MATHEMATICS *FOR LIFE* OR MATHEMATICS *OF YOUR LIFE*: A STUDY OF THE RVCC PROCESS OF PORTUGAL

Maria Cecilia Fantinato[1]

Universidade Federal Fluminense

This text aims to present some results of a post-doctoral project, which sought to understand pedagogical practices in contexts of adult education in Portugal, in the area of Mathematics. The study was based on a theoretical framework that reconciles literature from the fields of Adult Education, Ethnomathematics and Experiential Learning. A qualitative and multi-sited research was conducted, following the dynamics of the adult education centers, the professionals who work with adults and particularly the formers of an area titled "Mathematics for Life", which was part of the process of Recognition, Validation and Certification of Competences. The practice of the RVCC process proved to be challenging and complex, both to professionals and to adults involved.

INTRODUCTION

Throughout my journey as a researcher in the areas of Adult Education and Ethnomathematics, I have focused on some issues, such understanding the quantitative and spatial representations of a group of low educated adults (Fantinato, 2004), or how the ethnomathematical approach can contribute to teacher education. Among other subjects, I have investigated the extent to which contact with cultural diversity, which is characteristic of adult education, stimulates openness to unconventional forms of mathematical reasoning among teachers. I have studied as well, how adult Mathematics teachers create spaces of dialogue between different types of mathematical knowledge in the classroom (Fantinato, 2008). These issues were present during the achievement of my postdoctoral research[2], which sought to understand principles and practices of adult education both in Brazil and in Portugal, and in particular to grasp Mathematics teaching practices and their forms of interaction with students´ diverse mathematical knowledge and their construction processes.

This text aims to present some results of the development of this project, during the stage carried out in Europe. I have chosen here to perform an analysis, from the ethomathematical perspective, of the Portuguese process of recognition, validation and certification of competences - named RVCC process - focusing on its contradictions and on the challenges faced by professionals of "Mathematics for Life" (ML) area.

THEORETICAL FRAMEWORK

From the moment of its entry into the European Community in 1986, politics of education and training of adults in Portugal have come under the influence of the Lisbon Strategy[3] and its values of "lifelong learning". One of the consequences of

seeking integration into European models was the creation of the *Centros Novas Oportunidades*[4] (CNO), which from 2005 to May 2012, brought together the many activities related to adult education in Portugal, most of them located in school groups. The main activity performed in CNOs was the RVCC process, which was intended to assign a final school certification to adults.

The RVCC process is a practice on recognition of acquired experiential learning, and as such, according to Canário (2006), brings two ideas constituting its essential foundations: the notion that a person learns from the experience and the principle that one should not teach people what they already know. It assumes that "people are lifelong producers of their own knowledge, and that this knowledge driven from experiential learning processes, may be the subject of recognition, validation and certification[5]" (Cavaco, 2009a, p. 150). The RVCC process works on the principle of recognition of skills. This is a process that

> is based on a set of methodological assumptions [such as Balance of Powers, (auto) biographical approach] that allow demonstration of competencies previously acquired by adults throughout life, in formal, non-formal and informal contexts, which unfolds in the construction of a Reflective Portfolio of Learning oriented to a Key Competencies Referential. (ANQ, 2007, p.15)

A competence approach involves recognizing and valuing the knowledge acquired, especially in informal and non-formal contexts, reflecting the life learning of adults, differing, thus, from approaches that focus on the acquisition of subject content in formal learning contexts. These are life skills that enable adults to "understand and participate in knowledge society, mobilizing through them the knowing, the being and the know how to solve problems that the changing current world confronts them constantly" (ANEFA, 2002, p. 9). In this perspective, in the RVCC process competencies appear "as emerging from the action, giving them a finalized, contextual and contingent character" (Canário, 2006, p. 41).

Experiential Education, one of the theoretical orientations that guide the practice of recognition of experiential acquired learning in Portugal (Canário, 2006), considers experiential learning as "a local use knowledge, that the individual shares with the other members of the community to which he belongs [...] comprises the dimensions of knowledge, know-how and know being (Cavaco, 2002, p.39).

The research line of Ethnomathematics (D'Ambrosio, 2001) has also addressed the issue of knowledge constructed within contexts of life, more specifically, of mathematical knowledge built by different cultures, namely "how social groups are aware of their needs and on what terms they use their local math to address them" (Moreira, 2009, p. 66). Ethnomathematics:

> Has pioneered research and studies that seek to understand the different modes of youngsters and adults mathematical reasoning, that result from a cultural background built predominantly in contexts of domestic and professional life, without excluding previous school experiences. (Fantinato & De Vargas, 2010, p. 37).

