

HUMANIZING THE THEORETICAL AND THE PRACTICAL FOR MATHEMATICS EDUCATIONⁱ

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If we move towards a humanistic view of mathematics education we should then move to a reconceptualization of the traditional use of terms ‘theoretical’ and ‘practical’ to address learning contexts as socio-cultural practice, or even abandon these terms. I will reflect on this from three academic points of view.

The words ‘theoretical’ and ‘practical’ are traditionally used in philosophy and education to suggest two distinct forms of knowledge or two different ways in which people acquire knowledge/competences. The former is traditionally associated with conceptual and abstract knowledge/competences suggesting an exclusive mental movement or action of the mind. The word ‘practical’ is traditionally associated with *knowledge-in-use* which includes application of knowledge/competences in daily-life contexts and in professional performances; it traditionally indicates an engagement of a person in a perceptible activity, which often involves some movement or action of the body. Furthermore, this engagement is supposed not to require any reflection on what is being done in the sense that individuals often are not aware of the ‘tacit’ knowledge that underlies their action (see Frade & Borges 2006).

I found rethinking of this dichotomy between ‘theoretical’ and ‘practical’ challenging. I have taken it to suggest a separation between mind and body, and consequently detachment of what is seen as one form of learning (theoretical) from other forms of activity (e.g. living). This points to important social and educational implications that may not fit with any humanistic view of learning. Some of these implications are discussed by Jean Lave in the first chapter, *The practice of learning*, of the book *Understanding practice – perspectives on activity and context* (Chaiklin & Lave, 1996). Implications include: neglect of the lived-in world, uniformity of knowledge, learning detached from culture and affect, social positioning, power/control relationships, exclusion, individualistic and passive learning, cognitive hierarchy and failure to learn. If we take up a socio-cultural perspective of learning like that of situated cognition (Chaiklin & Lave, 1996), one that presupposes learning to be an aspect of everyday practices, not only does the dichotomy between the theoretical/mind and the practical/body collapse, but also the division between learning and other forms of activity. In fact, from such a perspective the word ‘knowledge’ moves to the word ‘knowing’ since the latter and learning are seen as engagement in changing processes of human activity. Jorge T. da Rocha Falcão and I have emphasized elsewhere (e.g. Da Rocha Falcão, 2006) that this traditional theoretical-practical dichotomy may also lead to a perverse hierarchy between mathematical activity developed out-of-school (e.g. street mathematics) and mathematical activity developed at school, where the former is viewed as

‘hierarchically inferior’ from some academic perspectives. Perhaps we could better say that what is considered as being theoretical and practical depends on the practice?

The island metaphor. In his contribution to the PME 30 discussion group *Participation, thought and language in the context of mathematics education* (DG: P,T&L), Luciano Meira (2006) suggested an insightful reconceptualization for ‘the theoretical’ and ‘the practical’ using the island metaphor to describe power/discursive relationships between ‘explorers’ and ‘natives’. This metaphor is an adaptation of a narrative of Bruno Latour in the book *Science in Action: How to Follow Scientists and Engineers through Society* (Latour, 1987). Through this metaphor Meira associates the practical to a person’s life (natives living on an island), whereas the theoretical is associated to a representation of this person’s life (explorers coming to the island and drawing a map). However, he points out that there is no good reason to think that the natives do not ‘theorize’ about the explorers’ *forms of life* at the moment they are mapping the island. According to Meira’s approach cultural conflicts arise inevitably both when the natives begin to live the lives ‘imposed’ by the map, and when they visit the homeland of the explorers and question the rationale for the map. It is not difficult to elaborate a correspondence suggested by Meira between the island metaphor and mathematics education. Let us suppose that the island corresponds to a mathematics classroom within a *strongly classified* curriculum (using Bernstein’s terms) in which ‘children-natives’ live a great part of their lives. The mathematics ‘teacher-explorers’ ‘impose’ on them a map which includes the *vertical discourse* of mathematics – *via recontextualization* – and some established social and mathematical norms, which the children-natives are supposed to share and to follow. The teacher-explorers’ homeland would correspond to what Alan Bishop – who also participated in this discussion group – suggested might be called ‘mathland’. Cultural conflicts arise, for example, when students question the rationale for this map or when they feel themselves to be ‘outsiders’ in mathland. Whatever the correspondence between Meira’s metaphor and mathematics education, it should suggest a kind of ‘dominator-dominated’ relationship between teachers and students. This leads us to a reflection about the character of mathematics education in terms of humanity. In the discussion group Alan Bishop, in an attempt to humanize this imbalanced relationship, asked Luciano Meira: ‘Why not set out to invite children into mathland and give them the tools to navigate it?’

