

**Doing the maths:**  
the training needs  
of numeracy tutors  
in Ireland, 2013  
and beyond.



**National Adult Literacy Agency**  
Áisíneacht Náisiúnta Litearthachta do Aosaigh



## Doing the maths:

### the training needs of numeracy tutors in Ireland, 2013 and beyond

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## Foreword

This publication is timely insofar as Ireland is going through the most extensive reform of further education and training in the history of the State, presenting a key opportunity to change and improve our practice. There is strong evidence of the critical importance of generic skills, in particular numeracy, for the labour market and for life and there is a need to ensure that the new further education and training system fully supports their development. This report provides valuable information which will assist in this task. It also makes much needed connections between developments in the traditional education sector where there are extensive plans to improve numeracy and mathematics outcomes for children and young people.

The improvement of the quality and quantity of adult numeracy teaching and learning is a key concern of NALA and the reason for conducting this research. We gratefully acknowledge the support of Institute of Technology Tallaght in our endeavour, as well as the cooperation of VECs and other providers. In order to advance our knowledge and make informed decisions, we need to source and analyse new data and share it with those stakeholders also concerned with adult numeracy teaching and learning. From the debate which will emanate from the report, it is hoped we will see action on the continuous professional development of numeracy tutors, resulting in improved outcomes for adult learners.



Inez Bailey

Director

National Adult Literacy Agency

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# Contents

<b>Foreword</b>	<b>01</b>
<b>Acknowledgements</b>	<b>02</b>
<b>Contents</b>	<b>03</b>
<b>Lists of figures</b>	<b>04</b>
<b>List of tables</b>	<b>05</b>
<b>Executive summary</b>	<b>06</b>
<b>Chapter one: Literature review</b>	<b>11</b>
Defining numeracy	11
Numeracy and literacy	15
Numeracy and mathematics	16
Professional development internationally	17
Adult numeracy in an Irish context	19
NALA and numeracy	20
Continuing professional development in mainstream education	21
National strategy to improve literacy and numeracy 2011-2020	21
Out of field teaching in second level education	22
Continuing professional development in adult numeracy	23
<b>Chapter two: Methodology</b>	<b>25</b>
Data collection methods and data analysis	25
Sampling strategy	25
Limitations of the study	26
<b>Chapter three: Research findings</b>	<b>27</b>
Section 1: Profile of survey participants	27
Section 2: Teaching experience	30
Section 3: Teaching practices	34
Section 4: Training	38
Section 5: Relationship between mathematics and numeracy	42
Section 6: National Framework of Qualifications	46
<b>Chapter four: Discussion and conclusion</b>	<b>51</b>
<b>Bibliography</b>	<b>59</b>
<b>Appendix 1</b>	<b>63</b>

## Lists of figures

<b>Figure 1:</b>	The concept of numeracy	14
<b>Figure 2:</b>	Different types of centres where tutors had taught	28
<b>Figure 3:</b>	Gender breakdown of tutors	28
<b>Figure 4:</b>	Highest overall qualification obtained by tutors	29
<b>Figure 5:</b>	Current contractual position	29
<b>Figure 6:</b>	Length of time in teaching	31
<b>Figure 7:</b>	Centres taught in as part of teaching career	31
<b>Figure 8:</b>	Subjects currently taught by tutors	32
<b>Figure 9:</b>	Age range of learners	32
<b>Figure 10:</b>	Number of years teaching numeracy/mathematics	33
<b>Figure 11:</b>	Level of mathematics/numeracy tutors are teaching	33
<b>Figure 12:</b>	Qualification that had strongest influence on tutor practice	35
<b>Figure 13:</b>	Training completed to date	38
<b>Figure 14:</b>	Training received to date	39
<b>Figure 15:</b>	Level of interest in attending training programme	40
<b>Figure 16:</b>	Degree of comfort in teaching different levels of mathematics	45



## List of tables

<b>Table 1:</b>	Numerate behaviour – key facets and their components	13
<b>Table 2:</b>	Teaching practice used by tutor	36
<b>Table 3:</b>	Approaches to teaching adults learner and younger learners	37
<b>Table 4:</b>	The importance of different types of training	39
<b>Table 5:</b>	Tutor views on new training package	40
<b>Table 6:</b>	Interest in attending training programme delivered in a number of ways	41
<b>Table 7:</b>	How tutors describe numeracy	43
<b>Table 8:</b>	Tutor attitudes towards numeracy	44
<b>Table 9:</b>	Attitudes towards training and collaboration	46
<b>Table 10:</b>	Attitudes towards the development of FETAC components	47
<b>Table 11:</b>	Degree of confidence in delivering FETAC components	48
<b>Table 12:</b>	Attitudes towards FETAC and accreditation	49

## Executive summary

### Introduction

This study carried out by the National Adult Literacy Agency (NALA) and Institute of Technology, Tallaght (ITT) documents the findings from a survey of numeracy/mathematics tutors working with adult learners in Ireland. The survey was carried out in 2012 and is based on a similar survey carried out in 2001. The similarity facilitated comparison between the data and the identification of any significant developments and/or changes in the sector over the last decade.

