The future of mathematics: insights from comparative education

One of the difficulties in analysing and then solving educational problems in one's own country is that policy and practice is located in unacknowledged and unarticulated assumptions about the nature and purpose of education and the mean by which systemic goals are attained. Looking at other systems, and in particular the manner in which mathematics is conceptualised and taught, not only allows us to understand more clearly our own problems but also facilitates the development of alternatives. In this brief paper I will not consider anything concerning the United States, as its problems are greater than our own, nor the Pacific Rim because substantial cultural differences make, what Clarke (2003) calls the adaptive potential of one country's traditions for another, an unlikely proposition.

Rather than offer a lengthy appraisal of the differences between the English educational system and many of our European partners, I will try to summarise the salient issues. In so doing, it is important to understand the historical roots of public education. English education is located in the traditions of classical humanism in which the development of personal morality and vocationally-focused skills are privileged. Many European traditions are located in notions of rational humanism in which the development of an intellectually-focused critical faculty is the aim. In short, the primary distinction between English and many European educational systems is that the former is behaviourally-focused while the latter is cognitively-focused. Thus we find, for example, that English mathematics teaching is skills-led (eg Leung, 1995), with learners working from low level texts (Haggarty and Pepin, 2002), located within a curriculum framework that makes little cognitive demand when compared with other countries (Andrews, 2005). These distinctions are summarised well by Jennings and Dunne's (1996) comparison of the English and French curricular and didactic traditions. The former seek to reduce the complexity of mathematics, in order to smooth the path of learners while the latter inducts learners into the complexity of mathematics.

Appropriating Skemp's (1976) notions we can argue that when mathematics is taught in a system in which the underlying emphasis is vocational it becomes instrumental. Mathematics in a system which privileges the development of the mind becomes relational. Obviously we can argue about words, but it seems to me that a fundamental issue we need to understand is that, in relation to those in many but not all countries in Europe, English students fail at mathematics because its teaching is too procedural. Its focus is on the acquisition of skills, thus addressing the behavioural domain, rather than on concepts and the links between them, and addressing the cognitive domain. Inevitably polarisations such as these distort reality but are useful in making a point. The truth of the matter is that we need to achieve a better balance, for all learners, between the necessary acquisition of skills, at whatever level, and learner cognition. Too great an emphasis in either direction will result in an impoverished experience for the learner. Moreover, successful and creative problem solving necessitates both conceptual understanding and procedural fluency; qualities which are not independent.

I close with an observation that typifies the English approach to mathematics. It would be inconceivable in other European countries for a committee, appointed to report on its mathematics education provision, not to include academic mathematicians or mathematics teachers working within that system's public-funded classrooms. Yet Adrian Smith's steering committee comprised neither mathematician nor teacher employed within the maintained sector. Until recently, although I acknowledge that the academic mathematics community was represented, similar statements could have applied to ACME; its chair was a physicist and the only serving teacher derived from the independent sector.

Genuine change in the quality of the outcomes of the educational process in this country will require more than just tinkering. It will require wholesale change to the ways in which mathematics is managed at the systemic level, conceptualised at the curricular level and taught and assessed at all levels.