

# Adult educators: dilemmas and professional practices in the area of mathematics<sup>I</sup>

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## Abstract

This article aims to discuss the challenges adult educators in the field of “Mathematics for Life” face, as well as to analyse the adaptation and creation of professional practices that emerge from the implementation of the Recognition, Validation and Certification of Competencies (RVCC) process used in the Portuguese adult education system, and in the New Opportunities Centres in particular. Methodologically, the study was undertaken using a qualitative, multi-situated approach that focussed on the dynamics of the New Opportunities Centres, particularly educators in the field of “Mathematics for Life”, who were formerly mathematics teachers in the mainstream education system. Using the official Portuguese documents as a reference framework, the results of the content analysis of the interviews conducted with the adult educators revealed dilemmas and challenges. These were analysed from the perspective of new teaching practices that educators in the “Mathematics for Life” field need to develop and implement in this particular model of adult education, the diversity amongst the adults who use the RVCC system and the need to decode and adapt official documents in this specific area. Our research shows that the recognition, validation and certification of competencies (RVCC) process tends to encourage adult educators in the “Mathematics for Life” area to take a dialogical stance that legitimates the daily mathematical knowledge of adults in a way that resembles an ethnomathematics perspective. The results indicate both new attitudes and professional practices related to the search for new teaching methodologies, the validation of learning, expanding previous perspectives and developing the process of identity, as well as understanding the meaning of becoming an adult educator in a more holistic way, contextualised within the educational reality of adult education.

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## Keywords

Adult education – RVCC – professional practices – “Mathematics for Life” – ethnomathematics.

# **Formadores de adultos: dilemas e práticas profissionais na área de matemática**

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## **Resumo**

*Este artigo tem por objetivo problematizar os desafios colocados aos formadores da área Matemática para a Vida (MV), bem como analisar a adaptação e criação de práticas profissionais que emergem da concretização do processo de Reconhecimento, Validação e Certificação de Competências (RVCC) existente na educação de adultos, em Portugal. Metodologicamente, o estudo desenvolveu-se por meio de uma abordagem qualitativa e multissituada, acompanhando a dinâmica dos Centros Novas Oportunidades e, particularmente, os formadores da área MV, os quais na sua maioria já tinham sido ou eram professores de matemática no ensino regular. Tendo por enquadramento os documentos oficiais de referência, emergiram, dos resultados da análise de conteúdo das entrevistas realizadas com os formadores, dilemas e desafios que são analisados face: às novas práticas pedagógicas que os formadores têm de desenvolver e implementar para atuar nesse modelo específico da educação de adultos; à diversidade existente entre os adultos que recorrem ao processo RVCC; à necessidade de descodificar e adaptar os documentos oficiais na área da MV. A pesquisa desenvolvida permitiu constatar que a metodologia do processo RVCC parece estimular nos formadores de MV uma postura dialógica e de legitimação de saberes matemáticos do cotidiano, que muito se aproxima de uma perspectiva etnomatemática. Os resultados apontam para novas posturas e práticas profissionais relacionadas com a procura de novas metodologias de ensino e de validação de aprendizagens, alargando anteriores perspectivas e desenvolvendo a identidade e a compreensão do significado de ser professor/formador de uma forma mais holística e enquadrada na realidade educativa da formação de adultos.*

## **Palavras-chave**

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*Educação de adultos – Processo RVCC – Práticas profissionais – Formadores de Matemática para a Vida – Etnomatemática.*

## Introduction

This article aims to discuss the challenges adult educators in the field of “Mathematics for Life” face in their professional practice when involved with the recognition, validation and certification of competencies (RVCC) process used in the Portuguese adult education system. Between 2005 and 2011, the RVCC process (initially launched in 2001 on a trial basis) became an integral part of a broad national policy called the New Opportunities Initiative, which aimed to improve the qualifications of the Portuguese, in order to:

[...] allow adults to restart, complete and progress in their studies, based on the knowledge and competencies that they acquire in informal contexts throughout their life via the recognition, validation and certification of competencies. (GUIMARÃES, 2009, p. 3).

For the last decade in Portugal, much like what has been happening in other countries, the RVCC process has gone from:

[...] a little used social practice to something that has played a key role in the education and training systems of industrialised countries, particularly in Europe, as part of ‘lifelong learning’ policies’. (CANÁRIO, 2006, p. 36).