In its broadest terms, the research set out to identify training needs/requirements among tutors providing numeracy tuition to adult learners in a number of settings nationally. The context for the research is the changing teaching and learning environment with its focus on:

- the use of technology in the classroom,
- real world focus driven by Project Maths and FETAC accreditation,
- labour force activation,
- assessment issues including FETAC accreditation at NFQ levels 1-4, and
- developments in teaching qualification requirements.

This research is timely in light of developments within the adult basic education<sup>1</sup> sector.

Ireland is currently participating in an international survey of adult life skills. The survey PIAAC (Programme for the International Assessment of Adult Competencies) is assessing the literacy and numeracy skills and the ability to solve problems in technology-rich environments of over 5000 adults (16-65) in Ireland. The results of this survey will be available in October 2013 and may impact on the demands for literacy and numeracy provision for adult learners.


### The study

The survey was designed to provide information on the profile of the tutors including age, gender and contractual status. It also examined their qualifications, teaching practices, how much continuing professional development they undertake and the influence of the introduction of FETAC modules on the teaching environment. The findings from this study were compared against findings from a similar survey carried out by Dr Terry Maguire in 2001. This enabled the authors to document any changes and developments since 2001.

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<sup>1</sup>In this report by adult basic education sector we mean adult and community education and training including literacy and numeracy provision delivered at Levels 1-4 on the National Framework of Qualifications.





The research used a quantitative research approach that involved the administration of an online survey. Over 160 adult numeracy/mathematics tutors, currently teaching adult learners completed the survey questionnaire. The survey took approximately 30 minutes to complete. Similar to the 2001 survey, the questionnaire was designed to capture the views and experience of tutors' currently teaching numeracy to adults. However the survey's main focus was to identify the Continuing Professional Development (CPD) needs of adult numeracy/mathematics tutors teaching in a variety of educational settings. The main findings from the research are set out below.

## **Main Findings**

### **Profile of the survey participants**

- The data from the survey showed that the majority of tutors teaching mathematics/numeracy to adults were female and over 45 years of age.
- The vast majority (90%) had attended third level education and a small number 8% had a degree where the main subject was mathematics.
- More than half of the tutors were working on part time contracts with less than a third on full time contracts.
- There was no major change in the age and gender profile of tutors since 2001. However, the education profile had changed. In 2001 the highest overall qualification obtained was the Leaving Certificate whereas in 2012 the majority of tutors had attended third level.

### **General teaching experience and specific experience of teaching mathematics/numeracy to adults**

- Among the tutors surveyed there was a wide spread of teaching experience. The majority of tutors teach in Vocational Education Committee (VEC) adult literacy services.
- There was considerable general teaching experience among tutors, however there was less experience of teaching numeracy/mathematics to adults.
- Tutors were delivering tuition to learners in a range of age categories with a significant number teaching young people who were less than 18 years of age.
- The data also showed tutors were currently teaching mathematics/numeracy to adult learners in combination with other subjects mostly adult literacy, English and Communications.
- The majority of tutors delivered numeracy/mathematics at NFQ Level 3.
- The biggest change between 2012 and 2001 data was in the contractual status of tutors.
- There was a reduction in the number of full time and volunteer tutors and an increase in the number of tutors on part time contracts.

## Teaching practices

- Almost 50% of the tutors indicated that their current teaching is influenced by their own school experience.
- Almost all tutors who completed in-service training reported a positive influence on their teaching practices.
- The predominant forms of delivery in the classroom were practical work, problem solving, consolidation and practice and blackboard chalk and talk. Tutors reported that they rarely or never used guest speakers, rote learning and investigational work.
- The real difference between the 2012 and 2001 survey data was the increase in the percentage of tutors (34% in 2001 to 60% in 2012) who use technology as a teaching practice.

## Training

- A little over a quarter of tutors surveyed indicated that they had received some form of continuing professional development in the previous six months. Thirty-two percent had training in the past two years and 40% in the last five years.
- Over 60% of tutors reported that they did not have enough training in teaching mathematics to adults and 15% reported that they had no training at all.
- The majority of tutors expressed a need for a training programme and indicated that it should be accredited, delivered part time and supported by technology.
- In terms of accredited training available to numeracy tutors there was little change between the 2012 and 2001. The Waterford Institute of Technology (WIT) offer two numeracy modules as part of its modular qualifications, NALA provides up to date training and with ITT Dublin host annual numeracy events for adult numeracy tutors.

