Chapter 10
Valuing Diversity in Mathematics Pedagogy Through the Volitional Nature and Alignment of Values

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Introduction

Students make sense of and construct mathematical ideas in different ways, drawing upon their own unique experiences in life and in mathematics learning. Teachers' valuing of students' *diversity* of ideas fosters students' efficacy in learning mathematics and deepens students' mathematical understanding (Castellon et al. 2011; Schifter 2005; Zevenbergen et al. 2004).

This diversity in (mathematics) classroom discourses has taken on a different dimension in the last few decades or so, as cross-border human movements take place in arguably unprecedented levels, due to such developments as globalisation and regionalisation of trade and business activities, armed conflicts as well as low fertility rates in many developed countries. The composition of student ethnicities and cultures in classrooms across most countries has become very varied, and as such the diversity of student ideas and learning styles is greater than ever before.

However, what does the valuing of *diversity* in one's teaching practice mean? More often than not in the academic literature, this would mean adopting the view that nonmainstream students are struggling to learn mathematics, and that the teacher's role is to rescue them from failure and disengagement (see, for example, Ferguson 2009; Weber et al. 2010). Indeed, until recently, many mathematics education systems cater to diversity by creating differentiation and exclusivity, such as through giving different students different mathematics curricula, or through introducing different students to mathematics tasks of different difficulties.

In this chapter, however, we rethink diversity from a more empowering perspective. We turn our attention to how the diversity of student cultures (youth, class, ethnic, gender, linguistic, etc.) and hence how the diversity of students' mathematical

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ideas can enrich students' mathematics learning experiences. What does it look like to be valuing this diversity? For some teachers, this may mean that they will encourage students to propose different solution approaches to any given mathematical task. For those teachers in this group who value *efficiency*, however, how might these values be in conflict? How do teachers negotiate about such professional and pedagogical valuing conflicts? Indeed, how might teachers plan their lessons so that they can be more proactive in teaching and modelling the valuing of *diversity* in the classroom discourse?

Yet, we also believe that students are aware of their capacities to adopt, resist or reject discursive positions. Given that there exists considerable within-class and within-school diversity of student cognitive and affective variables (Sullivan, Chapter 14, this volume), and in a context in which valuing is theoretically developed as a volitional act (a position which we will discuss below), classroom interactions between teachers and their students—and amongst students—represent sites of contestation and conflicts. This is inevitable, though we also do not desire for the domination of one particular (person's) goals and interests (Gutiérrez 2007). Quite clearly, the valuing of *diversity* is not about embracing different perspectives and ideas all at the same time.

We propose in this chapter that, through understanding valuing as volitional, the approach of aligning what students and teachers value facilitates the valuing of *diversity* in their respective mathematics classrooms, in ways which promote inclusivity and which optimise student learning of mathematics. In this chapter, we will be drawing upon observed episodes in mathematics lessons in schools to illustrate how this approach has been adopted successfully by teachers. In other words, we suggest that the ability to align values in one's classroom has been part of experienced teachers' craft. To achieve these, we will begin the chapter with a discussion of the nature of valuing relating to mathematics education, including an argument for values and valuing to be regarded as volitional in nature, representing commitment to a course of actions.

Valuing in Mathematics Learning and Teaching

Decisions and actions relating to the learning and teaching of mathematics in schools reflect directly what students and teachers value, and indirectly what is valued by parents and societies. Research into the role of values and valuing in mathematics learning and teaching began with Alan Bishop's proposal of three pairs of complementary values for 'Western' mathematics in the seminal book, 'Mathematical enculturation: A cultural perspective on mathematics education' (Bishop 1988). Our research findings in related studies (e.g. Andersson and Österling 2013; Andersson and Seah 2013; Seah 2005, 2011; Seah and Peng 2012) and our understanding of the academic literature (e.g. Bishop 1988, 1996; Clarkson et al. 2010a; Dede 2011; Hannula 2012; Lim and Kor 2010) led us to define values and valuing in mathematics education in the following way:

> Values are the convictions which an individual has internalised as being the things of importance and worth. What an individual values defines for her/him a window through which s/he views the world around her/him. Valuing provides the individual with the will and determination to maintain any course of action chosen in the learning and teaching of mathematics. They regulate the ways in which a learner's/teacher's cognitive skills and emotional dispositions are aligned to learning/teaching in any given educational context.