The aim here is not only to understand certain teaching practices within adult mathematics education, but also the challenges for educators in the area of “Mathematics for Life” (ML) within the RVCC process at basic level<sup>1</sup>. Using a qualitative and multi-situated approach,

the main focus was on the New Opportunities Centres (NOCs), particularly the educators in the ML area, the majority of whom had been or were still mathematics teachers in mainstream education, but who, at the time the fieldwork was undertaken, were working on the RVCC process.

As something that recognises experience, the RVCC process involves the recognition and appreciation of acquired knowledge, particularly in informal and non-formal contexts, as a reflection of what adults have learned in life. Within this context, ethnomathematics is an important theoretical framework to help explain the complexity and inherent contradiction in a world of less educated adults, as well as the professional practice of educators in the ML (Mathematics for Life) area of the RVCC process.

The text is divided into five parts. The first discusses how frequently there have been attempts to include aspects of daily life in educational practice in the field of adult education, presenting parallels between the perspective of ethnomathematics and the theoretical principles underlying the practices of recognising acquired experience. The second part of the article discusses the concept of practice within the context of mathematics education. The third section then presents the research methodology, making reference to the research context, the procedures employed and those involved. The fourth reveals features of the RVCC process in the area of mathematics and the fifth analyses field data, discussing the challenges ML educators face in relation to the RVCC process. The text ends with concluding remarks.

### **Adult education, ethnomathematics and the recognition of acquired experience**

The notion that education, in order to be meaningful, has to be based on students’ situations<sup>2</sup> has been recurrent within the

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**2-** This idea can consist of many versions (how to use the everyday life, context, previous knowledge of the trainees), which, despite initially

context of education in general, appearing to be “embedded” in it (DUARTE, 2009). This idea is also commonly found in the field of education of young people and adults, both among those involved, educational policies themselves and the legislation in this field. Therefore, there seems to be a:

[...] match between a pedagogical principle that advocates incorporating students’ culture and experience as content or as a starting point of the educational process (PEDROSO; MACEDO; FAÚNDEZ, 2011, p.183-184).

This premise is found in Brazilian adult education curriculum proposals. For the first part of basic education (BRASIL, 2001, p.102), the belief is that there is an obligation “to transform everyday situations that involve mathematical notions and notations to support meaningful learning of more abstract procedures”. The second part supports the contextualisation of mathematical themes, presenting them in situations that make sense to learners, via the connections made with everyday issues. According to this document:

the connections that the young person and adult make between the different mathematical themes, other knowledge areas and everyday situations, are what make mathematical activity meaningful (BRASIL, 2002, p.15).

The appreciation of knowledge that comes from experience is not exclusive to Brazil, with other examples found in official documents in countries like Portugal, where the basic level *Adult Education and Training Key-Competencies Framework* states that “life experience is generally an excellent resource for the adult’s educational process” (ANEFA,

2002, p. 3). Similarly, in relation to mathematics education, this framework states that:

work proposals for trainees should be organised, taking into consideration their life experiences and the mathematical skills they aim to develop (ANEFA, 2002, p. 4).

In Portugal, particularly in the area of adult education, the terms *acquired knowledge*, or *acquired experience* are used to denote learning constructed throughout a person’s domestic and/or professional life, which offers “a crucial importance to knowledge acquired via experience, and its ‘key’ role in the production of new knowledge [...] (CANÁRIO, 2008, p. 111).

Research on the issue of the relationship between adult learners’ experiential and academic knowledge has progressed and has been the subject of research on mathematical research, much of it from an ethnomathematical perspective (D’AMBROSIO, 2001; MOREIRA; PARDAL, 2012). According to Fonseca (2002, p. 69-70):

Scholars of mathematics education, particularly those working in the area of ethnomathematics (among which, not coincidentally, there is a significant number involved in EJA), insist on investigating or considering possible research on the specific forms of mathematizing each cultural group. For EJA<sup>3</sup>, in particular, considering this diversity and respecting these specific characteristics becomes essential.

Certain research on numeracy has also contributed to thinking on this relationship between everyday knowledge and academic knowledge. Faria (2007) advanced three categories to classify interactions between the everyday numeracy practices of adult learners and school numeracy practices: solidarity, questioning and parallelism. Solidarity focusses

seeming like synonyms at first glance, actually reflect different visions of the world, Mankind, knowledge and learning.