## Relationship between mathematics and numeracy and attitudes towards mathematics and teaching mathematics

- There is clear consensus among tutors that numeracy was being able to do mathematics in everyday life.
- The vast majority of tutors had a positive attitude towards mathematics and teaching different levels of mathematics. There was a strong belief among tutors that they had a natural ability with numbers and that mathematics was their favourite subject in school.
- A small percentage of tutors experienced some level of anxiety about mathematics when they were in school.
- Tutors reported that they believe that doing mathematics at school does not necessarily make you numerate.
- When we compared the 2001 and 2012 data we found little or no change in the attitudes of tutors regarding the relationship between mathematics and numeracy.



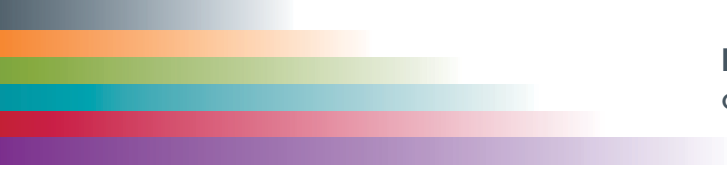
## National Framework of Qualifications

- Tutors reported that they understand the FETAC system of accreditation.
- Tutors indicated that having accreditation available is very important to their learners, but they believe that FETAC components reduce the flexibility they have in meeting individual learner needs.
- Within some centres tutors work collaboratively and share resources for the delivery of FETAC mathematics programmes.

## Finally

The recommendation coming from this report is that NALA convene an expert group to examine in detail the findings outlined in this report and address the following issues.

1. The further development of accredited numeracy provision for adult numeracy/mathematics tutors in Ireland should be based on identified need as outlined in this report.
2. The qualification requirement of adult numeracy tutors should be agreed by all service providers and relevant government agencies. It should recognise that the profile of adult numeracy tutors is different to that of mainstream teachers.
3. The kind of CPD required by tutors as indicated by this survey has not changed significantly since 2001. At that time a model of accredited professional development that would meet the needs of adult numeracy tutors in Ireland was developed (see Appendix 1). This model should be re-examined in light of changes in the provision of the NALA/WIT numeracy modules, on-going in service training and in response to training needs of tutors outlined in this report.
4. The question 'is there a need for an agreed national definition of numeracy'? Should be posed to the expert group.
5. If a broad concept of numeracy is used to measure Irish adults numeracy skills and competence we should insure the type of provision available to adults reflects this.



# Chapter One

## Literature review

This section provides an overview of selected national and international research on numeracy, continuing profession development and training for numeracy tutors. In particular, it captures the debate around how numeracy is defined and the problematic nature of it's' relationship to literacy and mathematics. The review highlights the lack of research on professional development opportunities for numeracy tutors in an Irish context.

### Defining numeracy

Although the term numeracy was first coined in the Crowther Report (1959) it has remained problematic to define. The term numeracy has multiple meanings across different countries and languages (OECD, 2009). Some of the existing conceptions of numeracy were developed by educators working in formal education with children, while other stakeholders link the term to adult competencies (OECD, 2009). Central to the debate is its link to literacy and its relationship to mathematics. Numeracy has been used as a synonym for adult mathematics, functional mathematics, workplace mathematics, and quantitative literacy, statistical literacy and mathematical literacy (Crowther, 1959; OECD, 2009; Carpentieri, 2010).

Following a review of how numeracy has been defined internationally, Kaye (2010) highlighted the dichotomy in how the term has been interpreted. 'Small' numeracy which is bounded by low levels, a part of mathematics strongly linked to school mathematics and limited in its reach. On the other hand 'big' numeracy includes all levels of mathematics 'plus' experiential and is context. Kaye also highlights how the use of the term numeracy has to be continually defended for political reasons rather than academic or pedagogical reasons.

How numeracy is defined in terms of current international developments has been examined in PIAAC. PIAAC defines numeracy as:

'the ability to access, use, interpret and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life' (OECD, 2009).

This definition builds on the numeracy framework developed for the Adult Literacy and Life Skills Survey (ALL). Within PIAAC, numeracy is broadly defined and complemented with a definition of ‘numerate behaviour’. Numerate behaviour involves managing a situation or solving a problem in a real context, by responding to mathematical content/information/ideas represented in multiple ways (OECD, 2009: p21).

The key facets and components of numerate behaviour as described by PIAAC are outlined in Table 1<sup>2</sup>.

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<sup>2</sup>Please refer to OECD 2009 for a more detailed discussion of numerate behaviour.

