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Theorising Values and their Study in Mathematics Education

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Abstract: *This paper provides a critical summary of the different conceptions of "values" in mathematics education literature as compared with the more general debate about values in current educational discourse. It attempts to provide a multidimensional theoretical and methodological model for studying values that is attuned with past research in the discipline as well as value of mathematics in society.*

During the past decade the discourse of values has re-entered education both within the national educational debate and policy (Department of Education, Science and Training, DEST, 2003) and the academic practice and theory (Aspin, 1999). In political discourse, the term "values" is often used to refer to social goals, norms, common interests, or behavioural standards and actions that are implicated in justifications of political decisions and social policy. In particular, education, as the primary institution where the young are entrusted for their socialisation, is one that is intrinsically laden with values. Values are reflected in every statement of policy, adopted school structures, selected curriculum as well as practices of pedagogy and regimes of assessments that are not only manifestations of social values but also are practices that inevitably contribute to the development of certain values in the students. Hence, it is not a question of whether education should deal with values. Education is about values inculcation and thus education cannot escape from dealing with values. The question is what values are - and 'ought' to be - reflected and how best to deal with them. Here we take the stance that schools are not only a place where values are transmitted from one generation to another; they must be places where an explicit discussion and debate on values must take a priority.

However, the construct of *values* remains a contested term. In this paper we will discuss issues related to theorising values, with special focus on mathematics education, and discuss some related methodological issues in their study. We draw upon a wide range of literature, both from within and outside mathematics education itself.

Perspectives of Values

First we note that, in educational policy and research values have been used in a wide range of meanings. For example, the Value Education Study (DEST, 2003) adopt the definition by Halstead and Taylor (2000) that define values as "the principles and fundamental convictions which act as

general guides to behaviour, the standards by which particular actions are judged as good or desirable" (p. 2). In the context of mathematics education, Bishop and Seah (in press) write that "values are part of the deep affective components of a person's mind which influence, and are influenced by, our choices, decisions and beliefs in engaging with life's challenges. These are dialectically related to beliefs and attitudes". Perhaps following the affective dimension of the Bloom Taxonomies (Krathwohl, Bloom, & Masia, 1964), the categorisation of values as affective variables has been more prevalent in mathematics education; whereas it is less so in general philosophical and general educational writings where they are associated with questions of ethics and moral decision making. Whether it is possible, or even desirable, to construct a universally well-defined meaning of this multidimensional construct is not a question that we will address here. Rather we will deal with it as "vague" term whose "essential meaning" as well as its function remains open to contestation.

Second, we note that values as manifested at three different levels and types of behaviour in personal and social life. At a *preference* level, values reflect a sentiment or taste, or even need that an agent possesses or professes which manifests itself in day to day personal actions. This is not to say that values are totally arbitrary. In fact they arise from experiences of the real world or from a set of beliefs adopted by the agent. Values, however are often more explicit at a *decision* level, values are incorporated in (often unconscious) actions an agent undertakes from among alternatives. Here, conflicts in values arise within the one agent or between different participating agents give rise to reflection, debate and negotiation to resolve them. Such decisions often give rise to a discussion of hierarchies of values. Similarly, values are implicated at a *reward* level that posits justifications of line of action based on its desirability or the material or symbolic benefit obtained from it.

Third, we note the debate about the origin and hence the nature of values. In some theorisations, values are ultimately personal. This is best illustrated by the discussion of values in the online encyclopaedia Wikipedia

> Personal values are implicitly related to choice; they guide decisions by allowing for an individual's choices to be compared to each choice's associated values.' Personal values developed early in life may be resistant to change. They may be derived from those of particular groups or systems, such as culture, religion, and political party. However, personal values are not universal; one's genes, family, nation and historical environment determine one's personal values. This is not to say that the value concepts themselves are not universal, merely that each individual possess a unique conception of them i.e. a personal knowledge of the appropriate values for their own genes, feelings and experience.

This *individualistic* approach studies values in the individual human subject. Research from this perspective aims to articulate the values individuals hold and how these values are manifested in preferences and actions. For example, Rudy and Grusec (2001) discuss the psychological tradition of understanding values expressed as acceptable standards of behaviour "most effectively accomplished when children see those values and standards as self-generated or autonomously chosen, rather than imposed by agents socialization" (p.202). Similarly, Bishop, Seah, and Chin (2003) claim that "a person who values *fun* will look for it and emphasize it in his/her daily life. It is a personally desirable quality in a somewhat universal way" (p. 726). Seah (2004) asserts that "values represent an individual's internalisation, 'cognitisation' and decontextualisation of affective constructs (such as beliefs and attitudes) in her socio-cultural context. Values related to mathematics education are inculcated through the nature of mathematics and through the individual's experience in the socio-cultural environment and in the mathematics classroom" (p. 43). While individualistic values are important to study in so much as they are involved in decisions that the individual make, this approach is limited in understanding the origin of these values and in dealing with a critical evaluation of the desirability of these values.