**3-** EJA in the original text. EJA is the Brazilian abbreviation for “education of young and adults” (Translator note)

on “the possibilities of a dialogical<sup>4</sup> relationship between the current school experiences and everyday experiences (as well as previous school experience) of learners” (FARIA, 2007, p. 206–207). In relation to questioning, “there is a distancing, a contrast, or even a dichotomy between mathematics ‘in life’ and mathematics ‘at school’” (FARIA, 2007, p. 222). Finally, parallelism essentially occurs when the dialogue between the diversity of knowledge and experiences in young people and adults’ classroom is prevented.

The recognition systems of adults’ acquired experience have, on principle, focussed on this issue, due to the emphasis on recognising previously acquired knowledge in relation to the knowledge being taught. These systems, like Portugal’s RVCC process, are competency-based approaches, which involve methodologies of recognition and appreciation of knowledge acquired by adults throughout life, particularly in informal and non-formal contexts, “thus, distinguishing themselves from approaches that focus on the acquisition of subject content in formal learning contexts” (FANTINATO; MOREIRA, 2012, p.2).

Acquired experience recognition practices in Portugal are underpinned by theoretical guidelines (CANÁRIO, 2006), which consider experiential knowledge as:

locally used knowledge, which the individual shares with the rest of the community they belong to [...] involving the knowledge dimensions of know-how and knowing how to be (CAVACO, 2002, p.39).

As such, the term *experiential education* brings with it the underlying assumption that one learns through experience. One constantly learns to respond to the challenges of everyday life; in other words, experiential education is, by its very nature, constant and intrinsically related to the need for survival.

4- Italics in the original

Ethnomathematical research (D’AMBROSIO, 2001) has also dealt with the issue of knowledge constructed in real-life contexts, more specifically the mathematical knowledge constructed by different cultures; in other words, “the way social groups are aware of their needs and under what conditions they use their local mathematics to meet them” (MOREIRA, 2009, p. 66). The ideas of ethnomathematics, by constructing “ways of discovering and analysing various mathematical epistemologies operating within their cultural contexts” (MOREIRA, 2009, p. 63), are therefore similar to the *experiential education* perspective (CAVACO, 2002).

The theoretical approach of ethnomathematics in this article offers a different analysis of certain principles of the ML element of the RVCC process and a new perspective regarding how experiential knowledge of adults is certified. Having pioneered the studies and research that seek to understand the different ways young people and adults think mathematically, this approach is the result of a cultural baggage that is predominantly created within domestic and professional life contexts, without excluding previous school experiences (FANTINATO; DE VARGAS, 2010, p. 37).

### **Professional practice in the context of adult education**

Teachers’ and educators’ professional practice has been the subject of study and a theme of research in recent decades, particularly in the field of mathematical education. In addition to other factors, the role of the institutional context in the construction of and changes to professional practice has been highlighted.

Here, we understand, like Ponte and Serrazina (2004) and Ponte, Quaresma and Branco (2008), that teachers’ professional practice refers to the work of teachers within educational contexts, such as the classroom, an academic institution and the times they perform their role as a teacher (THEES, 2012).

In order to consider the range of educational contexts researched and the roles performed by the teachers, for this specific piece of work, we understand this concept in a broad sense, as the practice of adult education professionals that work in the area of mathematics.

Education and training are undertaken within contexts whose complexity accentuates diverse practices that require the “orchestration of capacities, relationships and identity to undertake certain activities with others in specific environments” (GROSSMAN et al., 2009, p. 2059).

Teachers’ professional practices have been analysed in mathematical education literature, which demonstrates the important role teachers play in the creation and organisation of practices, as well as the importance of these practices for this professional group’s identity. As a member of their professional class, the teachers/educators identify with and see themselves reflected in a certain practice, undertaking it via certain actions and words, recognised by all; however, at the same time, they rejuvenate it, as there is room for innovation and new things, expressing their individuality and implementing and transmitting unique actions and words.

An interesting perspective regarding the concept of practice (rooted in the context of mathematical education) is that which considers the connection with other social groups. For example, Ponte (2011) mentions the importance of teachers’ practice for students’ parents and society at large. Stated thus:

If [...] our professional practice does not match curriculum guidelines and is not suited to the needs and conditions of each student group, the teacher will not meet the expectations of the school, students, parents and society (PONTE, 2011, p. 413).

Transferring this idea to adult education, it also becomes clear that the professional practice of adult educators has to, on one

hand, fit with official documents that prescribe the content areas where adults develop their competencies, while, on the other, dealing with the individuality of every adult.