The extent to which a value is embraced and prioritised is responsive to one's environment and is thus not fixed. In other words, opportunities for values teaching in (mathematics) education exist across all school years. Whereas values may be absorbed when one is young (Court 1991), value priorities continue to be examined and evaluated throughout one's life in school and beyond. This may be seen in the valuing process that was conceptualised by Raths et al. (1987). Made up of three stages, that is, choosing, prizing and acting, the first stage is related to choosing freely and amongst several alternatives, after having thought about the consequences of adopting any one of these alternatives. It is this choosing activity that is stimulated by phenomena that allows for one's value priorities to be assessed. In a rather paradoxical way, this adds to the extremely internalised and stable (see Krathwohl et al. 1964) nature of values. In this way, there are opportunities for values such as *diversity* to be taught and to be reinforced in the school (mathematics) classroom.

Values through Mathematics

This teaching of values through the school subject of mathematics (values through mathematics) is one of two ways in which values in mathematics education can be considered. The other way would be the facilitation of mathematics pedagogy through the harnessing of values (mathematics through values).

Values are espoused and transmitted through the education system. Teachers' roles have always been involved with the teaching of values, even though such teaching is often implicit with even the teachers themselves often not aware of the process (Clarkson et al. 2000). Recent educational policies in countries such as Singapore (see Heng 2012) and Sweden (see Skolverket 2011) are in fact encouraging teachers to be more cognizant of their values-teaching role. Indeed, the Swedish School Law 4§ (Utbildningsdepartementet 2010, p. 2) states that

> the school education system support students in acquiring and developing knowledge and values. It shall promote all students' learning as well as a lifelong desire to learn. The education will also teach and establish respect for human rights and fundamental democratic values upon which the Swedish society is based. (Translation by Andersson)

After all, Veugelers and Kat (2000) observed that

> teachers cannot withdraw from showing the values that are important to them. In the cultural policy of the government and the school, teachers are even supposed to stimulate the development of specific values. (p. 11)

These educational values might be taught through dedicated school subjects labelled as 'civic education' and the like. Most, however, are transmitted via the teaching of other subjects, including the languages, history and the sciences. Thus, the valuing of *peace* or *diplomacy* can be taught in history lessons, while the valuing of *sustainability* or *precision* can be espoused by teachers of science. Mathematics too has the potential to be a medium through which such values are taught. For example, Andersson (2011a) as well as Andersson and Valero (in press) reported how values such as *global fairness* and *social justice* can be addressed in mathematics education. Sawatzki (2012) researched the teaching of financial values through mathematics lessons. Gutstein's (2006) work in Chicago suburban schools with mainly underprivileged Latino and black students also revealed rich possibilities to discuss relevant values in mathematics education.

Mathematics Through Values

The focus of this chapter, however, is not on the teaching of values (such as *diversity*) through mathematics. Rather, the intention is to examine how mathematics learning can be optimised through the harnessing of values. In particular, how might the mathematics learning experiences be made optimal through the valuing of *diversity* (of students' ideas and reasonings, and of students' experiences and cultures)?

Consider the following scenario that is rather commonly encountered in an Australian primary school class:

> Kathryn has been working with her students on place value. In this lesson, she had given each student a piece of A4-size card. The students were given time to draw (and decorate) their own favourite numeral on their given piece of card, after which three students were randomly selected to come to the front of the class with their cards. These three cards were held to their chests so that they were visible to the rest of the class. The three students' task was to arrange themselves in a straight line such that the three-digit number formed is the largest possible in magnitude. This process was then repeated with a few other groups of three randomly-selected students.

The expectation for students in the class to listen to the explanations of their three peers up in front represents the teaching of *respect* or *democracy*. In most if not all cultures, either of these values would be a desirable one to introduce to students. Yet, in this example of 'values through mathematics', neither of these values is related to mathematics or to mathematics pedagogy alone, and either may be introduced to students in any other lesson at school.