Table 1: Numerate behaviour – key facets and their components

**Numerate behaviour involves managing a situation or solving a problem...**

**1. In a real context**

- Everyday life
- Work
- Societal
- Further learning

**2. By responding**

- Identify, locate or access
- Act upon, use, order, count, estimate, compete, measure model
- Interpret
- Evaluate/analyse
- Communicate

**3. To mathematical content/information/ideas**

- Quantity & number
- Dimensions & shape
- Pattern, relationships, change
- Data & chance

**4. Represented in multiple ways**

- Objects & pictures
- Numbers & mathematical symbols
- Formulae
- Diagrams & maps, graphs, tables
- Texts
- Technology based displays

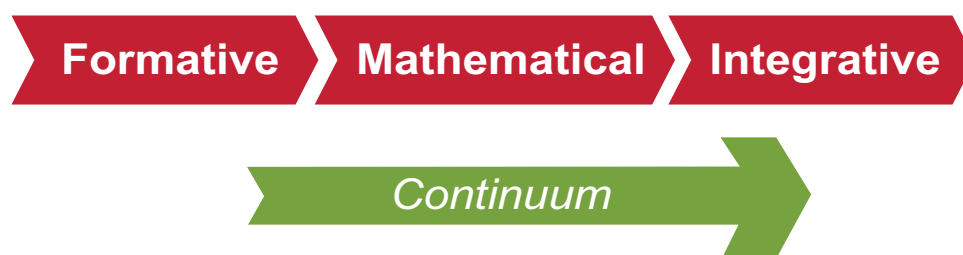
**Numerate behaviour is founded on the activation of several enabling factors and processes:**

- Mathematical knowledge and conceptual understanding
- Adaptive reasoning and mathematical problem-solving skills
- Literacy skills
- Beliefs and attitudes
- Numeracy-related practices and experience
- Context/world knowledge.

(OECD, 2009: p22)

The increasing sophistication of numeracy as a concept has been described as a continuum of three phases; from a limited concept of numeracy as basic arithmetic skills (formative phase) through a concept of numeracy as mathematics (mathematical phase) to a complex multi-faceted construct incorporating the mathematics, communication, cultural, social, emotional and personal aspects of each individual in a particular context (Maguire and O'Donoghue, 2004). The concept of numeracy described in the PIAAC framework is a 'big' view of numeracy firmly situated in the interpretative phase of concept development.

## The Concept of Numeracy



## Increasing Sophistication

Figure 1: The Concept of Numeracy (Maguire 2003)

The numeracy concept continuum (Figure 1) provides a useful tool for considering and positioning the development of adult numeracy/mathematics within a country. Following the 2001 survey of adult numeracy tutors and numeracy provision, Maguire and O Donoghue situated Ireland in the formative phase of numeracy concept development (2004). This phase describes numeracy as comprising of basic arithmetic and functional numeracy skills. At the upper end of this phase, numeracy is associated with basic mathematics and simple everyday concepts.

There is evidence to suggest that Ireland has moved from the formative phase through the numeracy concept continuum towards the mathematical or integrative phase. The recent development of an integrated adult mathematics framework from FETAC Level 1 to Level 5 seems to support this theory. The National Framework of Qualification focuses on functional, real world mathematics and the associated changes to the types of provision now available to adult learners. However, to be firmly positioned in the Integrative phase would require that numeracy provision is delivered by tutors who have the skills and knowledge to deliver mathematics teaching and learning. This needs to be done in a way that the mathematics, communication, cultural, social, emotional and personal aspects of each individual learner are met.



## Numeracy and literacy

In the field of adult education, literacy development has traditionally taken prominence over numeracy which, from the outset, has struggled to maintain its own identity. Although literacy and numeracy have some traditional links, numeracy is a construct with a life of its own that often has a central and distinct role in adults' lives (OECD, 2009). In its earliest conceptualisation numeracy provision was delivered through literacy provision and this has influenced its development as a concept (Maguire, 2003: p33). The evolution of numeracy viewed through the Crowther definition as 'the mirror image of literacy' was discussed by O'Donoghue, (2002) who identified the following steps in the development of the concept of numeracy:

- Mirror image of literacy
- Literacy (Primarily Literacy concern with some grassroots numeracy interest)
- Literacy (Concern for basic maths)
- Functional Numeracy (separate from Literacy)
- Literacy (Numeracy recognised)
- Types of Literacy (mathematical literacy, scientific literacy)
- Numeracy detached with its own identity and of equal importance to literacy.

(O'Donoghue: p48).

Kantner (2009) strongly argues that adult mathematics including numeracy has been marginalised within education. Indeed, an argument is made that the mathematics needs of adult learners are disregarded by all dimensions of adult education because adult education subsumes adult mathematics learning under the umbrella of literacy. Furthermore, adult education policies, research, and professional organisations prioritise reading and writing issues above those of numeracy. Kantner further argues that "Adult education needs to 'lead the charge' against innumeracy and include all participants –students, teachers, employers and government officials – in the process of adult mathematics education" (Kantner 2009: p5).