The literature in this area also highlights the importance of an education and training institution management and administrative body’s ability to create the right conditions and support teachers and educators in their practice. We also find authors who, when reflecting upon the concept of practice in teachers’ specific professional field, believe it pertinent to relate its meaning and contribution to both professional identity and the changes in professional culture. According to Gresalfi and Cobb (2011):

[...] identities in education are profoundly influenced (but not dictated) by the norms, values and practices of specific contexts that teachers participate in professionally. (GRESALFI; COBB, 2011, p. 273)

As practices are embedded in a variety of contexts and environments, involving different types of knowledge and dynamics, and considering that there are differences in the objects and tools used in the practices, some of them will be better understood in their dialectical relationship with the knowledge area of which they are part. Taking into account that teachers produce innovation and reproduce didactic knowledge in their work, the professional context that we are interested in is one of intellectual work, which, according to Caria (2005, p. 25), involves two distinct aspects: “the possession of suitably certified abstract knowledge and autonomy in the performance of a particular activity.” In other words, the intellectual work professional is institutionally qualified to practise their profession, which gives them legitimacy, and the social and symbolic power to practise their profession; it also places them at the heart of a professional culture that boasts a professional ethic and deontology that they have to adhere to.

In addition to this, the underlying professional culture, which involves professional learning, experiences and social relations, is strongly linked to fields of formal and abstract knowledge that require systematic learning. Moreover, in certain professional activities, inherent practices are essentially dynamic; in other words, as they are related to approaches to non-routine problems and set in complex social contexts, they are constantly changing.

As such, when considering a professional culture that needs constant learning and professional performance that requires that this assimilated knowledge be applied to procedures virtually simultaneously (i.e., transferring them to professional practices), we are led to a notion of practice that boasts the power to transform. In short, professional practices are identified as belonging to a particular field or structure and, at the same time, as including heterogeneous characteristics that boast transformative and generative powers.

### **The research:** context, procedures, participants

The research presented here is qualitative, using modified analytic induction (BOGDAN; BIKLEN, 1994) and a multisituated approach. A descriptive study concerned with the meaning that participants attributed was undertaken.

Different data collection tools were used – document analysis, participant observation and semi-structured interviews in particular. Participants were chosen using the “snowball sample technique” (BOGDAN; BIKLEN, 1994, p. 99), where the first person interviewed indicates other candidates and those people, in turn, suggest others, and so on, with each interview contributing to greater in-depth knowledge and the redefinition of the research issues. These interviews were with directors of the New Opportunities Centres, coordinators and educators.

At the initial stages of the research, there was an analysis of official documents from the Agência Nacional para a Qualificação –

ANQ (National Qualification Agency)<sup>5</sup>, which is the body that establishes the theoretical and methodological guidelines and policies for adult education in Portugal, particularly for basic and upper-secondary level *Adult Education and Training Key-Competencies Framework* documents (ANEFA, 2002). The document analysis focussed on one of the four areas of the basic level framework, entitled “Mathematics for life”. The document is divided into three levels of competency, B1, B2 and B3, “using, as a reference, the corresponding basic education teaching cycles, although not being identified directly with them” (ANEFA, 2002, p.11), and serves as a parameter for the RVCC process.

From 2005 to 2012, the New Opportunities Centres<sup>6</sup> (NOC) were the focus of the many activities related to adult education in Portugal, the majority of them in school clusters. The fieldwork itself was carried out from November 2011 to March 2012, when various NOCs were visited in the Lisbon Metropolitan Region and nearby municipalities. Regular RVCC process practices (eg. decoding and certification panel sessions) were monitored using participant observation and field diary notes. During the observation visits, certain documents were also collected for later analysis, such as the worksheets used by the educators in the ML sessions.

This article focusses on an analysis of the discourse of four ML educators (two men and two women) from four NOCs in the Lisbon Metropolitan Region or nearby municipalities. In relation to the initial training of these four educators, three have a graduation in mathematics and the other one in engineering. All had worked or were working as mathematics teachers in mainstream education for over ten years and had between one and five years experience in adult education. The interviews

**5-** On 15th February, 2012, this institution changed its policy focus and name to Agência Nacional para a Qualificação e a Educação Profissional – ANQEP (National Qualification and Professional Education Agency).

**6-** Three have been certain changes to this Portuguese educational policy and, in May 2012, these Centres changed their name to Centros para Qualificação e o Ensino Profissional (Vocational Education and Qualification Centres), having lost many of their adult education and training duties.

were carried out at the different workplaces, at times agreed between the interviewer and interviewee. These were later transcribed and analysed, using the categories that arose from the process. The analysis prioritised the challenges and dilemmas experienced by these educators during their professional practice while working with “Mathematics for Life” during the RVCC process.

