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GENERATING NOTIONS OF DEMOCRATIC CITIZENSHIP IN ADULT AND VOCATIONAL EDUCATION

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The Hamburg Declaration on Adult Learning (UNESCO, 1997) states that the informed and effective participation of men and women in every sphere of life is essential to the survival and transformation of humanity. Adult education “is a consequence of active citizenship and a condition for full participation in society. It is a powerful concept for fostering ecologically sustainable development, for promoting democracy, justice, gender equity, and scientific, social and economic development” (p. 1). In this paper I draw upon the work of Giroux, in particular his work on pedagogy of representation and representational pedagogies, to work towards enabling adult and vocational education students and educators to address representational practices that have the discursive power to construct common sense and textual authority.

Introduction

The Hamburg Declaration on Adult Learning (UNESCO 1997) states that the informed and effective participation of men and women in every sphere of life is essential to the survival and transformation of humanity. Adult education “is a consequence of active citizenship and a condition for full participation in society. It is a powerful concept for fostering ecologically sustainable development, for promoting democracy, justice, gender equity, and scientific, social and economic development” (p. 1). In previous years I have interrogated some of the many value-laden influences affecting the work of teachers in the Australian vocational education and training sector, also arguing that VET students are entitled to opportunities, through teaching for difference, for personal development in mathematics (FitzSimons, 1999, 2000b). From personal experience of teaching in the Australian VET sector for over two decades, I will address from theoretical and practical perspectives the issues associated with the development of democratic citizenship from the perspective of mathematics/numeracy education.

Knowledge demands for the new economy: The role of mathematics

It is generally accepted, in the rhetoric at least (e.g., Drucker 1993; Koutsoukis 2000; NBEET/ESC 1996) that the new economy requires creative thinkers who are able to communicate well with ‘customers,’ including fellow workers upstream and downstream throughout the hierarchies, real or apparent, in the work setting (see Waterhouse 1996, for elaboration). I have argued (e.g., FitzSimons in press) that mathematics knowledge — albeit not always recognised as such — is an essential component of communication in workplaces. Although unlikely to be under consideration in the Australian VET sector as it currently operates, mathematics also plays a role in supporting the possibility of democratic

participation — in and out of the workplace. For example, Buckingham (1997) and Wedege (2000) give accounts of how mathematics may be used as a means of control over workers through charts highlighting sick leave or production wastage — workers without adequate mathematical knowledge can find themselves without agency, without a voice to defend their own position. Even their expression of interest in acquiring or possessing mathematical knowledge has to be carefully guarded, in some cases, as it can appear to be potentially threatening to people of higher status.

The discipline of mathematics, including the increasingly popular subfield of numeracy (itself a contested concept, not universal in acceptance), is often taken as given and treated unproblematically — particularly in the Australian VET sector (e.g. ANTA, 2000). It may be supposed that, for a large majority of the population, the meaning of the term ‘mathematics’ is roughly coincident with what they remember from school days, however long ago. However, drawing upon historical, philosophical, cultural and social perspectives, the discipline can be appreciated more broadly for its aspects of social construction, fallibility, basic cultural universality yet with diversity of expression according to context. For example, the use of mathematics of the workplace has been shown to be pragmatic, limited in sites of application, largely dependent upon affordances to hand, focused on the achievement of a particular task and not the algorithm used, often with idiosyncratic methods and symbolisation (e.g., Kaner 1997a, 1997b; Noss, Hoyles, & Pozzi 1998). Yet the universality of activities such as counting, measuring, locating, designing, explaining, and playing (Bishop 1988) cannot be denied — although this is often the case in VET curricula (or training packages) which tend to focus solely on the first one or two (FitzSimons 2000a).

The discipline of mathematics is recognised for its formatting power in the structuring of society as we know it through technologies and other models of various kinds, and for its symbolic power in its specialised use of language as a tool for communication (Davis & Hersh 1986/1988; Keitel, Kotzmann, & Skovsmose 1993). As discussed by Bishop (1988), there are three pairs of values commonly associated with mathematics; rationalism and objectism, openness and mystery, and control and progress. They are valorised by those within the mathematical community and yet have tended to further the alienation of those external to it. As Fischer (1993) observes, while most people are aware of the value of mathematics as an external means of explanation and control, they tend to neglect the internalised, embodiment of the system of concepts and rules in each of us which is integral to identity formation.

Mathematics in adult and vocational education

Engeström (1999) outlined a framework for expansive learning, which took account of the range of interest groups, their historicity, multi-voicedness, contradictions, and possible zones of proximal development. I believe that it is essential with adult and vocational education students to consider their past experiences of mathematics, and the kinds of formative experiences they have experienced along the way. For example, they are born into a three-dimensional world and, as Alsina (2000) highlights, children are usually forced into one- and two-dimensional mathematics education from an early age. In vocational education, spatial knowledge is rarely considered although a good case could be made based upon careful observation of workers’ actual practices (e.g., FitzSimons 2000a); packaging, data or file storage, and warehousing practices are crucial components of many,

if not all, workplaces. D’Ambrosio (1985) poignantly discusses how ‘learned’ matheracy eliminates the ‘spontaneous’ matheracy — and this phenomenon is not limited to developing countries but may also be seen from the histories of adult students. In other words, children in school quickly learn that mathematics is not intended to make sense — and mathematical sense-making seems rarely to be addressed in the Australian VET sector.

