Mathematics, class and lifelong learning

Roseanne Benn
University of Exeter, UK

There can be no doubt that the UK has long been, and remains, characterised by deep and structural inequalities. In particular, it is a peculiarly class-ridden society. However, in the 1980s and 1990s, the concept of class fell into disuse in the UK. With the change to a Labour Government in May 1997 it has re-emerged.

Kennedy (1997), in her passionate cry for equity in *Learning works: widening participation in further education* commissioned by the UK Further Education Funding Council asserts that 'If at first you don't succeed...you don't succeed'. She includes the notion of working class in her analysis and argues that the children of the working class have not been the real beneficiaries of the expansion in post-16 education. Fryer (1997) in *Learning for the Twenty-First Century* the first report of the National Advisory Group for Continuing Education and Lifelong Learning argues that there still exists major differences of access and opportunities for learning for people from manual and routine non-manual backgrounds and coins the phrase 'the learning divide'. This language of inequality, division and social exclusion together with a discourse centred around the notions of citizenship and participation are a welcome return to a discussions of the basis of inequality in UK society. The culmination of these Government sponsored reports is the Green Paper *The Learning Age: a renaissance for a New Britain* (DfEE 1998). The Secretary for State in his Foreword reaffirms the central importance of education stating that 'It helps make ours a civilised society, develops the spiritual side of our lives and promotes active citizenship'. He sees the Governments role as creating a framework of opportunities and lifting barriers to access so that all people have the opportunity to succeed.

However if we as mathematics and numeracy educators are to play a part in this new 'learning society' we need to examine more deeply what these barriers to learning for the working class are and start to identify how they may be overcome (for a more detailed development of these ideas see Benn 1997).

A strong association exists between social background and educational performance (DES 1988, Uden 1996). Adults from lower socio-economic groupings have often achieved less well in school than those from the middle and professional classes. However, working class people often perform competently in jobs that require technical knowledge and skill. If these cognitive tasks can be carried out in the workplace, whether using formal mathematics or an ethno-mathematics, then this has educational implications. Different contexts such as work, home and school are characterised by different practices and related sets of terms and meanings which can be identified as discursive practices. Individuals are put into positions by the practices in which they are engaged as well as structurally by their social class origins. The discourses of workplace mathematics are not the same as those of family mathematics, school mathematics or

Proceedings ALM-5, July 1998, 124 - 128

formal mathematics. They may be particularly disparate for the working class whose home and family does not fully resonate with that of school and the wider society (Evans and Harris 1991).

This is supported by evidence from the investigations carried out by Carraher and Schliemann (1988) into the mathematical knowledge of children from both lower and middle class socio-economic groups in the north-east of Brazil. It was anticipated that many of the students from the lower socio-economic groups would fail in mathematics due to poverty and consequent malnutrition. At the end of the year of the study, as expected 32 per cent of the lower class pupils who had participated in the study failed mathematics as compared to 2 per cent of the middle class youths. However, cognitive assessments were also carried out which showed that there were no substantial differences between the middle and lower class children in mathematical skills or understanding after the year of mathematics schooling. This raised questions about the neutrality of schools in assessing the cognitive competence of children.

In America, poor performance has been traced directly to both blatant and subtle discrimination and extreme poverty (National Science Foundation 1983): when students from the lower socio-economic groups are exposed to a good learning environment, they perform as well as any. So low achievement norms do not reflect ability; they reflect a lack of preparation and early exposure. Further research in America has shown that basic mathematical thought develops in a robust manner among lower and middle-class children. Children enter school with some mathematics knowledge, a desire to learn and the ability to perform adequately (Ginsburg and Russell 1981). But from the very early school years children are socialised into the roles that their socio-economic background determines (Apple 1982). Teacher expectation for working class or poor children is low, resulting in poor performance which is exacerbated through the years of schooling.

Streaming can severely disadvantage working class children and further contribute to low expectations by staff and pupils and continued deterioration of performance. If further streaming is on the basis of achievement rather than potential, this forms a trap which cannot be escaped. A differentiated curriculum completes the process through low level practical mathematics for the working class for eventual low level occupations and high level theoretical mathematics for the middle class for eventual high level occupations. This will result in active or passive alienation and resistance for the former and autonomous critical citizenship for the later. This background of mathematics education for working class will be brought into the adult education mathematics class.

