Subjectivity: An alternative to the psychology of mathematics education

Mathematics education is a relatively new tradition that began as an adjunct to the practice of mathematics in schools. Its initial inception as a social science, some forty years ago, was defined by a marriage of mathematics with cognitive psychology. The discipline was regulated by mathematicians who saw school mathematics as being centred on the operation of individual cognitions confronting mathematical phenomena. These mathematicians, however, were not sophisticated social scientists and the positivistic model they created aspired to the neutrality for which mathematics itself was then well known. Alas, the marriage was not to last and it was formally annulled at the 2005 meeting of the *International Group on the Psychology of Mathematics Education.* An overwhelming vote deleted from the constitution the need to consult psychologists in preference to other thinkers. A would be usurper heckling from the fringes is the *Mathematics Education and Society* movement which perhaps has recoiled too insistently against the word "psychology" rather than exploring its possibilities and so risks throwing the baby out with the bathwater. Meanwhile the world in which researcher opinions are sought retains an emphasis on a "one size fits all" mathematics, where research is often commissioned to suit. Sometimes, however, governments with an eye on sound-bite headlines and international comparisons pay scant attention to the breadth of even this research. A recent £400m investment by the British government in curriculum control technology resulted in a slight overall increase in mathematics scores, but also a similar reduction in children's problem solving ability, a savage compromise to teacher professional autonomy and, arguably, a reassertion of the didactic teaching styles that lead to anxiety for many students, especially the less able.

This positivistically conceived world is governed by a mechanics that has evolved within a very specific reality frame. So often here, research is directed at harmonising the language spoken and shoring up final unknowns. Yet this mode of organisation that is dependent on having a god's eye view of a cherished creation is just one of the available choices if research is to serve beyond existing hegemonies. Instances of more recent qualitative social scientific models, based on contemporary theory, resist such transitive orientations and place greater emphasis on the positionings, motivations, discursive formations and emotions of the researchers involved. That is, they introduce the notion of subjectivity. Such models, however, are in their infancy within mathematics education research and it is this deficiency that this paper seeks to point out and address. Such adaptation is surely necessary in response to the proliferation and diversification of demands now placed on the discipline of mathematics. Future advances need to be seen in terms of locating and developing apparatus, to accommodate, for example, difference, diversity and contemporary understandings of the human subject within mathematics education research. Differences confront each other more regularly in globally conceived space. We need to find ways of working with each other. The homogenisation of mathematics teaching in schools across the world held in place by increasingly standardised testing is a pervasive response to this, but not a panacea, since differences between peoples will persist and continue to be asserted. Research in mathematics education can prepare the intellectual ground for pursuing practical alternatives that are variously responsive to differential forms of growth and relationally defined cultural preferences. Intellectual advances can only be meaningful however if theory/ practice

interfaces are better understood and are continually renewed in accordance with specific circumstances.

How do writers of mathematics education research papers conceptualise their academic domain and their audience? Laclau (2005, p. 53) insists that group formations derive from libidinal motivations. That is, such formations are a function of excitements for individuals resulting from feelings of being a part of or apart from current trends, fashions, innovations, transgressions or taboos. Individuals find themselves identifying or not with a range of alternative forms of social engagement, according to the particular social needs that they feel, the form of alignment or non-alignment they wish to pursue, or the particular ambitions that they set themselves. In a field like mathematics education research there appears, at least superficially, to be a tightly stratified arrangement for contributions to be received and disseminated. Major journals like *Educational Studies in Mathematics* and *Journal for Research in Mathematics Education* spearhead a relatively small group of journals where, through peer review processes, such outlets exert significant influence on the themes to be explored within the domain, what counts as important, what is seen as interesting and what needs to be cited for effective positioning to have been achieved. Yet research discourses inevitably create the analytical frames we use, which in turn create the objects we research; objects that evolve whether we acknowledge this evolution or not. And as such classroom activities observed within research enterprises and notions like “learners”, “teachers” and “mathematics” cannot escape such filtering especially those selected for specific analytical purposes. The activities cannot be seen independently of the analytical lens brought to them by the researchers. And such lenses are predicated on supposed conceptions of who we are, set against the complex backdrop of multiple ideologies shaping the discourses that underpin our actions. As such the lenses comprise particular choices in terms of the analytic filters that we apply governed by underlying ideological motivations and trends of which we are not always aware.