Adult numeracy does not have as high a profile as adult literacy and this imbalance needs to be addressed. Coben et al (2007) argue that until recently, adult numeracy has been under-researched and under developed and moreover it is not distinguished from literacy in either policy or practice. This has been emphasised by the low number of services currently delivering numeracy/mathematics tuition (DES, 2013).

However, other researchers have argued that there is a need to consider literacy when discussing numeracy as the two can effect, and in many cases are related to each other and therefore are not always mutually exclusive (Baker & Street, 1994). In England the emphasis on numeracy has grown since the government published an independent enquiry entitled 'Prosperity for all in the Global Economy –World Class Skills' in 2006. The report argued adult literacy and numeracy issues had to be addressed and recommended that England was greatly improving its

literacy but needed to increase numeracy skills in order to boost economic output for the future (Carpentieri et al, 2010). It was recognised that central to improving numeracy skills was the need to train and develop fully qualified numeracy specialists (Swain and Swan, 2007).

## Numeracy and mathematics

The lack of agreement on how numeracy should be defined has led to confusion regarding its relationship with mathematics (Perso, 2006). Research has shown that mathematical knowledge develops both 'in and out of school' (OECD, 2009: p30). Furthermore, the frequency of engaging with mathematical tasks in the social world, at work or in other contexts contributes significantly to adult learning (Lave, 1998; Saxe, 1992). This suggests that numerate behaviour is informed by both formal learning and everyday numeracy related practices.

However, research has highlighted there are some aspects of mathematics that are not necessary for numeracy and that there are aspects of numerate behaviour 'that have little to do with mathematics' (Perso, 2006: p37). It is the application of incorrect mathematics to problems that will eventually erode confidence and lead to a lower level of numeracy overall.

Research suggests that there is a need for 'mathematical understandings' but that many people in society can operate functional numeracy with very little knowledge of mathematics as a concept. A deeper understanding of maths is needed for critical numeracy while functional numeracy requires only basic manipulation of numbers (OECD, 2009; Perso, 2006). Therefore, it can be argued that if teachers and tutors are unaware of how numeracy and mathematics connect they will be unable to successfully communicate and deal with the demands placed upon them by their students (Perso, 2006).

## Professional development internationally

Internationally, there has been very little research carried out on what constitutes effective professional development for tutors in adult numeracy (Morton et al, 2006). Countries vary in their approach to professional development of those teaching numeracy/mathematics to adults. In many countries there is little professionalisation of the adult literacy and numeracy workforce and whilst many adult literacy and numeracy tutors do have qualifications these are not necessarily in adult literacy or numeracy (NALA/NRDC, 2011). In other countries, for example, Denmark, a separate qualification has been developed for adult numeracy tutors while in countries like, for example, Italy adult numeracy provision is delivered by mainstream school educators.

The Skills for Life Strategy (2006) in the United Kingdom (UK) emphasised improving the quality of the teaching workforce with a particular focus on teacher qualifications. Following the Skills for Life strategy, a study on 'The Skills for Life Teaching Workforce in England 2006' was published. The report is based on 6,100 individuals involved in the provision of government funded adult numeracy in England. The study showed that most numeracy teachers work part time and are not fully qualified. The report also shows that a significant number were involved in out of field teaching<sup>3</sup>. The study found that:

- numeracy accounted for 25% teacher headcount,
- literacy accounted for 34% of teacher headcount, and
- ESOL accounted for 41% of teacher headcount (Carpentieri et al, 2010: p54).

The data also showed that:

- two thirds of numeracy teachers were teaching at least one other subject, usually literacy and that of these only 13% were fully qualified in numeracy. This situation improved amongst those who taught numeracy only with 57% fully qualified as numeracy teachers;
- those who taught numeracy only were twice as likely to be fully qualified as ESOL-only teachers and nearly three times as likely as literacy-only teachers; and
- younger numeracy tutors are more likely to be fully qualified than their literacy counterparts.

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<sup>3</sup>Out of field teaching is defined as teachers assigned to teach subjects which do not match their training or education (Ingersoll, 2002).

The Skills for Life Strategy (2006) has led to major investment in literacy, language and numeracy in the UK. It also contained a commitment by the British government of the day to professionalise the literacy, numeracy and ESOL workforce through the introduction of a National Qualifications Framework (NQF) for the UK. The roles and qualification levels within the NQF are:

- NQF level 4 – Teacher/Subject Specialist
- NQF level 3 – Subject Support Teaching
- NQF level 2 – Adult Learner Support<sup>4</sup>

The rationale for the development of the NQF was to bring literacy, numeracy and ESOL requirements in line with teachers of other subjects who are expected to have academic or professional qualifications. A core element of the UK government Skills for Life Strategy was the professionalisation of the workforce which meant that those delivering adult numeracy/literacy/ESOL needed a generic teaching qualification and a subject specialist qualification. In order to meet its ambitious new targets, the Department for Innovation, Universities and Skills put in place a comprehensive programme of accredited professional development tailored to the cohort of tutors in the adult education sector (Carpentieri, 2010).