### **The RVCC process and “Mathematics for Life”**

As we have previously mentioned, the research outlined here focussed on the professional practice involved in the recognition and validation of mathematical competencies process for Portuguese adults who sought the services of the NOCs. As such, it is important to outline the work done with the RVCC process, specifically in the area of ML.

The RVCC process is a system of recognition and appreciation of knowledge acquired by adults throughout life, valuing the life competencies that allow adults:

To understand and participate in the knowledge society, mobilising, via these competencies, the knowledge, the being and the ability to solve problems that the changing world confronts us with constantly (ANEFA, 2002, p.9).

From this perspective, competencies appear “as arising from action, which gives them a finalised, contextual and contingent nature” (CANÁRIO, 2006, p. 41).

In 2005, the RVCC process was integrated into the *New Opportunities Social Programme* by the Portuguese government. It was designed for all adults (over the age of 18) who had not attended or concluded a particular level of basic or upper-secondary education but who had acquired knowledge and competencies via life experience in different contexts that could be formalised via school certification. This process

offers the possibility of a basic (4th, 6th or 9th year of schooling) or upper-secondary school level certification (12th year of schooling).

The basic level RVCC process mechanism, which provides recognition, validation and certification up to the 9th year of schooling, boasts four key competency areas: *information and communication technologies, citizenship and employability, language and communication*, and the area that this research focusses upon, *Mathematics for Life*. According to the basic level *Key-Competencies Framework*, the ML area was divided into four competency units, described in the document thus:

Unit A – To interpret, organise, analyse and communicate information using mathematical processes and procedures.

Unit B – To use mathematics to analyse and solve problems and problematic situations.

Unit C – To understand and use mathematical connections in life context.

Unit D – To reason mathematically, particularly in an inductive and deductive way. (ANEFA, 2002, p. 130).

The methodology used in the RVCC process is carried out in various stages, involving a diverse team of professionals with specific functions. According to Cavaco (2009), it involves a practice of recognising acquired experience, which is based on innovative and very complex methodologies, which are difficult to implement.

In the first phase, when adults arrive at the centres, they are welcomed by a professional whose task is to make a diagnosis, to orient and to assess their chances of undertaking the process and indicates their entry level. This is then followed by a phase in which an RVCC professional interviews the adults individually.

The next stage involves the educators, who are responsible for the key-competencies areas, which includes ML. This involves framework decoding sessions with the adult participants, normally in small groups, where

the educator seeks to establish links between the (mathematical) abilities acquired in their everyday experience and the competencies listed in the framework. All activity undertaken in these sessions results in the construction/reconstruction of the *Reflective Learning Portfolio* (RLP), a text written by the adults, which has successive versions. “As the RLP is consolidated, the technical-pedagogical officer (alongside the adult) establishes correlations between that tool/product and the *Key-Competencies Framework*” (ANQ, 2007 p. 16).

The next stage of the RVCC process is the validation of competencies, a session in which the adult and the pedagogical team analyse and assess the RLP, in terms of the framework, identifying the competencies to be validated and those still to be demonstrated or developed, via the continuation of the RVCC or any other training process. The last stage of the process (certification of competencies) occurs before a certification panel, which is nominated by the director of the centre and made up of the RVC professional, the educators and external assessors. The preparatory work for the certification session includes the RLP analysis and assessment by the technical-pedagogical team and the external assessor (ANQ, 2007).

### **Challenges faced by “Mathematics for Life” educators in the RVCC process**

Interviews with the ML educators involved in this study highlighted several aspects of complexity inherent in undertaking the RVCC (recognition, validation and certification of competencies) process of adult candidates. This point deals with the challenges faced by those professionals, which we identified as: the differences in the adult world; the new terminology inherent in new practices; decoding and adapting the framework and the transfer of oral mathematics to a written process. It also shows how professional practices were modified as the educators’ work progressed.

### **Differences among the adults**

One of the main challenges faced by ML educators is related to the diversity of the adult world, i.e. the differences among the adults who seek out the RVCC process: differences in motivation, differences in the time needed to complete the process, differences in prior knowledge.

