

**"CONSTRUCTIVISM" IN PRE-SERVICE TEACHER EDUCATION:  
PANACEA OR PANDORA'S BOX?**

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*This paper reports an action research project that spans more than two years and chronicles the transition from an unquestioning acceptance of constructivism as the "one best solution" for the problems of student-teacher empowerment in mathematics education to a questioning of its intuitively convincing canons. One of the many outcomes of the study centres around my changing notions of "empowerment" of students to construct their own knowledge, to an interrogation of constructivism itself for its evasion of consideration of the historical and social situatedness of the nature of knowing and learner subjectivity. Implicated as I am as the teacher in the project, I offer one interpretation of the data which to me renders constructivism vulnerable to censure for a perceived lack of recognition of the effects of culture and power inherent in all discursive practices. At the completion of two cycles and upon entering the third it appears that students, after participation in "constructivist" practices, are getting the same epistemological messages concerning mathematics and mathematics teaching as previously established during the reconnaissance phase.*

Constructivists generally would agree that learning means to create progressively more powerful conceptual structures. Representative of such educators and researchers is Paul Ernest (1992, p.99) who asserts that "the aims of teaching mathematics need to include the empowerment of learners to create their own mathematical knowledge". A second aim of teaching mathematics Ernest (1992, p.99) believes "is to facilitate confident problem posing and solving; the active construction of understanding built on learners' own knowledge; and the exploration and autonomous pursuit of the learners' own interests". In this paper I explore further, through reference to an action research project in initial teacher education, the problematic notion of empowerment itself. As well, the epistemological foundations of constructivism are ultimately interrogated for non-theorisation of the subject and the unquestioned acceptance of a technico-rational conception of learning for behavioural outcomes such as problem-solving, and "autonomous pursuit of ...own interests" (Ernest, 1992). Finally, the vulnerabilities and possibilities of the adoption of constructivist policy in pre-service teacher education are summarised.

The initial work on constructivist teaching had its genesis in Piagetian epistemology. Piaget reportedly believed "...the structure of the mind is the source of our understanding of the world" (Venn and Walkerdine, 1977, p.73). von Glasersfeld (1991) enlarged upon the two major assertions of Piaget's developmental psychology: (a) that knowledge acquisition is a process of coming to know that can be likened to biological adaptation of an organism or species to its environment; and (b) that cognition produces conceptual structures through a process of reflective abstraction. Thought is fundamental and language is merely a tool which facilitates the development of conceptual structures in the mind. It was with this understanding of knowledge as personally constructed that I undertook the first cycle of the project.

### **CONTROL CYCLE**

Evidence from the first of the three cycles of the action research project demonstrated an unqualified, unquestioning acceptance on my part of constructivism premised on the notions of developmental psychology as portrayed by Piaget and elaborated by von Glasersfeld. Although these theorists had not posited pedagogical practice to support their views on cognitive development, my interpretation was that if students were to be "empowered" to construct mathematical knowledge my role was to engineer an environment for learning in which this might happen. I saw constructivism as having pedagogical applications for theoretically informed practice. It was depicted in the data from this first action cycle as the opposite of "traditional" teaching, this evident from my placing each at opposite ends of a continuum in several lectures. My journal entries recorded distaste for, and

of various feminist and post-structural writers for enlightenment and renewed hope. These, considered alongside the data from the second action cycle, convinced me that something more than negativity would be needed to empower students and myself to change and ultimately bring about change (See Luke, 1992; Ellsworth, 1992; Delpit, 1988; Walkerdine, 1984, 1992). It was at this time too that disenchantment with the framework of Habermas' critical social science was replaced by the analytics of Foucault (1980) and his notion of the "capillary" form of existence of power.

Several points were given new clarity. First, that history and the discursive practices including power inscriptions were implicated in the emancipatory space that might eventually be afforded each of us. Second, that we needed to make problematical "the" mathematics and "the" teaching methods we were seeking to understand - it was not simply a question of which methodology should be favoured after all. Methodology implies set unquestioned means towards a fixed and unproblematic end. Constructivism is itself a discursive practice which privileges some voices and some knowledges over others. Third, it is not a question so much of "what" is said within the discourse as to who is doing the speaking and whose voice is authoritative and privileged. Nor is it a question of who holds the power but rather of how power operates within the discursive practice to legitimate some voices and silence others; to valorise some statements and marginalise others; to license some as holders of valid information and knowledge and to marginalise others. My practice included aspects of all of these in the name of constructivism.

Various aspects of Foucault's conception of power are especially helpful in enabling a reconceptualisation of mathematics which might prove emancipatory for students and teacher. Firstly, power is not essentially repressive and can be productive. Teachers in institutions will always hold some advantage over students, they can use this in productive ways towards student emancipation. It is not a matter of the authoritative use of power - nor the liberal denial of our power - but an explicit acknowledgment of our power and making it problematic. So teachers can make power relations obvious to students, (Delpit, 1988) and act to open up spaces of freedom where possible. Secondly, power in capillary form forces us to take account of local contexts for possibilities of change and to forgo the pre-occupation with power of the state and economic relations. Whereas Foucault's genealogy of modern power asserts that power touches individuals more through practices than through beliefs, we need to change our practices in teaching mathematics - the use of space, text and examinations to name but a few. This does not mean to raise the question of superiority of one method over another, for no method within a discursive practice can be always and inherently liberatory. It means to suspend the question of epistemic justification, the right or wrong, the true or false, and to take note of how in the local context practices in mathematics serve to facilitate learning in some students but not others.

### **PROBLEMATISING CYCLE**

In the third action cycle now in progress I encourage students to speak as the socially constructed subjects they are through involvement in a lifetime of cultural and social discursive practices and relationships. They speak about the mathematics we are doing and the projects on which they are working. Discussion is concerned more with the immediate context and student autobiographies of mathematics learning inform the possibility of a different (not necessarily "better") mathematics. I give lectures on topics covering the teaching of mathematics, on the various syllabus and policy documents, history, theoretical foundations, possible marginalisation of various cultural groups, women and girls and the poor. I stop every ten minutes or so for the students to discuss points just made and to list points about which they need to know more.

In tutorials students work together on projects covering various mathematical topics. I give them the concept area to be covered and some basic ideas, they extend these and include applications. As this is a "maths method" subject they develop ideas on the teaching of various topics, discuss and list possible problems. For assessment, students present to me the projects they have completed and discuss whether they think they have developed a useful non-discriminatory mathematics.

In a way I regret that for me the Pandora's box on constructivism was ever opened. There is something reassuring in being able to tell students about the "best" way of teaching mathematics, denied educators in the post-

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