Other theories of values have targeted the social context as a field of study. Agents within one social or cultural group often share a set of common values (McConatha and Schnell, 1995). As example of some of the issues on these cultural values, the Wikipedia article on values asserts:

> Groups, societies, or cultures have values that are largely shared by its members. Members share a culture even if each member's personal values do not entirely agree with some normative values sanctioned in the culture. This reflects an individual's ability to synthesize and extract aspects valuable to them from the multiple subcultures they belong to.
>
> If an individual expresses a value that is in serious conflict with their group's norms, the group's authority may carry out various ways of stigmatizing or conforming the individual. For example, imprisonment can result from conflict with social norms that have been established as law.

This *sociocultural* approach targets the set of values a group of people share. Worsley (1984) locates values as one of three dimensions of culture: cognitive (represented via ideas), conative (manifested via performance), normative (represented by values). McConatha and Schnell (1995, also Seah & Bishop, 2002) go even further and define culture as an organised system of values which are "transmitted to its members both formally and informally" (p. 81). Atweh, Bliechard and Cooper (1998) demonstrate how classroom practices were a function of students' gender and socioeconomic background. In a more recent study Seah (2005) argue that values of practicing teachers reflect their cultural backgrounds. Hence, this study investigates the social values as a function of these social factors. While understanding the values of the different participants in a community of practice is essential for functioning in pluralist communities, a mere description of differences, as in the above approach, falls short of engaging in the debate about the different values as discussed by Aspin (1999).

These different foci on the personal vs. the cultural considerations of values lead into an important debate on the status of objectivity vs. subjectivity of values. Aspin identifies two extreme positions on values, both of which he rejects. The fundamental absolutist position constructs values as universal objective principles of the same nature as natural objects and scientific laws. From this stance, there is no room for alternative set of values or a room for an agent making choice in valuing certain values more than others. These attitudes, Aspin associate with extreme fundamentalism and even acts of violence becoming familiar around the world. The second position, what he calls the postmodernist position, reduces values as mere individual preferences. Using the logical arguments of Kant, Aspin assets that personal preferences are on different nature to statements about what "ought' to be done. He goes on to discuss values as interpersonal and public agreements about what 'ought" to be done by the participants of community of practice for that social group to function. He adds that "Values are not private: they are not subjective. Values are public: they are as such as we can discuss, decide upon, reject or approve" (p. 126). Moreover, values are objective in the sense that the very fabric of our interpersonal and institutional interactions depend on them. It is within these human institutions – chief of which is language and communication – that values obtain their objectivity. This is in harmony with the Habermas's theory of communicative action that asserts that through critical reflection in openly democratic institutions it is possible utilise evidence to test assertions about and conflicts in values.

In summary then, while values can effectively be understood as commitments of an agent in making value judgements and decisions for action, this approach may be limited in understanding the origin of these values and in studying conflict of values within the agent or between agents. Further, taking values as commitments of a group of agents does not imply that they are absolutist or universal but can remain open to dialogue and contestation.

We now turn to issues related to values and mathematics education.

Values and Mathematics Education

Mathematics is traditionally associated with the scientific thinking often referred as "hard" subject, not in reference to the difficulties some students encounter in its study, but to differentiate if from "soft" subjects such as language and visual arts. This reflects the "positivist" differentiation between matters of fact and matters of value. According to this view science and scientific thinking is concerned with *truth* and not *meaning* or *values*, implying that they are objective, value-free and neutral (Bishop, 1988; Ernest, 1991). As Aspin (1990) explains, recent writings on the nature of science reject this misleading and erroneous distinction and claims that "it is not 'facts' that are objective but our inter-subjective agreements as to what things shall count as 'facts' – and such agreements are constituted in the institutions that make up our social and communal life" (p. 126). Accepting the social construction nature of all knowledge, does not imply that all knowledge is totally arbitrary or equally valuable. However, it means that any knowledge is open to question of value that open for justification on other basis than its claim for "truth". These justifications are undoubtedly reflected in questions of values.