I consider that, despite some crossovers between this theoretical approach and Experiential education, Ethnomathematics can provide a differentiated analysis of some principles of the ML component of the RVCC process, as well as a new look at the (mathematical) experiential knowledge of adults to be certified.

RESEARCH CONTEXT AND METHODOLOGICAL PROCEDURES

Research carried out was of a qualitative nature, using the modified analytic induction approach (Bogdan & Biklen, 1994). The project was developed in several CNOs and therefore the investigation can be considered as multi-sited. I have carried out a descriptive study, with a concern for the meaning given by participants. Throughout the investigation I used different instruments for data collection: document analysis, participant observation and semi-structured interview. Analysis and data collection were developed alternately. Because this was a qualitative study, I considered my own transformations in the process as a way of defining the object of investigation.

In a first moment of investigation, I carried out an analysis of the official documents of the National Agency for Qualification of Portugal (ANQ), which provided theoretical and methodological policies and guidelines for adult education in this country, at the time research was conducted. Particularly, I studied the Referential of Key Competencies of Adult Education (ANEFA, 2002), for primary and secondary level, trying to locate where these documents addressed the area of Mathematics. Since I did not find in the document for the secondary level explicitly mathematics[6], I focused on the analysis of one of the four areas of Referential for basic level, the one titled "Mathematics for Life". This document is structured into three skill levels, called "B1, B2 and B3, taking as reference the correspondence with the cycles of the Primary School, although they can not be identified with them" (ANEFA, 2002, p.11), and serves as a parameter to the RVCC process.

Fieldwork itself happened from November 2011 to March 2012, when I scoured several CNOs located in the metropolitan area of Lisbon and nearby municipalities. I watched practices and conducted interviews with directors, coordinators, and especially *formers* of "Mathematics for Life", using *snowball sampling technique*, one respondent indicating another, which indicated another, and so on, until I had enough information. Four of the Formers of ML selected for interview were graduates in Mathematics, and one had his degree in Engineering. These professionals all had previous experience as Mathematics school teachers, and by the time data was collected, two of them, besides working with adults, were also teaching Mathematics to regular students. However, despite their experience as classroom teachers, in carrying out professional practices of RVCC process with adults, they would identify themselves as *formers*. The different designations are consequence of different professional roles, while interacting with adults or with school children.

The interviews took place at informants´ workplace, at a time that was convenient for both the interviewer and interviewees. Later they were transcribed and analyzed,

based on the categories that emerged from the process. The analysis gave priority to challenges and contradictions of daily experience with RVCC process by professionals responsible for the area of mathematics. Therefore, this paper focuses on the interview data with ML Formers.

UNEARTHING THE PROCESS STEPS

The dynamics of the RVCC process comprises several steps. Upon arriving to CNOs, adults are received by technician for diagnosis and referral, which evaluates their ability to perform the RVCC process and indicates the level that should be integrated. After the RVCC professional has evaluated the adults in an individual interview, they go to next stage, when their work will be oriented by Formers from four different areas, one at a time, among them, "Mathematics for Life". The *decoding sessions* take place at this moment, whose main objective is:

> to try to show people what they have, or can speak in terms of subjects, to meet, matters which make, mathematically speaking [...] shopping, budget management, administrating a house, or a division of a house, and all that that implies. Or something that people can make at work, and then can write about. And then try to make them realize that with these situations, they can get validate competencies in the four units that compose the Referential (Mariana[7], ML former).

The initial work of the ML former is to show the adults what issues they might indicate in terms of their life experience and from a mathematical point of view, so they can later articulate in the written form their life story, where the situations described demonstrate competencies that can be validated according to the Referential "Mathematics for Life" (ANEFA, 2002). During the first decoding sessions, trainees have access to the Competencies Referential. One of the challenges of ML former is the adaptation of this official document text - written in formal language - into a form that is understandable to adults. Educators try to seek this challenge by elaborating tools for their work in the process. Mariana built a sheet entitled "What competencies from your daily life you can demonstrate?", which features more accessible and contextualized questions, elaborated consonants concepts that are at the Referential. One of the questions in this form asks if the adult usually relate the number of installments of a home, a car or an appliance with all the loans and the interest rates one will pay, and asked to describe life experiences that demonstrate this competence. Leandro, another ML former, when starting the decoding sessions, usually passes a movie that shows journalists interviewing fair dealers about their daily mathematical knowledge. He said it was a film "that dismantles everything," and that helps adults perceive that his role as former is identical to the role of those journalists, who go identifying in fair dealers daily practices some mathematical contents: simple rule of three, series sequence, "contents that are taught here in the eleventh year" (Leandro).