The scenario above also illustrates the introduction of at least two other values, both of which however, are related to mathematics or mathematics education in a unique way. The students' explanations exemplify the valuing by the teacher of *openness* (see Bishop 1988); each group of three students needed to defend publicly their choice of a three-digit number which satisfied the task criteria. This value expresses the spirit of mathematicians, in whose professional lives new theorems

and formulae are accepted only after these are disseminated and examined within the scientific circle.

Kathryn (the teacher) could have taught place value without facilitating the group activity outlined in the quote above. The fact that she did reflects her valuing and portrayal of *fun*. That is, Kathryn was making use of this valuing to make mathematics learning enjoyable, so as to optimise the learning experience for her students. Her portrayal of *openness* through this activity shared the same objective. Through this portrayal, students can appreciate the benefits of peer communication and discussion in facilitating understanding. For some of them, the valuing of *openness* may enable them to find the subject less threatening, less impersonal and, hopefully, more rewarding.

Thus, we have here a classroom scenario in which the representation and possibly the inculcation of the mathematical value *openness* and of the mathematics educational value *fun* served to promote more engaged and 'effective' mathematics learning amongst students. At the same time, the learning of mathematics is made more inclusive to all students. Values were portrayed not for their own sake, but with the objective to optimise mathematics learning and to make it open to all.

This scenario has also explicated what Bishop (1996) proposed as the three categories of values that function in the school mathematics classroom, these being mathematical (the valuing of *openness* in the example), mathematics educational (*fun*) and general educational (*respect*).

The category of mathematical values refers to the convictions that are emphasised in the discipline of mathematics. In relation to 'Western' mathematics, for example, Bishop (1988) had proposed three pairs of complementary mathematical values, namely *rationalism* and *objectism*, *control* and *progress*, as well as *mystery* and *openness*.

Mathematics educational values are expressed through the pedagogical practices of the subject in schools. They are understandably situated in the sociocultural context of different education systems, and as such, the range of these values can be extensive. Examples of this category of values include *ICT, practice*, *ability* and *effort*—one or more of these, amongst many others, may be valued by any mathematics teacher in his/her pedagogical practice.

Consider yet another scenario in the mathematics classroom:

> Sheridan teaches in a Grade 5 class in a primary school in Melbourne, Australia. There are many migrant children amongst her students. A few months ago she was introducing the algorithm for multiplying multiple-digit numbers such as 24×37. Towards the end of her demonstration and explanation, a migrant student raised her hand to offer 'a quicker method, Miss Sheridan'. This student then proceeded to show the class the lattice method of multiplication, which her dad had taught her at home. The student also shared that her dad told her that he had learnt this quicker way of multiplying in his primary school days in his home country.

The reader should be able to identify with incidents such as the one faced by Sheridan, involving other alternative algorithms or, indeed, other mathematical topics. In a critical incident (see Tripp 1993) such as this, Sheridan's response is crucial in shaping the students' understanding of the nature of mathematics and their feelings

of what it means to be learners of mathematics. That is to say, Sheridan's response will not affect just the particular student who raised her hand. For Sheridan, this was the first time she was shown the lattice method, and she was as amazed as some of her students at seeing how the product was efficiently and accurately computed. Since the student did not know what the method was called, Sheridan was not able to check it out on the laptop she had with her in class on-the-spot. Yet, she wanted to capitalise on that moment in the lesson when the students were eagerly watching the lattice method unfolding before their eyes, and so Sheridan asked the class to work in their groups of threes to 'test this method out'. She made use of the five minutes she had to compare the lattice method with the 'textbook method' of multiplying multiple digits. Being able to see similarities between the two, it gave her the confidence to ask the class to report their findings. Sheridan made use of the opportunity to ask the students to check the products they obtained with the lattice method against the corresponding answers they would have obtained using the method she taught them at the beginning of the class. She ended the lesson promising her students that she would look for the name of the alternative algorithm.