Research suggests that the relationship between teacher qualification and student achievement is significant. It also shows that students achieve higher standards in mathematics when taught by qualified mathematics teachers when compared to students taught by unqualified mathematics teachers (OECD, 2009; Goldhaber and Brewer, 2000; Wright, Horn and Sanders, 1997).

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<sup>4</sup>The UK NQF Level 2 is equivalent to NFQ Level 4; NQF Level 3 is equivalent to NFQ Level 5 and NQF Level 4 is equivalent to NFQ Level 6.

## Adult numeracy in an Irish context

The publication of the results of the International Adult Literacy Survey (1997) provided Ireland with its first profile of literacy skills of Irish adults aged 16-64 years. The focus in quantitative literacy was on the knowledge and skills needed to apply arithmetic operations. As well as the processing of printed information, the difficulty of such tasks was influenced by the following factors:

- the particular arithmetic operations required to complete the task;
- the number of operations needed to perform the task;
- the extent to which the numbers are embedded in printed materials; and
- the extent to which inferences must be made in order to identify the particular kind of arithmetic operation to be performed (IALS, 1997: p36).

The IALS findings showed that 25% of the population performed at the lowest end of literacy and numeracy skills and scored at level 1. Scoring at level 1 of the IALS indicated the person had profound literacy and numeracy difficulties. It requires performing a single relatively simple operation, usually addition. The IALS data also showed that people with the most profound literacy and numeracy difficulties were the least likely to be involved in education or training.

The publication of the IALS 1997 led to Government recognition of the importance of improving adult literacy levels in Ireland. The Green Paper on Adult Education (1998) outlined the need for the development of the adult literacy service as a whole. The White Paper *Learning for Life* (DES, 2000) set out a holistic approach to the development of a national programme for adult education and established the National Adult Literacy Programme.

The White Paper on Adult Education featured the important role of literacy and numeracy in lifelong learning policy and practice. The overall aim was to increase the number of adult learners into the adult literacy service, prioritise those with the lowest literacy levels and implement a quality framework to monitor the effectiveness of the service. In order to help achieve this aim, the White Paper documented the need for highly trained adult educators to strengthen the Adult Education sector.

## NALA and numeracy

In an effort to put a focus on numeracy as distinct from literacy NALA published a Numeracy Strategy (Meeting the Numeracy Challenge) in 2004. NALA defines numeracy as follows: Numeracy is a life skill that involves the competent use of mathematical language, knowledge and skills. Numerate adults have the confidence to manage the mathematical demands of real life situations such as everyday living, work related settings and in further education, so that effective choices are made in our evolving technology and knowledge based society (NALA, 2004).

NALA's strategy identified the following key elements in relation to numeracy.

- a need to develop tutor training;
- greater independent focus on numeracy;
- development of specific training programmes;
- delivery of accredited programmes; and
- requirement to facilitate tutor CPD (NALA, 2004).

Meeting the Numeracy Challenge highlighted the level of in-service training for tutors facilitated by the National Adult Literacy Agency (NALA). In-service training along with numeracy workshops and training for working with Numeracy and Farming were provided. However the report also noted that the demand for tutor training was “variable” and the NALA events were often undersubscribed. Tutors, especially those working part-time, had difficulty attending in-service because of lack of supports, for example, entitlement to subsistence and pay from their organisation. The report made a number of recommendations. These included:

- the implementation of numeracy training as an integral part of all adult literacy tutors professional development,
- the need for accredited numeracy professional development,
- provision for tutors to attend such training.

This position is backed up by Maguire (2003) who showed that there was a lack of numeracy tutor training in adult education relative to training to support the development of reading and writing skills. Maguire (2003) showed that the development of numeracy has often been affected by those who don't have numeracy as their primary interest. In particular, out of field teaching was identified as an area of concern within the adult numeracy sector.

Numeracy tutors were shown to have quite varied qualifications and little training opportunities. The Maguire research showed a real demand for accredited training programmes which are seen to be “a powerful influence in terms of what tutors do with their learners in the classroom” (Maguire, 2003: p29).



## CPD in main stream education

The rationale for Continual Professional Development (CPD) in Ireland stems from growing national awareness that the quality of teacher education is linked to higher learning expectation for students and expanding fields of knowledge and new ways of thinking about learning. Unlike an induction process or initial tutor training CPD is required to support the professional life of a teaching professional (Teaching Council, 2011).

In 2011 the Teaching Council produced the report Policy on the Continuum of Teacher Education. The Policy suggests that the pace of change in the education system since the 1990's is having a significant impact on teaching (Teaching Council, 2011). According to the Teaching Council, the lifelong learning and career development of teachers is a key national policy priority. The Council points to a number of developments that suggests an improvement in CPD provision in Ireland. Firstly, there is growing recognition of teachers and schools identifying their own needs and participating in collaborative networks that offer optional accreditation pathways.