The sessions of "Mathematics for Life" are developed in small groups of about ten people. Another former, Celina, believes that this group sharing favors the exchange

of experiences, and so "they can catch a life example. One says one example, another remembers another, another remembers another, it generates a chain reaction" (Celina).

Throughout the sessions adults go on writing successive versions of their autobiography, which are evaluated by formers and returned to adults with their comments on the competencies achieved and on the ones which needs to be developed, until reaching a final version that proves the required competencies for validation in the area of ML. This written explanation and the making of a speech about the activities they perform day by day is one of the main difficulties of the RVCC process, especially for adults with little schooling, because "the ability to construct the discourse on action, namely the formalization of the action, is a skill that is developed and is perfected at school, which allows us to understand the difficulties that low educated adults have in this area " (Cavaco, 2009b, p. 763).

RECOGNITION, VALIDATION, CERTIFICATION: PROCESS ACTIONS AND CONTRADICTIONS

When they started working in CNOs, professionals involved in RVCC faced the challenge of developing a work that was entirely new to them and to which they were unprepared. Although some of our respondents have participated in 2008 in a formative action proposed by ANQ[8], where some principles of this new methodology were transmitted, this training above all represented the learning of new terminologies and new roles (Fantinato & Moreira, 2012).

Likewise, for the professional in the field of Mathematics, there is a change of term that corresponds to a change in function, and Leandro makes explicit in his words:

> In the area of RVCC I am a former. I am a mathematics teacher at school. Yes, because there are different terminologies. For example, in the RVCC one does not give lessons, there are sessions, it is not the teacher, it is the former, more from the perspective of guiding. And in the diurnal course it is the usual methodology: classes (...) Methodology is completely different. During diurnal course student learns, in nocturnal course, especially in RVCC, student already brings the knowledge, he will show the competencies he has. (Leandro)

Leandro's speech indicated that there was a difference between the teacher´s work, who follows a school model - plans, teaches, evaluates - and the ML former, who "gives examples of things that adults will be able to look at their daily life" (João, director of CNO). Former Fernanda also declared not being prepared for the process practice:

> Usually I give lessons, students then show what they learned of what I taught. When I got here, they've brought their knowledge and I had to look at what they knew, what they already knew [...] (Fernanda)

Leaving therefore the acting as teachers to assume the role of formers, these professionals, to "ensure adequate performance must develop specific skills, rather

distinct than those requested when they were exercising their functions as regular teachers" (Cavaco, 2009b, p. 700-701).

Despite not knowing Ethnomathematics, it is observed that ML formers, while developing the RVCC process, seem to be stimulated to look at the diversity of "ways of knowing and doing of the various cultures and an acknowledgment of how and why groups of individuals [...] perform their practices of a mathematical nature, such as counting, measuring, comparing, classifying" (D'Ambrosio, 2009, p. 19). When talking about their work, these professionals mentioned the everyday mathematics and valued adults own knowledge, built in their life experiences. They recognize, for example, that "the adult who comes from the rural area has very different apprenticeships than those learned by an adult that comes from the urban environment" (João).

However, although RVCC practice promotes "readiness for dialogue" (Freire, 1997) of the teacher to diverse mathematical knowledge, it carries an intrinsic contradiction. Recognition of the diversity of adult knowledge does not imply its validation, since it follows a single referential as standard. The formers, even recognizing mathematical competences of adults, could only validate those that were listed in the Referential. As says João: "We can only validate the competencies that are on the Referential, what you did in your life that can represent that competency. This is hard".

The story presented by former Rodrigo, describing his conversation with a man who raised birds, and who at first said he did not recognize the presence of Mathematics in his life history, shows some aspects of the complexity of the process:

> "So you but if you raise birds, you do not have to buy rations, food for birds, what quantities do you buy? How much do you spend? Because if you make a table with such things, how much you spend per bird, quantities, and etc. All of this has to do with Math" [...] He understood. Then went home, and came up with things done. But what he wrote, that did not translate any special competence. However, after talking with him, I realized that the man used to build his your own cages of birds. He used to make the place where the birds were, then had to take measures, had to buy wood, had to go in search of prices, had to buy the network to put around. I told him: "This is where the competence is, when you take these measures, and do all those things, the competencies are there." That was when he realized what he had to do. So he came up to me with a concrete example of how he had done there with the cages backyard. Because he had to buy the wood costing I don't know how much, took those measures, and so and so. So I could validate those competencies. Because before, I could not do it, even though he had such abilities [...]. (Rodrigo)

Rodrigo´s report exemplifies the role of ML former, as a mediator between previous acquired knowledge and the competences listed in the Referential. But how to accomplish this if the Referential presents highly technical language, next to school mathematics? For example, how can a low educated adult identify in which situations

of his life he can infer "laws of formation of numeric or geometric sequences, using mathematical symbols, namely designating expressions[9]"?

