Linking Mathematics Education and Democracy: Citizenship, Mathematical Archaeology, Mathemacy and Deliberative Interaction

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Abstract: The relationship between mathematics education and democracy is discussed in terms of citizenship, mathematical archaeology, mathemacy and deliberative interaction. The first issue concentrates on the learner as a member of society; the second on the social functions of mathematics and on how to get to grips with mathematics in use; the third refers to an integrated kind of competence including different forms of reflection (mathematics-oriented, model-oriented, context-oriented and lifeworld-oriented reflections); the fourth issue considers the classroom as a micro-society and deals with the nature of the teaching-learning process. These four issues are discussed with reference to an example of educational practice, “Our Community”, carried out among sixteen-year-old students as an interdisciplinary project including a one-week trainee service. Finally, it is indicated that a discussion of mathematics education and democracy is essential to a further development of social theory, as the notions of citizenship, mathematical archaeology, mathemacy and deliberative interaction become part of the discussion about modernity, reflexive modernity and other constructs from recent social theory.


ZDM-Classification: A40, C60, D30

Introduction

In Reflexive Modernization, Ulrich Beck, Anthony Giddens and Scott Lash discuss social development in terms of modernity, individualisation, post-tradition, reflexion, risk society, and several other constructs from recent social theory. In separate chapters each author presents an analysis; and in The Reinvention of Politics, Beck interprets the industrial society as an expression of modernity. However, the very success of industrialisation brings with it a development towards a different kind of modernity: “This new stage, in which progress can turn into self-destruction, in which one kind of modernisation undercuts and changes another, is what I call the stage of reflexive modernisation” (Beck, Giddens and Lash, 1994, p. 2). This development is not decided upon or monitored by any democratic institution. It is a social, “sub-conscious” process. In this way reflexive modernisation brings us into a risk society (Beck, 1992).

If we study the index of Reflexive Modernization, we do not find any reference to “mathematics”. However, Beck’s chapter contains the following observation: “Risks flaunt and boast with mathematics” (Beck, Giddens and Lash, 1994, p. 9). To me, this comment is crucial, but in Reflexive Modernization it is left as an insignificant side remark. A discussion of mathematics and mathematics education with respect to democracy does not appear to be considered significant for a deeper understanding of today’s societies. Instead works like The Theory of Communicative Action I–II by Jürgen Habermas and The Constitution of Society by Anthony Giddens seem to subscribe to the idea that mathematics is “harmless”; a thesis which has been put forward by G. H. Hardy in A Mathematician’s Apology. Hardy devoted his life to “pure” mathematics and did not find any link between this occupation and “worldly matters”.

I shall maintain that the opposite is the case: An analysis of mathematics, mathematics education and democracy is essential to an interpretation of social development and to a discussion of, for instance, modernity, and reflexive modernisation. I shall return to this point in my conclusion. In what follows, however, I shall first of all concentrate on issues which relate mathematics education and the problems of democracy.

For this discussion, my involvement in a mathematics education project in South Africa has meant considerable inspiration to me. In a significant way the development in this country has raised issues about democracy and education.

Democracy

The linguistic roots of “democracy” are found in Greek. Demos means “people”, and cratos means “rule”; so, literally speaking, “democracy” means “ruled by people”. This conceptual clarification, however, raises two fundamental questions: What does “ruling” mean? And: Who are the people? “Ruling” can refer to “legislation”, but it can also refer to the actual process of carrying out decisions. In ancient Greece, the answer to the latter question was “free men”; slaves and women were not included.

Two extremes in the interpretation of “democracy” can be illustrated by the ideas of Joseph A. Schumpeter and Jean-Jacques Rousseau. In Capitalism, Socialism and Democracy, published in 1943, Schumpeter suggests an interpretation of democracy which is clear and simple. To him the role of the people is to produce a government, and he defines the democratic methods as “that institutional arrangement for arriving at political decisions in which individuals acquire the power to decide by means of a competitive struggle for the people’s vote” (Schum-
Democracy and education

The Second World War raised the questions: How could Nazi barbarism emerge in the heart of Europe? Did education have a responsibility in not trying to prevent the development of authoritarianism? The claim of critical education is: Fundamental undemocratic developments must be challenged by education! In fact, the development of “critical education” can be seen as an educational attempt to provide a new foundation for education for citizenship.4

However, already in Democracy and Education from 1916, John Dewey integrates a broad perspective on democracy with an interpretation of education. He elaborates this perspective in subsequent writings. According to Dewey’s pragmatic interpretation of science, nothing can be taken for granted. Science must refuse any form of dogmatism. Every question must be investigated with fresh eyes, and such a process, particularly as developed in empirical sciences, represents a process of inquiry. Basically, this process is initiated by a problem and based on experience. A research process can, however, also be interpreted as a process of learning. “It is a cardinal precept of the newer school of education that the beginning of instruction shall be made with the experience learners already have; that this experience and the capacities that have been developed during the course provide the starting point for all further learning” (Dewey, 1963, p. 74).

In his introduction to John Dewey’s On Education, Reginald D. Archambault summarises Dewey’s point of view concerning democracy, the scientific method and learning in the following way: “Dewey saw democracy as the political manifestation of scientific method, with its combination of purposiveness and objectivity, freedom and discipline, individual speculation and public verification. ... The aim of education is the development of reflective, creative, responsible thoughts. Hence, Dewey’s whole conception of science, and its methods and its aims is directly relevant to education” (Dewey, 1974, p. xvii–xviii). The scientific method bridges over education and democracy. Education which organises itself in line with an inquiry process becomes “education for democracy”.

That education has a social role to play can also be observed “negatively”. During the apartheid period of South Africa, Fundamental Pedagogics was developed in order to help “justify” the apartheid system. The dictatorship found it essential to involve education in such a task, and Fundamental Pedagogics became education for non-democracy.5 An important step to be taken in the education of the new South Africa is precisely to re-develop education as part of a democratic endeavour. Still, we have to keep in mind that whatever undemocratic aspects of global development we might refer to, the ultimate in barbarism against democratic life took place in central Europe.

Dewey makes two claims: (1) Education and democracy form aspects of the same discussion; and (2) the scientific method provides the important bridge between education and democracy. To me, Dewey’s first claim is as actual as ever, certainly illustrated by the development in South Africa. However, I find Dewey’s second claim problematic; also when we take a look at mathematics education.

Democracy and mathematics education

If mathematics is interpreted as language, the speech act theory of language (see Austin, 1971, and Searle, 1969) will raise the question: What can be done by means of mathematics? Mathematics can be interpreted not only as a descriptive tool, but also as a source for decision making and action. This brings into focus the notion of “symbolic power”, discussed by Pierre Bourdieu (1991), and the theme of “knowledge and power”. Michel Foucault has concentrated much of his work on unmasking the interplay between “knowledge” and “power” (see, for in-