Education Centres in consultation with local schools are designing targeted professional development courses to meet identified local needs at primary and secondary level. Secondly, the establishment of the cross-sectoral Professional Development Service for Teachers in 2010 will continue to address the limitations and challenges that have been associated with CPD in Ireland by promoting the continuing education and training and professional development of teachers.

## The National Strategy to Improve Literacy and Numeracy among Children and Young People 2011-2020

Literacy and Numeracy for Learning and Life: The National Strategy to Improve Literacy and Numeracy among Children and Young People 2011-2020 acknowledges the need for improvement to initial teacher training and CPD for teaching professionals for the successful implementation of the Strategy. This has resulted in a commitment from Government to ensure that focussed and relevant CPD will be provided for tutors during the lifetime of the Strategy. This will be achieved through:

- the Teaching Council advancing changes to initial teacher education. In 2011 over 12,000 primary school teachers participated in summer professional development courses that focused on literacy and numeracy;
- a national programme of CPD courses for school principles commenced in Autumn 2011;
- specific units on the teaching of literacy and numeracy have been included within the induction programme that is now available to all newly qualified teachers during their probationary period (DES, 2011).



The Strategy highlights that literacy and numeracy are fundamental to a person's ability to succeed in education, to gain fulfilling employment and to lead satisfying and rewarding lives. The Strategy emphasises the important role of schools and teachers in achieving this (DES, 2010).

To date, the professional development of adult numeracy tutors who work outside the mainstream education system has not been included in any debate on mathematics education in Ireland.

## Out of field teaching in second level education

In 2009 Ní Ríordáin & Hannigan investigated the level of out of field teaching that takes place in Irish post primary mathematics classrooms and its potential to influence mathematics learning. The sample for the study was 60 post primary schools across the country and each school represented a cluster of mathematics teachers. Teachers from 51 of the schools were surveyed and a total of 324 teachers teaching mathematics completed the questionnaires. The key findings from the survey show that:

- 48% of the teachers did not have a mathematical teaching qualification;
- qualified mathematics teachers are primarily assigned to Higher and Ordinary Level mathematic classes, particularly the examination years;
- out of field teachers for the most part were assigned Ordinary Level (non-exam years) Foundation, Leaving Certificate Applied and resource teaching hours;
- older teachers tended to be more likely to have a teaching qualification in mathematics; and
- 40% of teachers aged 35 or under had a teaching qualification compared to 65% of teachers aged over 35 years (Ní Ríordáin & Hannigan, 2009).

The authors of the report present the findings as one possible explanation for the poor performance in mathematics of post primary students in Ireland. As a possible solution to out of field teaching they recommend:

- the introduction of postgraduate qualifications in mathematics in order to provide opportunities for both in and out of field teachers to upgrade skills and achieve qualification to teach mathematics;
- launching a recruitment drive in order to attract mathematic graduates into the mathematics teaching profession; and
- develop a coherent national policy for improving mathematics teacher quality and qualification (Ní Ríordáin & Hannigan, 2009).

In a move to address this situation the Professional Diploma in Mathematics for Teaching (part time) was launched. The programme aims to train out of field mathematics teachers over a three year period from 2012-2015. The Diploma is funded by the DES as part of a national strategy to support the implementation of Project Maths and improve standards in mathematics in post primary schools by upskilling out of field teachers of mathematics (DES, 2013).



## CPD in adult numeracy

Since the publication of the White Paper on Adult Education there have been some developments in training for personnel working in the area of adult numeracy/mathematics tuition. The most notable was the inclusion of numeracy modules in the NALA/WIT programmes at NFQ Levels 6 and 7. Since its establishment in 1997, the NALA/WIT partnership programme has aimed to provide recognised higher education qualifications and professional standard training for adult literacy practitioners. These qualifications are available on a modular basis:

- Certificate in Adult Literacy Studies (Special Purpose Award NFQ 6)
- Bachelor of Arts in Adult Education (NFQ 7)
- Bachelor of Arts in Further and Adult Education (NFQ 8)
- Bachelor of Arts in Teaching in Further and Adult Education (NFQ 8).

To meet the challenging demands of adult numeracy provision, there is a need for adult numeracy tutors to have access to appropriate accredited numeracy professional development. Currently the availability of accredited professional development is through two modules each of 10 ECTS credits which can be chosen as part of the WIT adult literacy degree programme. According to the DES Adult Literacy Review 2013, about a third of the adult literacy workforce has completed third level qualifications through WIT. Whilst, other staff may possess equivalent qualifications gained through other tertiary organisations there is no national data available to support this. The Adult Literacy Review recognised that research indicates positive association between teachers' experience and qualifications and learner progress. However, apart from ALOs there is no set of required qualifications for adult literacy service staff delivering adult literacy and numeracy tuition (DES, 2013).