Another contradiction of RVCC process is the fact that it presupposes the use of the written mode of presenting the autobiography, which contrasts with the presence of mental calculation skills, from the so-called "oral mathematics" (Carraher, Carraher & Schliemann, 1988), common among low educated adults. This represents another challenge for ML formers. As Mariana says: "There is a phase where they say: 'Ah, but I do it in my head,' and I say, 'Yes, but what you do by heart, write, place, show, that it can be a proof' ". As for former Rodrigo, mental calculation usually reveals itself along with other calculations, and he realizes that "people who have this skill get the result sooner than others." However, despite recognizing this ability among adults, which indicates "some facility in mathematics," he warns: "I can not validate only because the person knows how to do good mental calculation."

The practices of recognition, validation and certification of acquired experiential learning among adults, involve therefore a great complexity, related to the act of valuing knowledge resulting from the action and to the search for establishments of links between them and theoretical knowledge. I agree with Cavaco, when she says that "theoretical knowledge and knowledge deriving from the action have different natures and irreducible differences, making it difficult and artificial any process that intends to merge or overlap them" (Cavaco, 2009a, p. 150).

Undoubtedly, "assessment is another element that contributes to this complexity in recognition devices of acquired experiential knowledge" (Cavaco, 2009b, p.766). Throughout RVCC process, adults are evaluated for their successive written autobiography. According to coordinator Leticia, this is a "dramatic" time, where professionals need to be careful how to address adults, because they are confronted with what they were not able, and can drop the process: "they leave, because they do not feel comfortable with someone who has more skills, they do not feel good about themselves. Because they were not able" (Leticia).

The adult going through the process receives from the CNO team several suggestions for improvement, until he reaches an autobiographical text that presents the competences needed to be validated and, thereby, can obtain the corresponding school certification. If needed, adults are referred for additional training, where formers work more individually with each adult in their needs. Even so, at the end of all these stages school certification of the expected level is not always obtained, and there is the alternative of the adult receiving a partial certification, that is, only in some areas of RVCC.

MATHEMATICS *FOR LIFE* OR MATHEMATICS *OF YOUR LIFE*?

The proposal of "Mathematics for Life" Referential (ANEFA, 2002), used as a parameter to validate the mathematical competencies of adults who perform the RVCC process, presents some seemingly contradictory characteristics, which are a

reflection of the inherent contradiction of validating knowledge built into everyday life by checking their equivalence to school mathematics knowledge. To what extent (mathematical) knowledge built in the diverse contexts of everyday life can be translated into a mathematical language seen as universal and unique? A discussion on bridging the gap between local knowledge and school knowledge, that is, transfer of knowledge from one context to another, has been in effect one of the critical points of the debate on the educational implications of the ethnomathematical approach (Pais, 2011). Power relations and values assigned to the different types of mathematical knowledge are present in this process of "translation".

The experience of the RVCC process is not immune to these contradictions. For adults with little education, to recognize that they built apprenticeships in contexts of life and that this learning can have be valued as a school certification, is certainly a challenge, which becomes even greater in the case of a socially valued area such as Mathematics. The contradiction of guidelines from RVCC process appears in the name of the area "Mathematics for Life". Is this a mathematics applied to everyday life, or recognition of the present mathematics in daily practices? Former Fernanda explains the little adequacy of this name, mentioning her professional experience with the process: "It seems that we are giving them the math and then people apply it. But that's not what we do here. Life, that already has mathematics, is that we seek".

NOTES

[1] mcfantinato@gmail.com

[2] Postdoctoral held in two phases, the first in Brazil between March and September 2011, in the Faculty of Education, Universidade de São Paulo (supervisor Maria do Carmo Domite), and the second in Portugal, between October 2011 and March 2012, at the Institute of Education, Universidade de Lisboa (supervisors João Pedro da Ponte and Darlinda Moreira), with a grant from Fundação para a Ciência e a Tecnologia (FCT).

