

The school mathematics practice and the mathematics of a practice not socially identified with mathematics¹

Elsa Fernandes, Universidade da Madeira, Portugal

Contextualizing the project

In the last decades, researchers of different areas – namely anthropologists, psychologists and mathematics educators – have increasingly worried about different forms of mathematical knowledge, such as the mathematics of street sellers (Nunes et al., 1993), of sugar-cane farmers (Abreu, 1995) and of carpenters (Millroy, 1992). Following Abreu (1993, p. 3) “very little is known about the conditions in which children home knowledge is evoked and how it interacts with school knowledge. The inverse is also true, in the sense that the way school knowledge interacts with out-of-school knowledge is also a subject under investigation”. But according to Boaler (1997), in the community of mathematics educators it seems that few persons believe that students are able to use mathematical knowledge they gain in classrooms, outside that context. In several studies (Abreu, 1995; Lave, 1988; Lave et al., 1984; Nunes et al., 1993) real situations that involved mathematics, such as street sales, grocery shopping, etc, have been observed and it appears that mathematical methods and procedures learnt in school were rarely used.

Lave (1988) used the results of her research about the grocery shopping activity, to criticize the traditional belief that mathematics is an abstract and powerful tool, whose knowledge is easily transferred from one situation to another. From her perspective, mathematics teaching in school is conceived as the acquisition of abilities that subsequently can be transferred to other practices. Lave (1988) criticizes ‘learning transfer’ theories and presents her thesis of learning as a ‘situated’ phenomenon that is intrinsically linked to the situation or to the context where it happens.

Also Bernstein (1975) raises the question of differences between uncommonsense² knowledge of school and commonsense knowledge. School knowledge is uncommonsense knowledge. Thus, we can raise the question of the relationship between the uncommonsense knowledge of school and the commonsense knowledge, everyday community knowledge, of the pupil, his family and his friends. This formulation invites us to ask how strong are the frames of school knowledge in relation to experimental, community-based

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² Bernstein (1975) uses expressions such as commonsense knowledge, everyday community knowledge and experimental-knowledge with the same sense. In the same way these expressions will be used in this paper.

knowledge. School socializes, very early, students into knowledge frames which discourage connections with everyday realities.

The principles of classification and framing are used to identify different kinds of curriculum structure and pedagogic practice that relate to forms of social organization. Framing was defined by Bernstein (1971) as the degree of control teachers and pupils have over the transmission knowledge. “Framing refers to the form of the context in which knowledge is transmitted and received. Frame refers to the specific pedagogic relation between teacher and taught, [...] to the strength of the boundary between what may be transmitted and what may not be transmitted, in the pedagogic relationship. Where frame is strong, there is a sharp boundary, where frame is weak, a blurred boundary, between what may and may not be transmitted, Frame refers us to the range of options available to teachers and taught in the control of what is transmitted and received in the context of the pedagogic relationship. Strong framing entails reduced options; weak framing entails a range of options. Thus frame refers to the degree of control teacher and pupil possess over the selection, organization and pacing of the knowledge transmitted and received in the pedagogic relation” (Bernstein, 1971, pp.205-6).

The first kind of boundary that may be considered here is between school knowledge and everyday knowledge, or between what children may bring with them from outside school and what they have to leave at the school door. This might refer to artifacts but more specifically it refers to what can literally be said and not said in the school context. The local school culture and the curriculum that is maintained by this context will determine the nature of this boundary.

Pedagogic framing makes school knowledge something not mundane, but something esoteric, which gives a special significance to those who possess it. When this frame allows everyday realities to come, it is often, for purposes of social control.

Knowledge that school entails is based on a distributive principle so that different knowledge and its possibilities are differently distributed to different social groups. This distribution of different knowledge and possibilities is not based on neutral differences of knowledge but in a distribution of knowledge that carries unequal values, power and potential (Bernstein, 1996).

These ideas make me want to better understand the relations between mathematics used in a practice that is not socially identified with mathematics and school mathematics.

Aim of the project

Continuing the line of my previous research (Fernandes, 1998), I’m starting a new research project aiming at identifying and characterizing student’s mathematical knowledge in a practice not socially identified with mathematics and trying to understand how that knowledge can be linked to mathematics curriculum and to mathematics curriculum development in school.

The following questions of research have been formulated:

1. What are the differences (similarities) between of school mathematics practice and the mathematics of a practice not socially identified with mathematics? Is there a boundary?
2. Where comes from mathematical knowledge students show in mathematical activities when they are in a practice not socially defined as mathematics?
3. If mathematics is a socially defined activity, who validates what is mathematical knowledge? How is that process realized?
4. Why students fail in learning mathematics at school and succeed in activities that evolves mathematical knowledge, but are not socially defined as mathematics?

Theoretical background

In this project I want to explore two theoretical issues that I find of extreme importance. This issues address, on the one hand, what knowledge is, and what mathematical knowledge is. On the other hand, it is also important to think about how mathematical knowledge learned in school could be integrated in the students' future (or actual) occupation. For these I will explore 'key-concepts' such as situated learning (Lave, 1988, Lave and Wenger, 1991, Wenger, 1998), practice (Lave and Wenger 1991, Wenger 1998, Bernstein, 1990, 1996), communities of practice (Lave and Wenger, 1991, Wenger 1998), legitimacy (Lave and Wenger, 1991, Wenger 1998), knowledge (Lave and Wenger 1991, Wenger 1998, Bernstein, 1971, 1975, 1990, 1996), legitimate discourse (Bernstein, 1990, 1996), and recontextualization (1990, 1996).

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