In this scenario, Sheridan's response to the migrant student—and to her class more generally—reflected her valuing of *diversity* and *openness*. Sheridan was modelling the importance and worth she dedicated to the diversity of mathematical ideas amongst her students. She was ready to entertain alternative ways of multiplying, and for this reason she did not select the easy way out by telling the student to ignore the mathematics she already knew, and to focus instead on learning the 'right' way of multiplying numbers. *Diversity* was being presented here as a general educational value in the Australian society, corresponding as it does with one of the nine values for Australian schooling, namely, *understanding, tolerance and inclusion*. Valuing this means to be 'aware of others and their cultures, accept diversity within a democratic society, being included and including others' (Australia Department of Education Employment and Workplace Relations 2011, np). This general educational value is also promoted in many other cultures too. For example, through the Swedish School Law 8§ (Utbildningsdepartementet 2010), Swedish teachers are made aware that 'all children and young people, regardless of gender, place of residence, and socioeconomic status, have equal access to education in public schools' (translation by Andersson).

The mathematical value of *openness* was espoused by Sheridan as well. Instead of simply accepting or rejecting the student's offer of a more efficient method so that she could get on with her planned pedagogical activities, Sheridan facilitated a group-based investigation to verify that the lattice method works for different multiple-digit multiplication situations. In so doing, she demonstrated how knowledge can be democratised through verifications and (student) explanations, which in Bishop's (2008) view is the defining feature of the valuing of *openness*.

Before we move on, it is worth noting that *diversity* can also be regarded as a mathematics educational value. That is, *diversity* may also be valued as part of teachers' pedagogical decisions or activities. The Australian Curriculum, for example, encourages teachers to structure in their lesson planning for students who are learners of English as an additional language or dialect (EAL/D), 'additional time

and support, along with teaching that explicitly addresses their individual language learning needs' (ACARA 2011, np).

Volitional Nature of Values

Mathematics educational research regarding values has previously been considered as part of the affective tradition. Bishop's (1999) definition that 'values in mathematics education are the deep affective qualities which education fosters through the school subject of mathematics' (p. 2) reflects this stance. The affective domain of the Taxonomy of Learning Objectives (Krathwohl et al. 1964) also positioned valuing as the emotional outcome that develops from attitudes and beliefs.

The valuing process (Raths et al. 1987), however, hints at the involvement of a certain degree of cognition as values are being internalised. The stage of choosing, for example, involves cognitively based considerations amongst alternatives to enable a choice to be made. The way that civic and moral values are taught in schools in some countries also demonstrates the cognitive nature of the acquisition of a value. These teaching approaches include the values clarification exercise method (see Simon and Clark 1975), a pedagogical approach which invites students to state their respective positions with regard to some given scenario, and to explain (and indeed clarify) their choices. The cognitive involvement is especially evident during this values clarification stage of the lesson, as students are made aware of what they value and of the extent to which this valuing is shared by peers. Also, the internalisation of a value by putting it into action is often defensible by an individual—another sign of valuing as involving cognition rather than it being an emotional response alone.

But is it sufficient to consider values and valuing as being cognitive/affective variables? How does this affect the ways in which we understand this construct, and how can we better utilise it to optimise mathematics learning and teaching for all students? In what ways might a new understanding of the nature of values and valuing contribute towards 'a process of identifying any barriers within and around the school that hinder learning, and reducing or removing these barriers' (UNESCO 2001, p. 16), and in so doing, fostering inclusive education in schools?

Consider, for example, a student who has been taught the range of mathematical problem-solving strategies, and who has developed confidence and efficacy in engaging with mathematical problem-solving. Having the cognitive skills and emotional dispositions, however, does not mean that the student will necessarily engage in—or value—problem-solving. The student might value *creativity* instead, and having found the problem-solving questions actually quite routine or predictable, she/he may decide to devote attention and engagement in other school subjects which allow him/her to display *creativity*.