A cultural-affective perspective of learning. Alan Bishop (2002a) proposes a distinction between ‘Western Mathematics’ and ‘Numeracies’, where the former is associated with ‘the theoretical’, and the latter is associated with ‘the practical’. In the context of mathematics classrooms, ‘Western Mathematics’ and ‘Numeracies’ come from different individuals with histories of experience in different discourses, which converge to form the classroom discourse or *the borderland discourse* (see Gee 1992 in Bishop 2002b). If we change the word ‘numeracies’ to ‘everyday “mathematical” knowing’, the relationship between Bishop’s reconceptualization of ‘the theoretical’ and ‘the practical’ leads to the recognition of the fundamental role of teachers’ values, and suggests that the way in which teachers ‘reveal in action’ (using Bishop’s words)

their general education and mathematical values in classrooms can strongly contribute to students' mathematical learning and approximates either to a process of *enculturation* or to a process of *acculturation* (2002b). Bishop borrowed these terms from anthropology. *Enculturation* is the induction, by the cultural group, of young people into their culture, whereas *acculturation* refers to the induction into an outside culture by an outside agent. Often one of the contact cultures is dominant, regardless of whether such dominance is intended. According to Bishop, mathematics teachers are the main agents of mathematics *acculturation*. He considers two types of 'acculturator'-teacher: a) the teacher who does not make any reference to any mathematical knowledge out-of-school; b) the teacher who imposes what s/he wants through her/his privileged position and power. In both cases, says Bishop, the resulting cultural conflicts, although containing a cognitive component are infused with emotional and affective traces/nuances indicating deeper and more fundamental aspects than can be accounted for from a cognitive perspective.

Learning in communities of practice. Etienne Wenger (1998) elaborates a theory of communities of practice (CoP) in which the term 'practice' does not reflect any dichotomy between 'the practical' and 'the theoretical'. For him, communities of practice include all of these, even if there might be discrepancies between 'what we say' and 'what we do'. He observes that 'when a theory is a goal in itself, it is not detached but instead is produced in the context of specific practices. Some communities specialize in the production of theories, but that too is a practice' (p.48). Thus, in Wenger's approach the distinction between theoretical and practical moves to distinctions between kinds of enterprises rather than distinctions in qualities of human experience and knowledge. To address learning in communities of practice or between enterprises the author proposes talking in terms of 'participation' and 'reification', where the former could be thought of as replacing 'the practical', and the latter 'the theoretical'. However, participation and reification 'say' much more than this and represent a humanistic view of learning since both processes explicitly take into account people, interaction, community, identity, and so on. In fact, according to Wenger, participation is a process related to the social experience of living in the world 'in terms of membership in social communities and active involvement in social enterprises' (p.55). Participation includes, then, talking, doing, feeling and belonging. On the other hand, a process of reification is constituted when talking, doing, feeling, belonging, etc take form by producing objects that congeal such experience into what the author calls "thingness". Reification includes: designing, representing, naming, encoding, describing, perceiving, interpreting, using, reusing, decoding and recasting. Wenger emphasises that participation and reification should not be viewed as a dichotomy, rather these processes correspond to a duality; they are seen to be complementary processes *through a process of* negotiation of meanings. Furthermore 'participation is not merely what is not reified' (p. 66) and 'reification is not just objectification; it does not end in an object(...)these objects(...)are only the tip of an iceberg' (p.60). The distinction between 'the theoretical' and 'the practical' is not an important focus in Wenger's theory about CoPs, since what has been traditionally seen

as ‘theory’ can be seen as the main practice of a certain CoP. Besides, the two forms of knowing that indeed characterise all CoPs are described in terms of the wide concepts of participation and reification, where both concepts have their own explicit and tacit dimensions. In the context of mathematics education these suggest a refocussing of the teachers’ attention away from students’ cognitive differences towards students’ ‘collective’ cognition which is *now* strictly linked to their participation and identity formation in learning practices.

Final comments. My understanding of ‘humanity mathematics education’, theme of this PME 31, is based on three main humanistic aspects: 1) a conception of mathematics with a ‘human face’; 2) which mathematics is good for people and why; 3) the way in which people are introduced to and learn mathematics. In this paper I have tried to focus on the third aspect. I chose to do so because I believe that the first two aspects may become reduced to empty discourses if education does not take into account that what is good for people is strongly dependent either on their culture or on the affective relationship these people develop with mathematics. It does not make much sense when we educators claim to believe in the powerful nature of mathematics whilst learners – here I am including all those who learn some mathematics for some use – neither get to recognize this nor see any sign of humanity in it.

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