

# **RECOGNIZING AND VALIDATING MATHEMATICAL COMPETENCE IN ADULTS: POLITICAL AND ETHICAL DIMENSIONS<sup>1</sup>**

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Simone – a 45 years old lady quite confident in life despite the fact that she left the school when she was 14 – works at a well known supermarket where she is responsible for the fish department and deals with quite sophisticated processes in the everyday. Her colleagues and the supervisor of the supermarket agree that Simone is a rather competent worker. She faces now the need to hold a 9<sup>th</sup> grade diploma in order to get a promotion. Her expectation is that the official process of recognition and validation of competencies will help her in the near future. According to the state department in charge of this process she will need to show evidence of competences in the area of Mathematics, Language, ICT and Citizenship.

The process of recognition takes place in meetings with a mediator (in most cases a teacher or a psychologist) who will help the candidate to produce a portfolio of some aspects of her life that will be appreciated and a final decision will be made about the need for Simone to take regular courses – for example in Mathematics.

The background where this scenario is running is a society where more and more academic diplomas are valued for a number of reasons although they don't constitute a pass to employment. The European policy regarding the valuing of acquired competences in the work place give birth to complex implementations of schemes and frameworks in order to make easy and straightforward the task of recognition and validation. However, in the field it seems clear that the only reference that people have is the school and we acknowledge the phenomenon of interpreting the process of recognition of competence from within a rather strong academic framework.

Research in mathematics education can contribute to help understanding how people organize her mathematical knowledge. For a number of years, both cultural studies and studies in the tradition of ethno-mathematics provided accounts of the particular ways people organize, adapt and build up mathematical structures and forms of thought in order to make sense of everyday activities. Now, the educational systems in Europe face the challenge of recognizing, validating, and certifying mathematical (and more general) competences in people such as Simone. This is a challenge to education – and in particular to mathematics and science and technology education – as millions of people in Europe who didn't follow the regular compulsory schooling (but who want to acquire the certification of the basic or secondary studies, valuing their personal and professional experience) are potential candidates.

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## **1. WHAT DO WE MEAN NOWADAYS BY BEING ‘MATHEMATICALLY COMPETENT’?**

A shift from ability, attitude and knowledge into competence is clear in many curricula and mathematics education programs. This trend is also apparent in adult education namely in the processes of recognition of experience for the purpose of getting certification from the educational authorities. In Portugal it is implemented for 6 years a system of recognition of competences that takes as a basis a set of Guidelines produced by the Ministry of Education. However, it is not explicit what is meant by mathematical competence although it is quite apparent that mathematical competence is equated as knowledge about school mathematics and some ability to give examples of ‘applications’ to the ‘real world’.

Two issues should be raised when thinking about mathematical competence. First, the epistemological and ontological problem of competence. What is the nature of competence? can we conceptualize competence in the absence of action? In other words: am I able to show that I’m competent in cooking in the absence of really cooking something? If we take the notion of ‘competence in action’ as referring to a quality of the action itself – in the sense that the word competent brings in an adjective stance – we come to admit that we can act with more or less competence (in some specific sense) and this means that we use a certain form of pattern when we refer to competence. This creates the opportunity to bring into play the claim that one can not discuss what it means to be mathematically competent in today social world without making links to a variety of issues (e.g. understanding how prices are defined, how population is controlled and subject to surveillance according to the generally accepted defence policy in most countries, etc.) and to understand and use mathematical models to make sense of the everyday.

## **2. WHAT ARE THE DIMENSIONS OF THE FIELD OF COMPETENCES THAT CAN BE CONSIDERED RELEVANT IN MATHEMATICS?**

Literature on adult education provides a range of views on how to improve people culture, skills and competence. However, adult education (specially in mathematics) is seldom seen and assumed as a political act<sup>2</sup>. But what would be the implications of such a positioning in regard to the conceptualization of competence in mathematics? Matos, Santos and Mesquita (2006) developed a set of guidelines to support mediators and educators to recognize and validate mathematical competence at the secondary level<sup>3</sup>. One of the key starting points was the assumption that mathematics confers a rather strong dimension to the models that society creates and adopts. This

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<sup>2</sup> In fact, all kinds of education and of mathematics education are a political act. The difference here is that not only we affirm the political character of any educational option but we explicitly assume intentionality and directionality towards freedom, emancipatory and social justice (Freire, 1985).

<sup>3</sup> The task of constructing such a set of Guidelines (called Referencial de Competências, in Portuguese) was carried after an invitation to the first author by the Ministry of Education in 2005.

is quite visible in most everyday situations. But there is a variety of mathematical models (not necessarily visible) that play a regulative role, prescribe and orientate many social practices (such as, for example, in state administration, while regulating mobility, access and progression of teachers in public schools). The knowledge and the use of mathematical models, representations and mathematical artefacts sustains people participation in the social world. Thus, being mathematically competent includes playing, in a critical way, with mathematical models, representations and artefacts. Matos, Santos and Mesquita (2006) have chosen the issue of sustainability among the web of possible hallmarks that make up the importance of mathematics in today society. And in doing so, they claim that “sustainability of democratic society necessarily presupposes a certain level of mathematical competence allowing citizens to reflect and intervene in the several domains of their practices (personal, professional and institutional)” (p. 4). It is of decisive democratic importance that everybody has at hand the essential instruments to understanding the role of mathematics in society. Not having access to those instruments may mean that one becomes a victim of social processes from which mathematics is just but a quite strong dimension.