As another example, the valuing of *achievement* in school mathematics does not necessarily mean that an individual is yet to possess the cognitive skills to achieve what is being aimed for, or that she/he is emotionally positive about it. Nevertheless,

she/he attaches importance to *achievement*, such that this valuing drives him/her to do what is needed to attain it, thus actualising it. Valuing *achievement* may prompt the individual to seek extra assistance (such as home tuition), and this valuing may sustain his/her efforts to do so even if she/he might not be interested or motivated in the tasks involved. Indeed, we feel that this might underlie the relatively high performance of East Asian students in international comparative tests, despite the common schooling experience they have with peers from other cultures, and despite these students in Asia not liking mathematics generally (OECD 2013). It might be said that the students' cultural values were responsible for, or at least contributed to, their valuing of *achievement*. Thus, we argue that for the East Asia students, these cultural values—as well as the mathematical and mathematics educational values that had been internalised over the years as learners—provide them with the drive and the will to succeed and to do well in school mathematics.

The philosopher Ayn Rand wrote that 'a being of volitional consciousness has no automatic course of behaviour. He [*sic*] needs a code of values to guide his actions' (1961, p. 97). Thus, values can be seen as variables which are action based. This is not to say, however, that values are always expressed in the form of actions. Rather, the potential for action is the basis for valuing. Whether it is expressed in action or not depends on the context. This can be seen in Andersson (2011b), in which the upper secondary student participants who had indicated that they disliked—even hated—mathematics, clarified that their stories of mathematics learning experiences were connected to the context in which they were told. That is, the students' stories and actions for learning mathematics changed as the contexts evolved. As volitional variables, values have both cognitive and affective components as well. The cognitive components are visible through the choosing dimension of the valuing process (Raths et al. 1987). That valuing also has an affective dimension can be seen in the way we often find ourselves embracing what we value in a passionate way, supported by associated emotions, attitudes and beliefs.

Values: Motivation or Will?

From Hannula's (2012) theoretical standpoint within the motivational research area, values as a volitional construct can be regarded as a motivational agent. Motivation initiates and directs action, but it may not be responsible for sustaining the action. Yet, whilst values guide an individual to choose a course of action, they appear to do more beyond this function. A teacher who values *exploration*, for example, will not only be motivated to plan and deliver his/her lessons in ways which include student investigation tasks and group discussion opportunities. Equally important, this valuing places so much emphasis on the worth of exploration that the teacher's actions will serve to sustain this pedagogical approach should obstacles arise. Thus, a parent may question the wisdom of 'wasting' instructional time in allowing students to 'discuss mathematics'. If values are mere motivational forces, such a parent intervention may affect the teacher's motivation to continue to facilitate exploration

amongst the students. Yet, as a value, the teacher will respond in ways which help him/her to continue to value *exploration* in his/her professional practice. Such a response might include a reply to the parent arguing for the case of inculcating student valuing of *exploration*, or explicit explanations to students of the advantages to their mathematics learning of their opportunities to explore strategies. In other words, an individual not only acts on what she/he values, but defends what she/he values as well.

As explained by Kivinen (2003),

> there is a distinguishing line between volition and motivation. Volition promotes the intent to learn and protects the commitment and concentration from competing action tendencies and other distractions …. For example, a student may be motivated to read a book in the evening. He or she is more or less motivated to do so. The student takes the book and starts to read (motivation has done its work). Volitional processes (will) keep him or her reading, in spite of the fact that there is an interesting football match on TV. (pp. 26–27)

In other words, as a volitional variable, values (in mathematics education) not only motivate and guide decisions and actions, but they also provide the individual with the will and determination to maintain this course of action in the face of competing actions and obstacles.

It is this second aspect of the volitional characteristic of values which gives them their characteristic soul. The importance attached to a value is reflected not just through its regulating action, but also through the ways in which it provides the individual with a will and determination to continue valuing it. A country's valuing of *freedom* and/or *justice* may lead to decisions about fighting a war half a globe away, but it is how this valuing is sustained in the face of public protests and academic doubts that allows for the effects of this valuing to be felt. In the context of the school mathematics classroom, then, there is every hope that teacher harnessing of the valuing of *diversity* of students' mathematical ideas and reasoning, and of *diversity* of students' ethnicities and ways of thinking, will stimulate a sense of greater inclusivity in the classroom.