In summary, although the discipline of mathematics plays a complex role in an era of globalisation and digitisation, this role is often not well understood — should it ever be under serious consideration. For many, the experience of learning mathematics in school and the concept of democracy seem to be totally incompatible. Klein (2000a, 2000b), discussing theories of subjectification, acknowledges that both teacher and students are subject to relationships of power and knowledge. She argues that: “numerate behaviour reflects a certain agency with mathematics and comprises intellectual and social aspects of knowing mathematics” (p. 76), where agency, like power (Barnes 1988), is discursively determined. The issue is whose voice/s have the capacity to be heard? How do teachers in adult and vocational education position their students in mathematics/numeracy classes? Are their voices able to be heard within and beyond the collective discourses? But then, how are teachers in this sector of education themselves positioned? How were they positioned by the academy as trainee teachers? How are they positioned currently by managers (local and national)? What agency do they feel they have in terms of curriculum and pedagogy?

Democracy and education

Following the late work of Jacques Derrida (1994, 1997) (and acknowledging the contribution of Evan Kritikakos, from Monash University, in discussion on this issue), I consider that democracy is not the present, lived reality of Western ‘liberal’ systems of government. Neither is it a regulative framework, a source of deduction or determinate judgement. Nor is it a Utopia — an idealised concept that we should aim for and might achieve some time in the future. Rather, it is an ethical demand or injunction, concerning concepts of friendship, community, and so forth. It must be understood in terms of democracy to come; not in the future, but in the sense of maintaining now “l’ici maintenant,” without presence. As I understand it, democracy is not a thing to be grasped, nor an absolute standard of moral judgement.

The commitment that adult and vocational education students make to continuing their education is very precious — especially when the opportunity costs of time and money, not to mention emotional risks, are considered. It is therefore incumbent on those with responsibility for this education to attend seriously to their historicity, the multi-voicedness, and the contradictions that their students face. Within the setting of (re)learning mathematics, the work of Longoni, Riva, and Rottoli (2001) concerning the ethics of “delicatezza” indicates the possibility of a respectful interaction culminating in astonishment in the learner for new mathematical discoveries and a disposition towards tolerance for diversity and uncertainty. In other words, adult and vocational mathematical literacy needs to be founded upon respect.

Pedagogy of representation

In relation to racism, Giroux (1994) offers educators a critical *pedagogy of representation*, arguing that such a pedagogy would highlight the role played by the growth

of new mass communication and information technologies inextricably linked to the growth of corporate-controlled and knowledge-based economies in an era of globalisation. In other words, he is calling for a critical pedagogy of public image formation both in the present as it creates, mobilises, and secures particular desires as well as enabling students to understand their own historical locations and social formations in relation to the ordering and structuring of dominant practices (e.g., the institutions of mathematics and mathematics education) in order that they can produce and mobilise new forms of identity and agency.

It is accepted that one aim of mathematics education should be to demystify this mathematics, to promote creativity and citizenship as well as a critical attitude towards the use of mathematics. The *Adult Literacy and Lifeskills* international survey [ALL] website document [<http://nces.ed.gov/surveys/all/documents/num.pdf>] proposes a working definition of *numerate behaviour*. However, it does not appear to address in practice the development of critical attitudes among adult learners as proposed by the UNESCO agenda (1997) or the Commission of the European Communities (EU, 2000). Survey documents such as this may be interrogated, with students, for their construction of the ‘numerate person.’ In fact, I assert that all documents (in whatever media) which exhort or even compel certain groups of people to study mathematics (or numeracy) without problematising the curricula or pedagogy should be examined critically to see whose interests they are serving (e.g., FitzSimons 2000a, 2001).

In the next section I illustrate an aspect of Giroux’s (1994) work which lends support to adult learners (of mathematics in this case) to challenge their positioning. This is especially important in view of the gatekeeper role that mathematics plays in our society.

Representational pedagogies

In terms of *representational pedagogies* Giroux (1994) suggests that beyond analysis of structuring principles, students learn to identify, challenge and rewrite such representations. Pertinent to mathematics education for adult and vocational students, he advocates the discovery and recovery of hidden histories, “rewriting the relationship between identity and difference through the retelling of a historical past” (p. 50). In other words there should be an engagement, by students and teachers alike, with the social and political realities associated with the discipline of mathematics shaping the larger society, while they maintain a critical attitude towards pedagogical practices employed in mathematics education.

The following are excerpts from one adult’s mathematics life history (in italics) with possible re-working as a form of representational pedagogy (in bold):

Jane’s Story

When I was ten we had a teacher who was keen on what he called “Mental Arithmetic” which stopped me from being able to calculate sums in my head, which I could do up till then. From then on, my maths learning was learning little tricks of survival to try to cope with the panic that had been sown. Tricks to see around the panic. But it never left me.