Several recent mathematics curriculum documents in many Australian states discuss the multidimensional relationship between mathematics and values. First, increasingly such documents reflect a stance that mathematics is not an objective absolute field of knowledge but is a reflection of a set of values in the contexts in which it has arisen. For example, the recent Queensland Curriculum states that mathematics "is dynamic because it is socially, culturally and historically constructed, responding to changing needs and expectations while also creating conditions for change" (QLD Curriculum Council, 2004 p. 2). As such it is a reflection of the values adopted in these contexts. Similarly the curriculum document in Western Australia asserts that "Student needs to develop an awareness of the nature of mathematics, how it is created, used and communicated, for what purposes, and how it both influences and is influenced by the things we believe and the values we hold" (WA Curriculum Council, 1998, p. 179). The multicultural origins of mathematical ideas, and the associated repertoire of different socioculturally-based values, are indeed very evident in the Victorian Essential Learning Standards' (2005) statement that "many societies and cultures have contributed to the growth of mathematics, often in times of scientific, technological, artistic and philosophical change and development" (p. 4).

Similarly, there is an increasing acknowledgment in these documents that the cultural values of the students' background are instrumental in determining their learning opportunities in mathematics. The Queensland curriculum document states that "Learners have a broad range of knowledge, attitudes, values and experiences shaped by their gender, sexual identity, socioeconomic circumstances, cultural and linguistic backgrounds and geographical locations, and by other aspects of their background, all of which form part of their learning environment" (QLD Curriculum Council, 2004 p. 8); while the Western Australian document states that "Learning experiences should connect with students' existing knowledge, skills and values while extending and challenging their current ways of thinking and acting" (WA Curriculum Council, 1998, p. 206).

Lastly, there is an acknowledgement that mathematics knowledge developed in schools can be effective in reflecting and contributing to values in society. For example, the Queensland curriculum discuss the contribution of mathematics to the social value of equity. "An equitable curriculum provides opportunities for students to learn about equity. In the context of the Mathematics key learning area, students express, explore and critique personal, group and societal values. They challenge misrepresentations and stereotypes to become active participants in interdependent societies" (QLD Curriculum Council, 2004 p. 12). The Western Australian curriculum gives an example where mathematics problem solving can be used as a vehicle to expose social values: "Students recognise, … , that we can use algebra to work out the price at which maximum profit is achieved, but not to decide whether profit is an appropriate criterion for setting the price – that decision will reflect a range of non-mathematical factors, including the values they hold"(WA Curriculum Council, 1998, p. 191).

The value of mathematics in general education is often justified on the basis to its contribution to the scientific and technical, and hence economical, well being of society (e.g. Kuku, 1995; VCAA, 2005). Less often does its contribution to general citizenship are given high prominence. If mathematics is a subject that is of importance to *all* students then its role in cultivating civic, ethically and morally responsible citizens is paramount. The global post-September 11 political and security climate has certainly impacted on the Australasian region in no less significant ways to emphasise the inculcation of moral and civic values in school systems through all school subjects. This perspective does not appear to have been targeted much by the mathematics education research community in Australasia. One of the few exceptions is a study by Seah and Kalogeropoulos (2004) that identified ways in which the mathematics teacher might finetune his/her classroom practice and discourse to more explicitly inculcate 'desirable' values to students. It was written in the ongoing socio-political context of the release of a federal *Values Education Study* report (Department of Education, Science and Training, 2003) and of a new curriculum reform statement in Victoria. The *Values Education Study* report emphasised that "values interact with and are integral to all key learning areas" (Department of Education, Science and Training, 2003, p. 152), and listed a set of ten commonly-fostered values to be inculcated in Australian schools. These ten values were incorporated into the discussion of the Victorian curriculum reform, such that the new Victorian Essential Learning Standards has as one of its three pillars of beliefs, the fostering of personal and social skills, attitudes and values.

In summary, the question of values enters mathematics education discourse according to different foci. First, there are values implicated *in* mathematics itself as a product of certain cultural milieus in witch it has arisen. Similarly, as a part of a more general social practice of education, mathematics teaching reflects some general values within that practice but also it may illustrate its own values. However, perhaps less prevalent in mathematics education literature, mathematics study and learning can also contribute to the achievement of societal values as well as to the critical debate about these values. Lastly, the study of mathematics itself has a certain value in society as seen by students, parents and teachers. These last two values represented in mathematics education we will call *social* values *of* mathematics education – to differentiate them from values *in* mathematics education represented in the first two roles.