The Significance of Valuing When Facilitating Mathematics Learning and Teaching

Thus, valuing provides one with the will and determination to act in particular ways. This may involve the modification of related beliefs and other emotional constructs, as well as the choice of mental strategies and decisions deployed to 'do mathematics'. In other words, what is valued regulates cognitive processes and affective modes. We now provide some examples to highlight the significance of values in mathematics learning and teaching.

It is often observed in some 'Western' societies (see, for examples, Byun and Park 2012; Wei and Eisenhart 2011) that Asian students, especially East Asian students, perform better than their peers in school mathematics. These students would, however, be attending the same schools as their peers from other ethnic back-

grounds. That is, they and their peers would have been taught by the same teachers, have performed similar activities during mathematics lessons, be expected to do the same homework and have sat for the same assessment tasks. They would also have experienced the same classroom learning environment and conditions, as well as the same external motivational factors. Given these same educational opportunities, then, why do East Asian students perform better in school mathematics? For these East Asian students, what are the underlying cultural values conveyed by parents and the wider society which might support the students' mastery of cognitive skills and development of affective dispositions in the school mathematics classroom?

At the same time, again considering the case with East Asian students, there is no conclusive evidence of any correlation between affect and performance. For example, even though Grootenboer and Hemmings (2007) found that affective factors such as beliefs and confidence were associated significantly with mathematical performance, they were not predictive of performance. Indeed, students from Singapore and Hong Kong (top performing countries in international comparative assessments) can often be heard expressing their dislike of or stress with school mathematics. Quite clearly, the level of mathematical wellbeing (Clarkson et al. 2010b) is not high for these high-performing students.

The results of PISA 2003 told a similar story. In PISA 2003, students' interest in and enjoyment of mathematics were highest in Tunisia, followed by Indonesia, Thailand, Mexico and Brazil. Yet, students from these five countries also occupied the last five spots in the country ranking by performance (OECD 2004). These observations suggest that favourable affective dispositions in students may not be sufficient to bring about 'effective' learning and performance in school mathematics. Some factors beyond the cognitive and affective ones are at play. Several reports (e.g. Leung 2006; Wei and Eisenhart 2011) have made reference to culturally based values in mathematics education. Askew et al. (1997) appeared to stop short of naming these as the factor regulating 'effective' teaching, referring instead to teachers 'believing in the importance of' (p. 4) particular pedagogical practices in their mathematics teaching repertoire. It is these variables of importance and worth which constitute the focus of this chapter.

Values Alignment in the Mathematics Classroom

We are interested in this chapter to make use of a theoretical stance, understanding values and valuing as volitional with the purpose to support teacher modelling and teaching of *diversity* in the classroom discourse. We are mindful that teachers and their respective students come to class with their own aspects of valuing. The decisions and actions of teachers and students in the mathematics classroom reflect their respective valuing. How do teachers (and students) go about negotiating the differences that inevitably exist, so as to facilitate learning of the subject? Indeed, in Australia for example, teachers' unmet professional development needs are centred round ways of planning for diverse student needs and capabilities (see Panizzon,

Chapter 3). Why is it that teachers whose practice may be fruitful in one classroom may not find him/herself equally 'effective' in another?

Given the volitional nature of values, it is reasonable to argue that any expectation by teachers (students) for others in class to share their valuing automatically is heading for failure. In order to maintain a functioning classroom environment amidst the range of values present, teachers and students will want to see one another's values to be aligned and in harmony. In fact, if we perceive the classroom as an organisation that is dedicated to learning mathematics, then Senge's (2006) five disciplines of learning organisations would foreground values alignment as a crucial attribute. In particular, one of them, personal mastery, would require the teacher and student to align her/his values with those of the class. Also, the discipline of building shared vision also calls for aligned values in an organisation in order for the shared vision of the future to be co-created. Thus, central to our discussion in this chapter is the notion of values alignment:

> Building … values alignment is about providing a cooperative and collaborative process whereby the members of the organisation can develop strategies, systems and capabilities that not only support those values that have previously been clarified as being essential for the ultimate success of the group as a whole but also are supported by the majority of the people within the group as acceptable guidelines for directing their behaviour (Henderson and Thompson 2003). (Branson 2008, p. 383)