Some of the barriers to participation operate particularly against the working class. Cost is a major perceived barrier and several national and regional surveys showed that sharp fee increases which have characterised some recent adult education provision have substantially affected participation by those from the lower socio-economic groups (McGivney 1990). Barriers to participation for the working class include time constraints especially for those doing part-time or shift work. Many adult education courses assume students possess a secure financial basis and plenty of time to study. Many working class women in particular have to work, function as adults and have childcare commitments without the middle class network of support for study (Clark 1993).

In addition, education is not seen as part of reference group norms. McGivney (1990) suggests that many people in working class occupations are hostile to the education system and hence to education in general which is particularly important as reference group attitudes and norms exert a powerful influence over attitudes and behaviour within this group. Effective recruitment therefore needs to be located in working class culture and perhaps through the workplace or word of mouth.

There is a further difficulty that student-centred, needs-meeting learning requires the ability in the learner to recognise, formulate and articulate the mathematics required and in the tutor to interpret and translate these needs. Many working class people find adult education centres unwelcoming places and are deterred by the timing and siting of classes, lack of creche facilities and chaotic and insensitive procedures at enrollment time. The lack of resources of the working class is an additional enormous disadvantage (Tuckett 1991).

A further barrier is the middle class nature of adult education itself. In times of recession and the current preoccupation with the market, the tendency is for adult education to service those who most readily come forward. This tends to be those had reasonably good and positive experiences of initial schooling: the middle classes. Schuller effectively describes this as 'the phenomenon of second creaming: an increase in services principally benefits those who just failed to profit from what already existed, leaving others relatively worse off' (1978: 25). People who have 'failed' the school system do not wish to repeat the failure. If school has reinforced cultural constraints arising from cultural and social class divisions, then many working class people may be programmed to feel that education is not for them. Voluntary learning is perceived to be part of the cultural pattern of higher socio-economic groups. The common language, shared experiences, implicit assumptions and agreed frames of reference of the middle classes establish the boundaries.

Simply put for the middle class adult education appears relevant for many working class people it does not. Research in an inner city school supports this class, rather than ability, divide (Walker 1988). It indicated that the more academically successful students were those whose culture converged with that of the teachers and that the strength of this 'intercultural articulation' determined the likely success of educational outcomes. The main cultural divergence was identified as that between the middle class teachers and the working class students. Where divergence was great, then success could only come from teachers developing cultural 'touchstones' that expanded the range of common interest between the two groups.

There is a widespread assumption that there is a fixed linear hierarchy of mathematical ability from the least able to the most able. Every person can be assigned a position on this hierarchy and few shift their position during their lifetime. Vygotsky (1962) argues that a learner's capabilities are not fixed but can be extended though social interaction. He acknowledges individual differences in mathematical attainment but suggests that the cognitive level of student response in mathematics is determined not by the 'ability' of the student but by the skill with which the teacher is able to engage the student in mathematical 'activity'. This implies a need for a pedagogy which relates to students' goals and culture. Students labeled as 'mathematically less able' can dramatically raise

their levels of performance when they become engaged in socially- and culturally-related activities in mathematics (Ernest 1991).

To locate the concept of disadvantage in personalised or individualised explanations is to divert attention away from the more fundamental examination of the structural causes of poverty, inequality, educational divisiveness in our society and the vicious circle of poverty, poor educational performance and limited life chances. The problem is not located in the socially and educationally deprived but within the class divisions in our society. These are reflected in the value system inherent in much adult education.

An example of a situation where the 'correct' solution of a mathematics problem is clearly linked to middle-class norms and expectations is given by Ladson-Billings (1995). The problem given to a group of American youngsters was as follows:

> *It costs $1.50 to travel each way on the city bus. A transit system 'fast pass' costs $65 a month. Which is the more economical way to get to work, the daily fare or the fast pass?*

The white middle-class youngsters suggested the daily fare was cheaper ($1.50 each way for approximately 20 days a month would be $60). In contrast, many of the inner-city youngsters saw the problem as much less clear cut. Their experience was that people often had several low-paying part-time or full-time jobs so might need to take the bus more than twice a day. They also suggested that those without a car might use the bus for other reasons apart from commuting such as going to the cinema or visiting friends and family. These factors might all conspire to make the pass better value for inner city people without a car. Here context, rather than mathematics on its own, determines the answer.