Research on Values in Mathematics Education

Research into the role of values in mathematics and mathematics education is often attributed to the original work by Alan Bishop and his colleagues in Victoria, Australia through the Australian Research Council-funded *Values and Mathematics Project* [VAMP] (1999 – 2002). This project acknowledges the six values associated with mathematics as a discipline (see Bishop, 1988). More recently, the *Values in Mathematics and Science Education* project witnessed an alternative label being introduced to one of these six mathematical values .. This was the result of "much discussion and analysis of [the] … initial values framework, particularly in relation to whether the same structure could hold for science …. In particular, with the value cluster of *objectism*, it was recast as *empiricism* in order to accommodate the scientist's approach" (Bishop & Seah, in press). The other five values in this framework remain to be *rationalism*, *control*, *progress*, *openness*, and *mystery*.

Whereas mathematical values relate to the scientific discipline of mathematics, mathematics educational values are associated with the pedagogy of this discipline. Different cultures and the different education systems within these will no doubt accept and emphasise different ways of mathematics teaching differently. For example, many mathematics education systems in Australia value *technology* as a mathematics educational value, and these systems will probably subscribe to

belief statements such as 'the calculator having removed the need for students to compute, these learners will thus spend more time dealing with problems'. Yet, we cannot be certain that another education system would necessarily value *technology* in teachers' professional discourse for any reason. As such, mathematics educational values are more subjective by nature, and certainly the valuing of any of these is situated within the unique sociocultural context of the particular education system. Some other examples of this category of values might be *student-centred learning*, *games*, *noise*, and *assessment*.

Bishop (1991) identified four levels of educational organisation where values are exhibited: the societal level (e.g. the value society places on mathematics in official curricula and in entry requirements to higher education); the institutional level (eg. the role of mathematics in school curriculum and school organisational practices); the pedagogical or teaching level (e.g. teachers' preferences in stressing one aspect of mathematics rather than another); and the individual level (e.g. the personal importance that a student places on achieving best test results in mathematics). Similarly, Bishop (1996) differentiated between types of values as relating to mathematics as a discipline (e.g. emphasis on *rigor* or *logical argumentation*), to education in general (e.g. emphasis on *honesty*) and to mathematics education itself (e.g. valuing of *neat presentation* of students' work).

Within the approach adopted in these innovative projects in mathematics education, the effect of culture on the evolution of values has been highlighted by several authors. Teachers' values also constituted one of the variables in Galligan's (2005) ethnographic research with teachers and students of (university preparatory) mathematics offshore (Hong Kong). These values were 'measured' using the questionnaire set up by Seah (2002). The data collected from the multiple sources were then analysed and interpreted using Zone Theory and Hofstede's (1997) theory, from which culturally-based value difference categories emerged. Specifically, the values that were in conflict were grounded in the respective cultures, that is, Hong Kong and Australian cultures. As such, these constitute the sociocultural factors that regulated the practices and discourses of the mathematics lessons offered offshore by one Australian university. In a study about reform in mathematic education in Taiwan, Leu and Wu (2004) demonstrated how an a curricula developed in accordance with international standards and values without taking the local cultural values may fail in not taking local values in the country and in its failure to change the values of the teachers that they are accustomed to.

Bills and Husbands (2005) by studying the practice of a single teacher and the values implied in her day to day decisions in the classroom demonstrated how the literature on general values in education as well as the subject specific values are useful to expose some of the practices, this literature fails to show tensions between sets of values and to guide the teacher in their decision making.

Some studies in mathematics education targeted the incorporation of a focus on values into the pedagogy of the mathematics classroom. Seah (2007) also reported on the preliminary findings of a pilot study aimed at identifying what teachers and students of effective primary mathematics lessons *co-valued*. It has as one of its assumptions that an effective mathematics lesson is facilitated by a teacher guiding the negotiation, mediation and co-valuing of enabling qualities with his/her students (Seah, 2007), building on ideas of co-construction of knowledge. While the observed gender difference in perception of whether task- or social-orientation was more co-valued in effective mathematics lessons validated related gender research, what was striking through this study were the qualities found to be most co-valued in effective mathematics lessons. These are, in order from the most co-valued, *fun*, (teacher) *experience*, *boardwork*, *instruction / explanation*, and *interestingness* (Seah, 2007). There appeared to be a relationship between student perception of lesson effectiveness and 'traditional' pedagogical practices such as explicit teaching and explanation on the board in class, and the nature of this relationship will be explored in greater detail in the main study in 2008.