Significantly within mathematics education research, Piaget and Vygotsky continue to have considerable impact on how we understand the psychology of learning. There has been a rich debate about whether we should privilege the individual cognitive psychology of Piaget or more socially oriented models such as Vygotsky. That is, do we conceptualise the task of mathematics teaching to activate and transform the minds of children, which are assumed to be responsive to such external agitation, or do we suppose that individuals can only be understood as integral to more collective conceptions of who humans are and how they develop? Surely, such oppositions are irresolvable, though Vygotskian theory remains on the ascendance in fuelling vibrant contemporary debate (e.g. the annual Sociocultural Theory in Education Conference). Such debate, however, is arguably somewhat distanced from contemporary cultural theory as understood within a broader social scientific domain. In mathematics education research we are dealing with both individuals and social groups and consequently we require a variety of apparatus that enable us to span variously conceived domains. The choice of apparatus depends on the task being addressed, whether that be trying to support individual teachers or pupils, or perhaps alternatively trying to design and implement a policy. Mathematics education research has a choice of positions for itself and its supposed readership, and how it imagines its dissemination might operate. For example, the policy level task of improving particular mathematical capabilities for specific populations of students requires very

different apparatus to an individual teacher assessing her own personal capabilities for work with particular individual children.

Subjectivity as presently defined within mathematics education research discourses is often defined narrowly. For example, the individual pupil is reduced in formulations predicated on getting the mathematical learning structure straight. Yet positionings of subjects more generally can assume somewhat restrictive possibilities within such work, perhaps characterised by suppositions that all subjects would witness equivalent events in given circumstances. This applies to all people implicated in research processes, whether they are the teachers and children being researched or the researchers themselves, as well as the audience predicated within the research design. From the point of the view of the individual research author expressions of "I" and other such subjective formulations are relatively inexperienced in the domains of mathematics and of science. There is a need for caution in coming out personally in mathematics education research, which is noted for its third person formality, and implicit cultural assumptions about the generalisability of its findings. More generally, conceptions of "I" are discourse specific. There typically appears to be little scope for contestation of places assigned to such participants within mathematics education research discourses, reduced as they are to "types" (Berger and Luckmann, 1972), responsive in predictable ways according to prevailing discursive frames. Such research is conceptualized as adopting a relatively objective eye rather than subjective "I" in positioning teachers and pupils in roles from which they cannot readily escape. Yet as mathematics education research reports make tentative steps towards welcoming subjective commentary the world has moved on such that the very concept of "self" or "I" or the "individual" has been lost amidst a flurry of work talking about subjectivity. Whilst for some authors much the same thing is meant by self and subjectivity a key shift in contemporary social theory has been towards seeing the individual caught up in more or less committed participation in a multitude of discursive activity. That is, individuals partake in social languages that more or less fit what they are trying to say but the individual is obliged to use these languages if they are to be included in social exchanges.

Self has often been understood as the biological entity held together by a cognitive unity, but as Lemke (1995, p. 82) argues, from a "post-modern view this was a massive sleight of hand. Even within the natural sciences there is no guarantee that physical, chemical and biological definitions of an organism coincide for all purposes". Subjectivity is constituted discursively, defined by participations in a multitude of discursive practices. As such subjects identify with something outside of their selves. They identify with and partake in social discourses and through these identifications craft their subjectivity. Although possessiveness of one's subjectivity is also in question since subjects are acting out aspects of previously formed languages, trying them out for size, but never quite fitting (Althusser, 1971). As such subjects are "alienated" from *their* discourse.

Mathematics is a function of many social activities and school mathematics is shaped in relation to such social demands. For this reason there is a case to be made for including reference to research in the social sciences on how such social activities might be understood in relation to other social frameworks. Authors such as Lemke (1995), Fairclough (1999) and Gee (2005) provide approaches to analysis of social situations relevant to educational concerns. Morgan (2006) provides an example of a mathematics

education study attentive to such authors. These authors address the issue of how "inter-discursivity" or "inter-textuality" define the evolution of fields of knowledge. Such a view is responsive to the classic work of Bakhtin whose view of discourse is that it is "always implicitly *dialogical*, as always speaking against the background of what others have said or written in other times and places" (Lemke, 1995, p. 23). As such analytical tools are provided to enable us to better understand how social phenomena are implicated or formed through alternative filters. For example, they would provide apparatus for considering how two genres read against each other produce new cultures of knowledge. The authors also draw a direct lineage to Foucault who saw himself primarily as a historian seeking to explore alternative ways of re-telling the past to enable alternative strategies for constructing continuities or discontinuities with many pasts and alternative potential futures. Such re-telling depend crucially on how different texts are located and combined.