[3] The Lisbon European Council (2000) set policies to boost the economy, end unemployment, stimulate competitiveness and reduce the differences in schooling and technology inclusion among adult populations of the member states of European Union.

[4] After May 2012 the *Centros Novas Oportunidades* (New Opportunities Centers) came to be known as *Centros para a Qualificação e o Ensino Profissional* (Centers for Qualification and Vocational Education), and lost many of its functions of adult education and training.

[5] Every translation from Portuguese in this paper will be our own..

[6] This Referential covers three interdisciplinary areas; content area of mathematics can be found, implicitly, in the area titled Sociedade, Ciência e Tecnologia (Society, Science and Technology).

[7] The names adopted herein are fictitious, in order to protect the identity of informants.

[8] Training held in the Algarve, which lasted for three weekends.

[9] Level B3 evidence criterion, from "Mathematics for Life" Referential (ANEFA, 2002, p. 24).

REFERENCES

ANEFA (2002). *Referencial de competências-chave – Educação e Formação de Adultos*. Lisboa: ANEFA. Acedido em 18 de Outubro de 2011, em http://www.anq.gov.pt/default.aspx .

ANQ (2007) *Carta de Qualidade dos Centros Novas Oportunidades*.Lisboa: Agência Nacional para a Qualificação. Acedido em 08 de Fevereiro de 2012, em http://www.anq.gov.pt/default.aspx .

Bogdan, R. & Biklen, S. (1994). *Investigação qualitativa em educação: uma introdução à teoria e aos métodos*. Porto: Porto Editora.

Canário, R. (2006). Formação de Adquiridos Experienciais: entre a Pessoa e o Indivíduo. In G. Figari, P. Rodrigues, M. P. Alves & P. Valois (Eds.). *Avaliação de competências e aprendizagens experienciais: saberes, modelos e métodos*. Lisboa: Educa, pp.35-46.

Carraher, T. Carraher, D. & Schliemann, A. (1988). *Na vida dez, na escola zero*. São Paulo: Cortez Editora.

Cavaco, C. (2002). *Aprender fora da escola: percursos de formação experiencial*. Lisboa: Educa.

Cavaco, C. (2009a) . Adultos pouco escolarizados e reconhecimento de adquiridos experienciais.In: S. M. Rummert; R. Canário; G Frigotto (orgs). *Políticas de formação de jovens e adultos no Brasil e em Portugal*. Niterói: Editora da UFF, pp.147-165.

Cavaco, C. (2009b). *Adultos pouco escolarizados: políticas e práticas de formação*. Lisboa: Educa.

D'Ambrosio, U. (2001). *Etnomatemática: elo entre as tradições e a modernidade*. Belo Horizonte: Autêntica.

D´ Ambrosio, U. (2009) Etnomatemática e História da matemática. In: M.C.C.B. Fantinato (org) *Etnomatemática: novos desafios teóricos e pedagógicos*. Niterói: Editora da UFF, pp.17-28.

Fantinato, M.C.C.B. (2004) Quantitative and spatial representations among working class adults from Rio de Janeiro. *Ethomathematics and Mathematics Education*: *Proceedings of the 10th International Congress of Mathematics Education*. Pisa: Tipografia Editrice Pisana, pp.29-38.

Fantinato, M.C.C.B. (2008) Teachers´ practice under the ethnomathematical perspective: a study case in young and adult education. *Proceedings of the Fifth*

International Mathematics Education and Society Conference. Albufeira, Portugal, pp.228-236.

Fantinato, M. C. C. B. & De Vargas, S. M. (2010) Saberes matemáticos do campo e da escola: processos de aprendizagem e educação de jovens e adultos. *Quadrante*, Vol. XIX No1, pp. 29-47.

Fantinato, M. C. & Moreira, D. (2012) Desafios de formadores de "Matemática para a Vida" do Processo RVCC. Trabalho aprovado para apresentação. *XXIII Seminário de Investigação em Educação Matemática*. Escola Secundária Quinta das Flores, Coimbra, Portugal.

Freire, P. (1997) *Pedagogia da autonomia*: saberes necessários a prática educativa. São Paulo: Editora Paz e Terra.

Moreira, D. (2009). Etnomatemática e mediação de saberes matemáticos na sociedade global e multicultural. In M.C.C.B. Fantinato (Org.), *Etnomatemática: novos desafios teóricos e pedagógicos* . Niterói: Editora da UFF, pp. 59-68.

Pais, A. (2011) Criticisms and contradictions of ethnomathematics. *Educational Studies in Mathematics*, vol. 76, nº2, pp. 209-230.