There are adults, generally older ones, who go to the centres mainly to keep up with the family. Leandro<sup>7</sup> recalls the case of a man who said he had no need for certification because he was already at the top of his company, even though he only had the “fourth class”<sup>8</sup>, but he had gone to the NOC because he felt out of his league with his wife and daughter, who had more education, and was not even able to talk to them. Others recognise that they learn during the process and enjoy it so much that they continue going to the centre, even after validation. As the educator Rodrigo says, “they realise it’s relevant to their lives [...] that what they’re learning might be useful”.

Apart from the adults who choose to go to the NOC of their own accord, there are others who are sent there. It is often the companies where the adults work that approach the institution in search of partnerships to run the RVCC process for their less educated employees. As for the unemployed, they go to the NOC not only to avoid the risk of having their unemployment benefit cut, but also to give them better qualifications that will provide access to work in the future.

Many adults that attend the NOCs come with the preconceived notion that the process is quick and easy. When they realise that the dynamic of the process is not so simple, some adults start to lose motivation and are then sent to what is called complementary training, which involves more individual work with the

<sup>7</sup>- All the names given here are fictitious to protect the privacy of those involved.

<sup>8</sup>- The so-called “fourth class” in Portugal is equivalent to four years of primary education and the fifth year of education in Brazil.

educators and is therefore more appropriate for those adults who require greater support in writing their life report. As the educator Mariana clarifies, “sometimes [the adults] can’t understand the need for training [...] they lose a bit of motivation, but they end up enjoying it”.

There are also differences in terms of the time it takes to complete the RVCC process. On average, the process takes four or five months for trainees with good attendance and availability. However, according to the educator Leandro, there are cases of people who spend a year or year-and-a-half in the process, because they give up and then go back. They give up due to illness or because they have received a job offer and they are unable to continue coming to the NOC. A specific example of when the RVCC process takes longer, and which is a great challenge for the professionals involved, is working with adults with a general learning disability. In this case, according to Rodrigo, “the recognition part is minimal; recognition and training are practically the same thing” and it takes longer.

Another way in which there are differences among the adults is related to prior knowledge. Some educators identify more organised thinking and mastery of more mathematical concepts from experience working in industry, or in areas such as the construction industry, plumbing and electricity. The educator Rodrigo, who has worked as an engineer, compares the knowledge of adults who work in companies to the way he uses his own prior knowledge in his work as a ML educator. He says: “when people start describing the processes, it’s easier for me to understand what they’re saying because I’ve had those experiences”.

Another interesting aspect the educators highlight is the lack of a direct link between the years of education completed by the adults and the competencies they have acquired in the area of mathematics. Leandro exemplifies this contradiction:

I have a gentleman here who’s practically the director of a transport company. He

writes very well, he speaks very well yet he only has the fourth class [four years of education]. Then there’s another man who attended the eighth year, but the former [with four years of schooling] is much more competent in the area of mathematics than the latter. (Leandro)

This situation corroborates the ideas put forward by Cavaco (2002, p. 76-77), that learning acquired from experiential training also depends greatly on individual factors, “despite being closely related to the wealth of situations experienced and the diversity of challenges and demands placed on individuals”.

### **New terms, new practices**

When the ML professionals began their work at the NOCs, they were faced with the challenge of doing a job that was completely new to them and for which they were totally unprepared. The educator Fernanda says it was “a shock”. In the meantime, several said they had taken part in a training session run over three weekends, offered by the National Qualification Agency in 2008 and designed for all those professionals who would be working in the NOCs and using the RVCC process, at which some principles of this new methodology were transmitted. The focus of this training was to learn new terminologies and new roles. The *RVCC Process, decoding sessions and competencies validation panel* are among the terms that were initially rather unfamiliar to the team. As for new professions, we have, for example, *the needs and referral professional* who receives and gives the initial guidelines to the adult arriving at the NOC, the *RVCC professional* who supervises the entire recognition process of the adults’ competencies and the *educators* of the four key competencies areas.

For the mathematics professional, there is also a change in the name, which corresponds to a change in function. Leandro clarifies the differences between teacher and educator:

In the RVCC area I'm an educator. At school, I'm a mathematics teacher. Right, because there's different terminology. For instance, in RVCC you don't give classes, they're called sessions; it's not the teacher, it's the educator. It's more to do with giving guidance. And on the daytime course it's the usual methodology: classes [...]. The methodology is completely different. On the daytime course, the student learns, on the evening course, namely in RVCC, the student has prior knowledge, he'll show what competencies he already has. (Leandro)

The ML educators therefore take on a wide range of functions related to recognising and validating prior knowledge, distancing themselves from their normal role as teachers in regular education. As Cavaco (2009, p. 700-701) says, in order to:

guarantee adequate performance they have to develop specific competencies, quite different to those required of them as teachers in regular education.