Although values alignment may be a concept borrowed from the field of business administration (see, for example, Branson 2008), its appropriateness in accounting for the professional practice of teachers negotiating about value differences is supported by the observation that in both a business organisation and school organisation, there is often a desire amongst the employers/management and the teachers/school for a shared goal. In addition, the employees and the students respectively would subscribe to these goals to different degrees. The value of values alignment lies in the observation that

> all relationships—between one person and another, between the present and the future, between customer and product, a team and its goals, a leader and a vision—are claimed to be strengthened by aligned values. (Branson 2008, p. 381)

Thus, for a teacher, being able to facilitate values alignment between what she/he values and what his/her students value promises to strengthen the relationships, and is one of the keys to nourishing teaching and learning practices. Indeed, we propose that teachers are seen as being 'effective' in different classrooms because they are resourceful and creative enough to attain values alignment in whatever classroom situation they find themselves.

Even though the teacher may take a leading role in facilitating values alignment within his/her classroom, student agency might not be lost (Andersson and Valero, in press). A key assumption in our work is that all students are agentic in either adopting or resisting/rejecting discursive positions. Students are explicitly and implicitly providing their teachers with feedback about their learning, both consciously and subconsciously, just as teachers provide similar feedback to their respective students. These feedback data should allow the teacher to monitor the extent to

which the values being negotiated are accepted by their students, and/or the extent to which they are being shaped by the students in turn. We can see examples of these in the two cases provided below.

It needs to be reminded that values alignment is not about facilitating a classroom situation in which everyone or most people subscribe to the same values. Values alignment is different from values inculcation; in fact, it is doubtful that values inculcation—or even an expectation of it—would ever be accepted by students, parents and teachers in most classroom situations today. Rather, values alignment facilitates the coexistence of different values as these are held by different people interacting in any given context. In so doing, students perceive that their knowledge, skills and dispositions are valued. They feel valued and inclusive in relation to their learning of mathematics. That is to say, values alignment acts as an agent for promoting inclusivity in the mathematics classroom.

Case 1

> Michael (a pseudonym) was a mathematics teacher in a secondary school. He had noticed that his Grade 10 students had been unwilling to work with concrete manipulatives such as geoboards and pattern blocks. 'These are for young kiddies, sir!' they would say. Yet, Michael felt that learning is more effective when students are able to visualise the relevant concepts. Michael's students are now exploring and understanding geometrical concepts through software programs, such as dynamic geometry software.

In this case, Michael's use of concrete manipulatives reflects his valuing of *visualisation*. However, this teaching approach was resisted by his students whose values were not aligned with the image of teenagers 'playing with blocks'. There was a potential here of a value conflict between Michael and his students, which could possibly result in the students being disengaged with his lessons. What Michael did to resolve the potential value conflict was his redefining of what he and his students value, coming to an understanding that in effect, his valuing of *visualisation* was underlied by a valuing of *exploration*. This was crucial, since the students' values were aligned with *exploration* as well; it was just that they did not want to feel like small kids playing with blocks and teddy bears. By redefining his valuing of visualisation with the use of digital learning technologies, Michael was able to plan and execute his lessons such that the dynamic geometry software provided the students with opportunities to explore—and thus visualise—the relevant geometrical ideas and concepts in a form that is now aligned with what the students value. Michael's valuing of *visualisation* had given him the will to resolve the value difference situation in ways which still allow for student visualising to take place, only that the means of actualising this valuing were now accepted by the teenage students, who were understandably trying to look more adult-like and doing adult tasks. For his students, their positive response to the ICT use was an endorsement of their common valuing of *exploration* as well.

In this instance, then, values alignment was achieved through Michael's volitionally redefining what he values such that its expression now is aligned with what his students value.

