Springer.
- Lim, C. S., & Ernest, P. (1997). Values in mathematics education: What is planned and what is espoused? *British Society for Research into Learning Mathematics*, 37.
- Lim, C. S., & Kor, L. K. (2012). 'Excellent' primary mathematics teachers' espoused and enacted values of effective lessons. *ZDM*, 44(1), 59-69.
- McLeod, D. B. (1992). Research on affect in mathematics education: A reconceptualization. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 575-594). New York: Macmillan.
- Philipp, R. A. (2007). Mathematics teachers' beliefs and affect. In J. F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (Vol. 1, pp. 257-315). Charlotte, NC: Information Age.
- Raths, L. E., Harmin, M., & Simon, S. B. (1987). Selections from values and teaching. In P. F. Carbone (Ed.), *Value theory and education* (pp. 198-214). Malabar: Krieger.
- Seah, W. T. (2016). Values in the mathematics classroom: Supporting cognitive and affective pedagogical ideas. *Pedagogical Research*, 1(2), 53.
- Seah, W. T., & Andersson, A. (2015a). *Teacher alignment of values in mathematics classrooms*. Paper presented at the Ninth Congress of the European Society for Research in Mathematics Education, Prague, Czech Republic.
- Seah, W. T., & Andersson, A. (2015b). Valuing diversity in mathematics pedagogy through the volitional nature and alignment of values. In A. Bishop, T. N. Barkatsas, & H. Tan (Eds.), *Diversity in mathematics education* (pp. 167-183). Netherland: Springer.
- Seah, W. T., & Peng, A. (2012). What students outside Asia value in effective mathematics lessons: A scoping study. *ZDM*, 44(1), 71-82.
- Seah, W. T., & Wong, N. Y. (2012). What students value in effective mathematics learning: a 'Third Wave Project' research study. *ZDM*, 44(1), 33-43.
- Steinbring, H. (2005). *The construction of new mathematical knowledge in classroom interaction: an epistemological perspective*. New York: Springer.
- Wilkins, J. L. (2008). The relationship among elementary teachers' content knowledge, attitudes, beliefs, and practices. *Journal of Mathematics Teacher Education*, 11(2), 139-164.
- Zhang, Q., Barkatsas, T., Law, H., Leu, Y., & Seah, W. (2016). What primary students value in mathematics learning: A comparative analysis among the Chinese mainland, Hong Kong, and Taiwan. *International Journal of Science and Mathematics Education*, 14(5), 907-924.