There is a need for learning contexts which trigger the imagination. If the learner is to use their knowledge and experience as a means of linking practice with theory and concepts, there is a need to re-evaluate what we as educators and we as society counts as knowledge. There is a need to re-examine prevalent assumptions that mathematics is absolute not relative, abstract not concrete, context-free not context-bound A move to a more constructivist approach to mathematics allows the knowledge and social experience of the working class learner to be reflected back as valid and significant; the mathematical knowledge hidden in the family, work or community to be recognised. From this the learner can then move to a wider awareness.

Most tutors are themselves middle class. This cultural difference between tutor and working class student is a further factor in participation and achievement. Crucial to working class culture is the element of equality and common interest implicit in the term 'solidarity'. The prevalent concept of adult education as needs-driven implies students with needs and tutors as needs-meeters. The tutor may perceive these needs through a filter of middle class values. It is the responsibility of the tutor to be aware of these issues and ensure that the relationship between tutor and student is built on demonstration of solidarity and on principles of equity and genuine mutual respect.

This is not an easy process for the adult education tutor. Most education institutions are committed to institutional-based and qualification-orientated provision, linked

ideologically and structurally to existing patterns of provision and to the dominant culture and its assumptions. Nevertheless the prize of greater social justice is worth the struggle and as 'others' such as the working class participate more in formal mathematics, our ways of perceiving mathematics will expand. This will be liberating for all of us. It may even result in a genuine learning society and lifelong learning for all.

Bibliography

Apple, M. (1982) *Education and Power*, Boston: Routledge and Kegan Paul.

Benn, R. (1997) *Adults count too: mathematics for empowerment, Leicester: NIACE.*

Carraher, T and Schliemann, A. (1988) 'Culture, arithmetic, and mathematical models' *Cultural Dynamics*, 1(2) pp.180-194 quoted in Carraher, D. (1991).

Clarke, P. (1993) 'Putting class back on the agenda' *Journal of Access Studies*, 8(2) pp. 225-230.

Department of Education and Science (1988) *Final Report of the Mathematics Working Group*, London: HMSO.

Department for Education and Employment (1998) *The Learning Age: a renaissance for a New Britain* Cm 3790 London: HMSO.

Ernest, P. (1991) *The Philosophy of Mathematics Education*, Basingstoke: Falmer Press.

Evans, J. and Harris, M. (1991) 'Theories of Practice' in Harris, M. (ed) (1991) *School, Mathematics and Work*, Basingstoke: Falmer Press pp.202-210.

Fryer,R. (1997) *Learning for the twenty-first century* NAGCELL

Ginsburg, H. and Russell, R. (1981) *Social Class and Racial Influences on Early Mathematical Thinking*, Chicago: SRCD, p.56.

Kennedy, H. (1997) *Learning works: widening participation in further education* Coventry: Further Education Funding Council

Ladson-Billings, G. (1995) 'Making mathematics meaningful in multicultural contexts' in Secada, W., Fennema, E. and Adajian, L. (eds) *New Directions for Equity in Mathematics Education*, Cambridge: Cambridge University Press, pp. 126-145.

National Science Foundation (1983) *Educating Americans for the 21st Century*, Washington, DC. pp.13-14.

Schuller, T. (1978) *Education Through Life*, Fabian Society.

Taylor, R. (1986) 'Problems of inequality: the nature of adult education in Britain' in Ward, K. and Taylor, R. (eds) (1986) *Adult Education and the Working Class: Education for the Missing Millions*, London: Croom Helm pp. 1-26.

Thompson, J.(1981) *Adult Education for a Change*, London: Hutchinson

Tuckett, A. (1991) 'Counting the cost: managerialism, the market and the education of adults in the 1980s and beyond' in Westwood, S. and Thomas, J. (1991) pp.21-43.

Uden, T. (1996) *Widening participation,* Leicester: NIACE.

Vygotsky, L. (1962) *Thought and Language*, Cambridge: MIT Press.

Walker, J. (1988) *Louts and Legends*, Sydney: Allen and Unwin quoted in Watson, I. (1993) 'Education, class and culture: the Birmingham ethnographic tradition and the problems of the new middle class' *British Journal of Sociology of Education*, 14(2) pp.179-197.