Therefore, Matos, Santos and Mesquita (2006) suggest a framework that takes three units for mathematical competence: mathematical modelling, mathematical representation and mathematical artefacts. These three units are crossed with three dimensions: communication (as the repertoire which includes models, representations and artefacts), analysis (as the ability to elaborate and interpret) and technology (referred to the ability to use).

While escaping from a characterization of mathematical competence based on traditional mathematical areas (e.g. algebra, geometry, statistics) and putting as an entry point key dimensions of mathematics as part of people practices, these authors brought up the apparent difficulty of adjusting and articulating the form of talk mathematics in school with the tacit and rather pragmatic character of people everyday practices. Thus, the critical issue of relevance of dimensions in mathematical competence is open to reflection and interrogation: relevant to whom? and relevant to what?

### **3. WHAT IS THE ETHICS OF THE PROCESS OF RECOGNITION AND VALIDATION OF MATHEMATICAL COMPETENCES?**

One of the key issues in the process of recognition of competence is the ‘how’ of that process. How is mathematical competence recognized? does a person recognize his or her competence? how should we specify criteria of evidence that help someone (the mediator or educator) to identify a mathematical competence? These are rather difficult questions if one assumes to preserve the complexity of the task of recognizing competences in adults. How can I recognize a certain competence in the other unless by observation of signs and verbal expression, asking the person for certain productions? and how can the person display the (specific) competence unless

there is some need to put that competence in action? what about consciousness in this process? It seems unavoidable to escape from the very idea of ‘conscientization’ after Freire (1985) and the intentionality that the mediator / educator needs to put in the interaction with the adult whose competence wants to be recognized. These are the kind of questions that one needs to address when reflecting on the ethics of recognizing mathematical competence.

Certainly that we must ask who should own the power of deciding about people mathematical competences. Because it is socially accepted that the educational authorities own the right to do it (as certification of competence is regulated by the power conferred by society to special social groups and institutions such as secondary schools or universities) the responsibility is ultimately in the hands of mediators and mathematics educators and in their critical orientation.

#### **4. FURTHER QUESTIONS FOR ANALYSIS: IN SEARCH OF A THEORETICAL FRAMEWORK**

Taking learning as participation in communities of practice (drawing on the approach proposed by Lave & Wenger, 1991) we see people as members of communities (both at a local and a global level) sharing frameworks, ideas, tools and information, and thus making specific the knowledge that the community develops and maintains. Practice within communities of practice tend to evolve as a collective product where several contributions seem to be relevant. First, the interactional facilities provided by the setting bring in opportunities for people to define joint tasks and take initiatives making them knowledgeable to others and thus creating a sense of mutuality (Wenger, 1998). But if one addresses learning – and thus the construction of competence in action – from such a stance, it creates a critical paradox as competence is situated in communities of practice and therefore not exportable to settings adapted for the purpose of recognition<sup>4</sup>. As the adult and the mediator / educator keep building together a portefolio aiming to document the life history of the adult – recording and sharing information about the past and ongoing activities and discussing and making representations of the results of their analysis and of the discussion – they are producing a reificative memory of the practice (Wenger, 1998). Because the different teams create spaces of interaction that allow adults to participate in the negotiation of the ways events are reported within the communities of practice (in Centres where recognition takes place) and thus creating ways of showing the developments, the communities contribute to maintain a participative memory therefore allowing continuity of the practice of recognition. All these contribute to the development of the competence of members creating entry points for the negotiation and development of new enterprises shaping the engagement of

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<sup>4</sup> Until 2006, around 120 Centers for Recognition of Competences (in Portuguese, Centros de Reconhecimento, Validação e Certificação de Competências, RVCC) opened in Portugal with the specific purpose of receiving adults seeking for the recognition of acquired competences in their past experience. Nowadays these Centers are called ‘Novas Oportunidades’ (New Opportunities) but they keep the dual character of recognition of competence and education of adults in regular courses.

people in the practice of recognition – a rather crucial dimension of belonging to the communities (Wenger, 1998). But the paradox of recognizing a mathematical competence out of the practice where it is normally displayed tends to cut out the possibility of de-schooling the processes of recognition.

Inducing consciousness that one belongs to communities helps to create possibilities for people to realize their location in the space of the different local communities and at the same time to create possibilities for people to locate themselves in the meanings shared by the members. As knowledge and power are distributed among participants this creates conditions for people to locate themselves in the process of recognition and thus opens opportunities to ‘conscientization’.

This very brief entrance in a situated perspective where learning is seen as participation in communities of practice raises key questions such as: how should we theoretically frame the recognition of mathematical competences? how can we draw on critical mathematics education theory including aspects of situated learning theories?

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