[Mathematical facts are quickly recalled and have only one right answer.

People judge you as a person by how well you perform these tasks.]

In form 5 we had a teacher who loved Maths, but didn’t want to let me in on his secrets, because when I asked complicated questions he would say: “Well you won’t

need to know that until you get to University and you won't be going (not many country kids did). So don't bother your pretty head about it." And the boys would snigger and look superior, and I never knew if they knew what I wanted to know, or whether they were in the dark too.

[Mathematics, and higher education in general, are not the domain of girls or of rural children.]

As a result, and this fascinates me, the questions I was asking then I am still asking now. I asked these questions in my maths year 11 class last year and bamboozled [confused] the teacher without meaning to. Perhaps the questions I ask don't have answers.

[There is some mathematical knowledge which is not open to all. Perhaps the discipline of mathematics is not meant to disclose all of its mysteries.]

What messages are we as adult and vocational educators giving our students, though our intended curricula, our implemented curricula, our words, and our behaviours? How can we work to challenge stereotypical roles and positionings, especially in a discipline such as mathematics which is so strongly associated in complex ways with issues of power? In the following section I detail some activities which I believe could empower vocational students in their roles as citizens as well as (prospective) workers.

Examples of attempts towards democratic participation

On the suggestion of a pharmaceuticals manufacturing employer, students (operators) were to spend time on the institutional campus as well as learning on-site in their workplace. The students were, typically, a non-homogeneous group in terms of previous educational levels and included some immigrants for whom English was not their first language.

To help develop (for some students at least) a cultural awareness of libraries and to increase their accessibility, the core basic computing and mathematics modules were linked by having the operators learn how to access the university library catalogue, and then to use their knowledge of decimals to locate a book of their choice, with borrowing as a further option. This activity was designed to enhance or reinforce students' confidence with using a computer for a real practical purpose, with making sense of the Dewey decimal system of cataloguing, and to give the students ownership of the task as they chose and located a book or journal of immediate interest to themselves. Of course, the learning objectives had to be 'ticked off', but this activity replaced the practice of giving pages of decontextualised or pseudo-contextualised exercises — the typical fare of school (and much vocational) mathematics. Rather, the students who needed help could turn to whomever they wished for help, and see the logical structure of the system for themselves (as well as the vagaries of using technology which does not always perform as and when you need it!). Their questions were genuine, and they were given time and space to learn what they needed. This activity was complemented by others set in their immediate workplace locations, incorporating knowledge of decimals and computers for practical purposes, as well as the social uses and misuses of computers. Unfortunately the social impact of mathematics was not included under the learning objectives.

A second example is provided by a project set for Science Laboratory Technicians to extend their knowledge, both theoretical and practical, in the area of Quality Assurance. Systematically collecting data on a topic of personal or professional interest, and then

analysing it using professional, statistical techniques together with justified personal interpretation, gives students the agency that Klein (2000a, 2000b) was advocating. In the past, students have, for example, brought about improvements in their workplace and domestic arrangements — for example, in the use of the family refrigerator, in the removal of one of the TAFE institute's drinking-fountains whose water was found to be too high in copper levels, and in the less haphazard production processes of paint manufacturing.

I consider that these activities opened up new democratic possibilities to at least some of the students, giving them a sense of agency over both the topic at hand (mathematics/statistics) and activities of concern in their lives. Students had some control over the uses to which their knowledge was put, even though this was not a feature of the curriculum as it was prescribed. They gained in self-confidence, were able to critique aspects of their everyday environment which affected them personally and to justify their assertions. In short, they found a new voice.

Conclusion

Engeström's (1999) model of expansive learning allows for creativity and interaction between Activity Systems operating in relative isolation. Contradictions are many — such as endless calls for creative problem-solving workers (mentioned above) in the face of narrow outcomes-based educational agendas, with teachers who would be considered unqualified in other sectors or other countries, not to mention outdated equipment such as dot-matrix printers attempting to draw state-of-the-art statistical (and other) graphics. Such contradictions may be exploited for or against the interests of democracy, and can possibly be negotiated — but typically they are resolved pragmatically by teachers in the interests of their students and their own survival. In my experience of TAFE teaching over the last two decades, contradictions tend to be ignored by managers and politicians until they become a political threat (see Offe 1972). Yet, as the Australian Education Union (2001) claims, teachers have the right to teach in a well-resourced learning environment — as students have the right so to learn.

The ideal in Engeström's model would be expansion from isolation to collaboration in design and implementation of curriculum (taken in its broadest sense) and engagement by *all* stakeholders with this curriculum — not forgetting the importance of these people being able to operate within their individual Zones of Proximal Development. Expansive Learning would emanate from conversations, analyses, and genuinely open research; and by stakeholders reflecting on alternative/new models of implementation. Just as one way to overcome the disempowering legacies of past oppressive pedagogical discourses in mathematics is to critically analyse their practices, one way to empower students for democratic citizenship is to enable them to incorporate their personal and professional interests in a critical manner.

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