In conclusion, although questions of value are intrinsically related to mathematics and mathematics education discourse, the explicit use of the term in mathematics education is rather recent, yet gaining rapid credence internationally. In fact, this theme was chosen to be one of the chapters in the current edition of the *International Handbook of Mathematics Education* (see Bishop, Seah & Chin, 2003). However, most studies conducted in this area seem to follow a single conceptualisation and focus identified by the seminal theorisation of Bishop and his colleagues in Melbourne. In particular, this research has concentrated *on* the values in mathematics and mathematics education. This might be because from the point of view of mathematics education researchers, this approach has the most direct implications towards the improvement of mathematics learning and teaching. On the other hand, while researchers in values education might promote the inculcation of values through all school subjects, we wonder if the frequently-seen societal misconception of the value-free nature of mathematics might have been a reason for the lack of studies that relate mathematics more widely to social values.

We note, however, a rising diversification of issues to consider values *of* mathematics in society and relating mathematics to social values, topics which are traditionally discussed within the critical mathematics approach (Frankenstein, 1994**;** Skovsmose, 1994)**).** Students' engagement in a mathematics classroom might be determined not only by what values are being exhibited *in* mathematics education, but also by the social values they expect learning of school mathematics will contribute to their current and future lives. This relationship between values "in" and "of" mathematics education has not been investigated in a systematic and rigorous way. For example, for students who value mathematics as a means of university admission, the values reflected *in* mathematics may be of no significance as long as they obtain the highest marks. On the other hand, a student who values mathematics for its own beauty and power may not place much value on teachers' emphasis on *neatness* or in obtaining best test results. These values *of* mathematics, we will call the social values. They are social in two meanings. On one hand, they arise as a result of the human agency in a particular social context, and on the other, they refer to values of mathematics in a wider context than the classroom.

Approaches to Research into Values and Mathematics Education

In the introductory section of this paper we discussed two general approaches, what we called the *individualistic* and *sociocultural* approaches, to the conceptualisation of values and to their study and noted some of their limitations. Here we argue for a third approach which we shall call a *critical* approach to understanding values and to their study. In presenting these three approaches, we note, however, that we do not posit them as alternatives but a hierarch where each incorporates and extends issues investigated in the previous one. Here we argue that the need for this third approach is based on what Vithal and Valero (2003) call the challenge of "resonance" between the theoretical stances that a researcher has and the research questions that they raise and the research methodologies they employ. A research that targets values in education necessarily should be open to questions of values. Here we briefly raise three issues about values and the research on values itself; in particular the *values of the researcher, the values of the researched* and *the values of the research.*

In post-empiricist paradigms of research, values have been acknowledged to enter research in many ways. For example, Hammersley (2000) argued that the mere engagement of the researcher in the act or research is a testimony of their valuing the process of research for the generation of knowledge. Secondly, the researchers' personal values are always reflected in the research questions selected and often the methodologies adopted including data analysis. Lastly, valuing of the researched themselves often lead into value and ethical judgements in the data collection, analysis and reporting. The British Educational Research Association guidelines on best practice research acknowledge that "all research is influenced by the ideology of the researcher. (BERA,

2000, p. 5). The guidelines go on to suggest that good practice in research should aim to "provide a clean statement of methodological stance in terms of the values and beliefs of the researcher" (p. 5).

Another relationship between values and research that is a more controversial is related to the question of the social and political values of the research itself. Hammersley (2000), for example argues that the social researcher is not be involved in matters of policy and practice. However, as Gewirtz and Cribb (2006) argue that as member of a society it is absurd to suggest that they should not contribute to public debate about the implications of their research. Further, the separation of roles of knowledge generation and knowledge application is only an abstraction and does not apply in practice. Hence, not only research cannot escape for the social values of the researchers and the society context of its conduct, it can not escape the political and practice implications of its findings.

Lastly, research activity often gives rise to conflicts between the values of the researcher and the values of the researched. Halliday (2002) points out to the challenge faced by research into values to differentiate between the subjects' actual values or their articulations in terms their social desirability. In the latter case, "research is not so much into or for values as into or for what participants thought would be the most acceptable thing socially to say or do" (p. 50). The postmodern response to this challenge is to construct research as a mere interruption, or deconstruction of the confessed values of the researched. Another response, articulated by Habermas (1984) is based on the role of empirical research to support social constructions of values. Habermas argues "that it is helpful to conduct empirical research to check rational reconstructions of what subjects might think they are doing but that morality cannot be anything other than an issue for the subject or subjects acting together in democratic community. Indeed, for him, it would be immoral not to carry out such checks" (in Halliday, 2002, p. 50).