Coming from mainstream education designed for children and adolescents, they admit they have learnt to work in the RVCC process while actually doing this type of work, creating their own documents, sharing them with the other people on the NOC team and, above all, observing the adults. This adaptation has implied changes in the way they behave and speak and in the level of rigour related to mathematical language, when compared to the parameters of regular education. They needed to be flexible, "like bamboo", in the words of the educator Mariana.

These changes in the professional context (new terms, new roles and new learning) obviously lead to professional changes that are not always easy to achieve without on-going training. According to João, the director of a NOC, who has also already worked in this area,

"the educators who ask for the most training are those from Mathematics for Life". He adds:

We're trained in mathematics, we're prepared to teach mathematics, but recognising that an adult has learnt mathematics isn't quite the same thing. [...] Of course, there are educators who manage to adapt to the reality and deconstruct their learning and try to see mathematics through another prism, but it isn't easy. (João)

This professional mentions another important aspect resulting from these practices, which is specific to the educators in the mathematics area; the deconstruction of a hegemonic view of mathematics as unique and timeless knowledge, leading to the recognition of less formal ways of learning and using mathematical knowledge. Fernanda, for example, says that the experiences brought by adults made her "see mathematics from another perspective".

In this sense, the orientation of these teachers' work reflects the ideas of ethnomathematics, an area that has acted as a source of criticism to the way academic mathematical knowledge has been transferred to schools:

since teaching institutions have adopted mathematics in such a way that any mathematical activity that takes place in different social groups is erased or even ignored by the school (MOREIRA, 2009, p. 63).

### **Decoding and adapting the framework**

One of the first things the ML educator learns is how to manage the stages of the RVCC process. Once the adults have been received by the needs analysis and referral professional, which assesses the possibility of adults following the RVCC process and indicates the level at which they should be integrated, and after the RVCC professional has interviewed

the adults individually, the adults then meet the educators, including the ML educator. This is followed by the *decoding sessions*, in which the work of the educator involves showing the adults which areas they can indicate, in terms of their life experience and from a mathematical point of view, that which will then enable them to write their life history. The situations they describe in this must demonstrate the competencies that can be validated according to the ML Framework.

The dynamic of these sessions is up to the educator; however, they try to create a favourable climate for the adults, who are often rather “muddled” (Rodrigo). After all, the RVCC process is also new for the adults in many ways. Leandro usually shows a film in which journalists interview market vendors regarding their everyday mathematical knowledge. He says it’s a film “that deconstructs everything” and helps the adults to understand that his role as educator is the same as the role of those journalists, who identify certain mathematical contents in the daily practices of the market vendors: rule of three, sequences and series, “content that is taught here in the eleventh year” (Leandro). In the other sessions, Leandro presents situations-problems and motivates the adults to solve them “any way they can”, or rather, using their “day-to-day mathematics”, and then presents the way school mathematics would solve the same problem.

One of the initial decoding sessions is to show the adults the Framework competencies. Since this is an official document, written in formal language, the ML educators feel they have to adapt this language in order to make it easier for the adults to understand. Mariana, together with the NOC team, created a file with more accessible and contextualised questions, according to the concepts that are in the Framework, because, as she says, “if we put it in that language, it’s not worth it” (Mariana). One of the questions on this file, for instance, is: “Do you check bank statements, supermarket bills, invoices or receipts?” The adult has to respond and write

down situations or life experiences in which he normally uses this mathematical competency.

### **Mental arithmetic and autobiographical writing**

The RVCC process involves successive pieces of autobiographical writing, which are assessed by the educators and given back to the adults with their comments on which competencies have been achieved and which they need to develop, until a final version is reached that proves the necessary competencies for validation in the ML area. Since this process is in writing, it is even more difficult for the adults and represents a challenge for the ML educators. In the words of the educator, Rodrigo:

When people start this process, normally they’ve never written an autobiography and they find it really difficult. So I say to them: “Now you have to show that you have mathematical capacities. Show me on paper how you work out percentages”. I insist that it’s something that people are often faced with in their daily lives. (Rodrigo)

Adults with little education often have mental arithmetic competencies, the so-called *oral mathematics* (CARRAHER; CARRAHER; SCHLIEMANN, 1988). However, in order for this knowledge acquired throughout life to be validated, it has to be written. As Mariana says:

There’s a point at which they say: “Ah, but I do that in my head!”, and I reply: “Yes, but write what you do in your head down, demonstrate it, so that it can be used as proof”.