As an example from outside of mathematics education, I was recently on a training course for recruiting staff where we were considering a case of alleged unfairness. Yet unfairness itself is not necessarily against the law and so the victim in the case was obliged to identify racial elements of the unfairness to create a legally viable complaint, since racial discrimination is against the law. He was obliged to express his complaint within the *available* legal discourse of racial discrimination even though this did not match the exact character of his central complaint. Within mathematical learning there are many alternative approaches to demonstrating achievement, yet these may count for little if they do not align themselves with the specific assessment regime. Self is self and may be understood through a range of possible filters. Yet a subject is subject to the specific discursive framework presently being applied and is recognised according to the degree of compliance. The subject in his or her alienation he or she is obliged to be understood through externally imposed linguistic filters. In Duval's (2006) Piagetian analysis of school mathematical learning, for example, students fill their assigned space in the appropriate construction of child, seen as being at this or that stage, within the discursive order presented by the research author.

The tendency to create "types" within mathematics education research appears to be in the name of promoting some sort of instrumental rationality whereby assessments of mathematics education phenomena are associated with the identification of a control technology to bring about tangible change. In this respect mathematics education research seems to be in the business of influencing populations rather than being about promoting differences in groups of children. Yet this seems to contrast at the same time with so many individual reports that are predicated on small-scale research understood from the perspective of an individual teacher, teacher educator or researcher. Such perspectives are then communicated as if to individual teachers, teacher educators or researchers rather than policy makers or curriculum writers who are more able to influence a broader domain of activity. As an example of a broader perspective, Brown and McNamara (2005) provide an account of a national policy initiative in which all primary level teachers were obliged to work according to a centralized curriculum with high degrees of specification. The study premised on the perspectives of the teachers themselves sought to better understand how the policy framework was articulated through the teachers' accounts of their own practices. The study was premised on understanding how the curriculum represented mathematical activity to the population of teachers. A key

element of this study was that it was the government who determined the constitution of mathematics within a legislated curriculum rather than mathematicians or even mathematics teachers. As such the study sought to show how teachers mediated the policy framework, with view to examining how policies might be adjusted towards achieving alternative effects. That is, the study demonstrated how teachers were *subject* to the policy framework and the terminology it employed. Their validity, professionalism and identities as teachers were understood through the filter of their compliance with this regime. The authors however, were not advocates of this regime but sought to examine how the ideology of the regime was processed by teachers. That is, they sought to understand how mathematics, students and teachers were shaped by this policy initiative. All mathematics teaching takes place within the context of some curriculum structure where factors outside of immediate mathematical concerns intervene.

The notion of subjectivity is crucially important to mathematics education research in that we can ill afford to be insensitive to the alternative and diverse needs of learners, their teachers and the communities with which they associate, nor of the alternative forms of research that support them. Mathematics is a function of the community that embraces it and evolves in relation to the needs expressed and tasks performed. For this reason it is necessary to resist moves in which mathematical achievement in schools is read against a register of *commodified* procedures, in a "one size fits all" model, spanning diverse nations and communities. Such moves seem symptomatic of the twentieth century that has left a legacy of techno-scientific control governed by the ideology of "real" social forces (Lather, 2003). The field of mathematics education spans science and social science and there is much contestation about the boundaries of each of those domains. Yet consensus is neither possible nor desirable. Whereas mathematics often continues to be conceptualized as a discipline resistant to social discourses, education resists conceptual immersion in the broader social sciences. As we begin to experience a new century during which such rationalistic aspirations have been re-routed in so many areas of social theory mathematics education research needs to move away from earlier instrumentalist tendencies concerned with understanding and "improving" mathematical performance against unproblematised social registers.

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