However, this acknowledgement of the role of values in research should not lead into absolute relativism and be used to justify bias and tendentiousness. The challenge of educational and social researchers is to "oscillate …. between relativism and objectivism" (Halliday, 2002). Gewirtz and Cribb (2006) argue for increasing "ethical reflexivity" in research as means to maintain rigor in research while acknowledging the values embedded in it. They posit five principles of good practice that researchers need to adhere to:

- First, being explicit, as far as is possible, about the value assumptions and evaluative judgments that inform or are embedded in every stage of our research.
- Second, being prepared to offer a defense of our assumptions and judgments to the extent that either they might not be shared by others or, conversely, that they are not sufficiently problematised by others.
- Third, acknowledging, and where possible responding to, tensions between the various values that are embedded in our research.
- Fourth, taking seriously the practical judgments and dilemmas of the people we are researching.
- Finally, taking responsibility for the political and ethical implications of our research. (pp. 147-148),

Reflexive research into social values should use methodologies that are indicative of the social commitments of the researcher. For example, a researcher with a commitment to social justice and democratic participation would opt for methodologies that would maximise the contributions of teachers and learners, at significant stages of research. Also such research questions and methodologies should be sensitive to investigate social values as a function of factors such as ethnicity, gender and socioeconomic class. Similarly, a researcher who is committed to valuing research in so much as it improves practice, methodologies adopted should also aim at achieving improvement of classroom practice and students' learning and not only knowledge generation.

Finally, a researcher who is committed to the construction of values as social constructs and not universal imperatives would target research questions and methodologies that allow for the exposition of the different values of the different parties and allow for a dialogue and engagement with each others' values.

Summary and Conclusions

In this paper, we discussed the different roles in which the discourse of values enters the debate and literature in mathematics education. While the question of values has entered the research literature and increasingly is becoming explicit in many curriculum documents, some implications of values in the discipline remain more implicit. Here we differentiated between values *in* mathematics education (which are often the subject of research on the topic) and values *of* mathematics education (which are often discussed only implicitly in the research literature). These values relate to the role of mathematics in contributing to the achievement, and critique of the social values in society. They also involve awareness of the purpose and benefit of studying mathematics at different levels. Likewise, in this paper we have outlined a general approach to the study of values in mathematics education that reflexively incorporate the question of values of the researcher, the researched and the value of the research itself.

There appears to be more institutional attention and focus on how the teaching of values might be optimally facilitated through a range of school disciplines, rather than being incorporated into the curricula of specially designed school subjects. In this paper we reflected our commitment to the stance that the question of values is intrinsically related to mathematics education curriculum and research. While some may take the question of values as important in mathematics education, but not necessary to the questions of learning and achievement in the discipline, here we take the stance, that values are related to the development of cognitive learning of mathematics – thus should be within the concern at all levels of practice in the discipline. This stance is in accordance with what Seah (2007) calls the *third wave* in contemporary mathematics education research, where the consideration of the sociocultural context including values adds to existing cognitive and affective approaches to deepen our understanding of mathematics learning.

Through its emphasis on problem solving and modelling, the teaching and learning of mathematics in schools in the 'Western' world has understandably often been linked to student acquisition of concepts and skills, packaged in the form of lifeskills for dealing with the numeracy demands of civic and societal lives. The nature of high-stakes mathematics assessment in most countries these days effectively reinforced this perspective of mathematics education, such that well-intended statements in curriculum documents relating mathematics to culture and its values are often de-prioritised in the busy schedule of the typical mathematics classroom. However, in the context of what we wrote in the last section, we need to be open to the possibility that this phenomenon is but a 'Western' practice / trend. For example, our respective experience and interaction researching with colleagues in non-Western cultures reveal to us that the notion of values in and of school mathematics education has been more explicitly expressed in the Romanian and mainland Chinese mathematics curricula. Unfortunately, more and more education systems amongst these nations have been led to believe in the labels bestowed upon them of 'developing countries' and 'traditional societies'. As they embrace the mathematics curricula from the relatively-developed, 'Western' nations, our concern is that the pedagogical heritage of these 'developing' nations which ironically encapsulates the emerging interest in values in and of school mathematics in 'Western' education cultures are fast being eroded. The need for collaborative research and academic communication between education researchers in mathematics and in values education, as well as between mathematics education researchers from the East (or South) and the West (or North), has never been more urgent.

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