This is another aspect for reflection since the path from oral culture to written culture is not followed instantaneously after an order to do so. On the contrary, the complexity includes, among other aspects, reasonable manipulation of the symbolic code of writing and being able to use discourse that is suitable for the context,

the place, the listener and the reader (ITURRA, 1990; MOREIRA, 2004).

For the educator Rodrigo, mental arithmetic normally comes about in association with other calculations and he understands that “people who can do this get to the result faster than others”. Despite recognising that this ability in adults indicates “a certain ease in mathematics”, he warns: “I can’t validate it just because the person knows how to do mental arithmetic well”.

Mental arithmetic learning among adults with little education comes from experiential training resulting from survival activities and strategies. It is therefore difficult to explain in writing. The way in which they formed their experiential knowledge, including the ability to do mental arithmetic, was often by observing more experienced people, generally a relative, or through trial and error processes. In her research carried out with young people and adults from a low-income community in Brazil, Fantinato (2003) noticed the cultural characteristic associated with mental arithmetic, based on the way in which these strategies had been learnt, generally with an older relative who played the role of *master*.

On the other hand, as Cavaco argues (2009, p. 763):

the capacity to construct discourse about action, or rather to formalise the action, is a competency that is developed and perfected at school, which helps to explain the difficulties adults with little education have in this area.

The RVCC process requires a written explanation and a speech about what they do. This contrast represents a challenge both for the adult candidates and for the ML educators.

## **Final considerations**

The complex changes of modern-day societies require frequent professional

adaptations or radical alterations, which, in turn, require new training, new knowledge and new competencies that interact with previous professional procedures. This process of change, which can also be viewed as a challenge, a new opportunity, a difficulty or an obstacle, requires or imposes transformations of identity, whereby professional identity is constructed and expressed through professional practice, the social relationships created and developed in the workplace, professional learning and experience and the expectation of social participation and intervention via the profession.

“Mathematics for Life” educators involved in the RVCC process face a number of challenges, including the diversity of the adult world in its many facets: age, which may vary from young adults of 18 to senior adults over 65 years old; the reasons why adults are studying in formal education; the way they come to the course, whether it is a voluntary process or if it comes from the owners of the companies in which they work or some other institution; the expectations underlying the desire to achieve new qualifications and what they intend to do with them; what type of previous formal education each student had and how positive (or negative) their experience was.

These professionals also need to learn new methodologies and playing unfamiliar roles, “different to those usually taken on by traditional adult educators” (CAVACO, 2009, p. 780). With no suitable training to work with a recognition and validation of acquired experience process, the educators construct their professional practice based on their everyday work patterns with adults and cooperation with colleagues in the NOC teams.

Due to its innovative nature, experience of the RVCC process offers new learning, both for the adults seeking certification and the professionals involved. The ML educators in particular learn to see mathematics from another perspective, even questioning the name “Mathematics for Life”. Fernanda sums up this contradiction: “It seems like we are teaching

mathematics for people to then apply it. That is not what we do here. It is life, which already has mathematics, which we seek out”.

Adhering to the recommendations of Agudelo-Valderrama; Clarke; Bishop (2007), we observe that the previously presented areas of reflection for educators not only provide a perspective on their own practices but also offer insights regarding what might constitute obstacles to change in their professional practice. Indeed, in the above-mentioned social context, the training included in the RVCC process became an important catalyst for improving and transforming professional practice. In other words, as the RVCC process involves innovative pedagogical approaches, emphasising a change to the appreciation and recognition of acquired knowledge and the development of learning with meanings, it actually legitimises innovation and, within

a training context, offers an atmosphere in which change is seen as a sure step towards improving adult learning. In addition to this, it involves the need for the educator to express themselves via their practice; in other words, to individualize their way of thinking and implement their perspective on the meaning of learning mathematics.

In short, the results, which arise from the complexity and inherent contradictions in both the adult world and the practice of recognising, validating and certifying the competencies of less educated adults, point to new stances of identity from those professionals involved in the search for new teaching methodologies and the validation of learning. In doing so, they broaden previous perspectives and develop an understanding of what being a more holistic teacher/educator within the Portuguese education system really means.

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