Case 2

> Diane was an immigrant secondary school mathematics teacher from Canada. When one of her students answered one of her questions by saying 'just chuck in c, just chuck in the c', she responded that he was being too casual with his use of mathematical language. Diane's

> own mathematics learning experience in Canada had instilled in her a valuing of the formality in mathematics, a tradition which she felt needed to be upheld. Thus she would have preferred her students to talk about 'adding the constant, c'.
> Yet, Diane was deeply aware and concerned that she was teaching a 'weak' class, and that meant that it would not be wise to get 'too caught up in those formal, scary things'. She was mindful that for these students, a valuing of fun would be a key motivator for them. As such, she made a conscious effort to 'sacrifice "plus c" for "chuck in a c"'.

Here, Diane had realised that 'pushing' her students to share her valuing of *formality* and to use formal terminology would be counter-productive. This group of students needed first and foremost to be able to be interested enough in the subject, and to develop some confidence to acquire the skills and concepts required of them. The students' valuing of *fun* was a volitional force which supported the cognitive and affective growth that they needed. Diane's understanding of this, and her subsequent re-prioritisation of her valuing of *formality* and *fun*, resulted in values alignment between herself and her students. This re-prioritisation of Diane's values was evident when she talked about the relative importance of notations/formality and understanding/enjoyment, and how it would be her willing sacrifice to interchange the order of priority for the sake of facilitating her students' learning.

In this second case, values alignment was achieved when one group of people (in this case, Diane the mathematics teacher) in interaction re-prioritises what they value, such that there is now a common valuing in the whole group. If valuing as a volitional variable means that the individual subscribing to particular values will sustain the valuing at all costs, this feature is not violated here: Diane still values *formality*. However, she also shares students' valuing of *fun*, and a re-prioritisation between these two values within herself has resulted in an alignment of what she and her students value.

Concluding Ideas

The writing of this chapter was motivated by our interest in examining how we might support teachers' valuing of *diversity* which we believe in turn optimises students' learning experience. We have theoretically argued that values and valuing might be volitional in character. The lesson scenario involving Sheridan provides us with an example of how this valuing might look like in practice.

Yet, the mathematics classroom is a place where the different values of teachers, students and indirectly others come together in intersection, resulting in value differences and value conflicts. If teachers' espousal of *diversity* is key to facilitating an inclusive learning environment and to optimising the learning experiences of all students, it is important for teachers to be able to negotiate these value differences and value conflict situations in their respective classes.

We propose in this chapter that the awareness and alignment of present values in the different educational and classroom contexts can empower teachers to achieve this. In discussing this approach, we highlighted the will aspect of values

and valuing. This drive to maintain the course of action is evident in both Michael and Diane, whose respective actions at aligning their own values with their students' were aimed at optimising student learning. Michael's redefining his valuing as *exploration*, and Diane's prioritising of the valuing of *fun* over that of *formality*, are two examples of teacher strategies that might be adopted to bring about values alignment.

Diane's case shows how *fun,* as it was valued by her and her students, was also actualised in the norms of the class. In the process, Diane's valuing of *formality* was given a relatively lower priority. For Diane, the different values (*student learning*, *fun* and *formality*) appeared to be internalised to different degrees within herself. While each of these values is volitional, it is not possible for all three values to be emphasised to the same degree. Diane's overriding emphasis on (student) *learning* thus guided her to prioritise *fun* over *formality* in order to embody this overriding emphasis.

Values alignment in Michael's case, however, did not involve the teacher and students embracing the same values. Michael's decision to make use of dynamic geometry software in his lessons allowed him to express his valuing of *visualisation* in another form, one that does not involve the use of concrete manipulatives. In so doing, this expression of the teacher valuing of *visualisation* supports and is in alignment with what the students valued, underlied by the common valuing of *exploration* amongst Michael and his students.

The challenges for teachers, however, are firstly, the extent to which they are aware of what they personally value in relation to the mathematics subject, to mathematics pedagogy and to general educational aims. Secondly, there is also the challenge of being more 'effective' at facilitating values alignment within the teachers' own classrooms. These challenges are by no means unrelated: If teachers are not able to articulate their personal convictions, their values alignment experience to facilitate student learning will remain tacit. Thus, teacher capacity to actualise values alignment between herself/himself and her/his students go a long way towards acknowledging students' cultures, knowledge, skills and dispositions, thereby contributing to *diversity* in mathematics learning and teaching in ways which are inclusive and empowering.

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