There has been little change in the accredited provision of adult numeracy CPD since the publication of the 'Meeting the Numeracy Challenge' in 2004. NALA has continued to provide much needed up to date numeracy training to tutors through in-service training, a series of local and regional workshops and an annual national conference in partnership with Institute of Technology Tallaght. Tutors from a range of organisations delivering adult numeracy/mathematics tuition including, the adult basic education sector, the National Learning Network, FÁS community training centres, Youthreach programmes, community education and training centres, have availed of these opportunities.

Numeracy teaching is different to teaching literacy or teaching school mathematics. Adult numeracy tutors require opportunities for continuing professional development that consider all aspects of numeracy teaching and learning, specifically in relation to numeracy rather than through the lens of literacy or mainstream mathematics. Current developments include:

- development of the FETAC components for functional mathematics (Level 3 and Level 4) mathematics (Level 4), the upskilling of out of field teachers in mainstream education and the future publication
- PIAAC international assessment of adult life skills which includes
- numeracy as an explicit domain, highlights the need to ensure that appropriately equipped numeracy professionals are available to meet the increasing demands for adult numeracy into the future.

The implementation of Project Maths in the post primary sector and the publication of the Department of Education and Skills Strategy for Literacy and Numeracy Learning for Life (2009) has put numeracy on the national agenda and this is likely to have an effect on numeracy in adult education. In this regard, this report is timely in that it can inform the future CDP provision for adult numeracy/mathematics tutors in Ireland.

# Chapter Two

## Methodology

The primary aim of this research is to identify the training needs of tutors and trainers providing numeracy tuition to adult learners in a number of settings nationally. In particular, the survey was targeted at those delivering customised or accredited FETAC mathematics programmes in the adult basic education sector. To a large extent, the survey mirrored a similar survey carried out in 2001 (Maguire, 2003). However, the original survey was extended to include adult numeracy tutors' feedback on the new FETAC processes and mathematical components that are currently being delivered in this sector.

### Data collection methods and data analysis

The questionnaire was compiled using the online survey instrument Survey Monkey and was structured in six sections:

- Section 1 Profile of participants
- Section 2 Specific experience in teaching mathematics/numeracy
- Section 3 Teaching practices
- Section 4 Training
- Section 5 Attitude towards and relationship between mathematics/numeracy
- Section 6 National Framework of Qualifications

The survey was designed primarily to gather quantitative data; however, text boxes were included to provide the tutors with the opportunity to make general comments or to provide a more detailed explanation of their responses. The online survey data was downloaded into the Statistical Package for Social Scientists (SPSS) through which the data was stored and analysed.

### Sampling strategy

The sampling frame for this study was the tutors of adult mathematics/numeracy in the literacy and further education sector in Ireland. Agreement to carry out the survey was sought and obtained from the Irish Vocational Education Association (IVEA), the VEC adult literacy forum, FÁS and Youthreach. Subsequently the Chief Executive Officer (CEO) in each Vocational Education Committee and Managers in FÁS were contacted and invited to take part in the

research. Each CEO and manager was then asked to distribute the survey to all staff members who deliver mathematics/numeracy tuition to adult learners within their organisation. The link to the survey was also emailed to other organisations such as AONTAS and the National Learning Network.

In total 207 tutors took part in the survey. Of these 166 tutors (84%) are currently teaching mathematics/numeracy to adult learners and it is the data on this cohort that was extrapolated for analysis in this report. The remaining 16% have taught the subject in the past and are not included as part of the data set for this report. A profile of respondents is set out in Section 1 of this report.

## Limitations of the study

The main respondents to the survey came from the VEC adult literacy sector, although at the time some VEC's were not in a position to take part in the research. As the VEC sector represents the majority of those delivering adult numeracy nationally, other providers' views may not be fully represented in the data collected.

# Chapter Two

## Research Findings

### Research Findings

This chapter provides an overview of the data collated from the responses to the questionnaire. It is divided into six sections as follows:

1. Profile of participants;
2. Specific experience in teaching mathematics/numeracy;
3. Teaching practices;
4. Training;
5. The relationship between and attitude towards mathematics/numeracy;
6. National Framework of Qualifications.

### Section 1: Profile of the Survey Participants

This section provides an overview of the range of centres within which adult numeracy tutors deliver adult numeracy/mathematics in the adult literacy and further education sector in Ireland. It also profiles tutors' age, gender and education qualifications and current contractual status.

#### Key insights

- The profile of adult numeracy tutors is similar to that found by Maguire in 2001. The overwhelming majority of numeracy tutors (79%) are female and over half of these are over 45 years of age.
- The profile of the qualifications of the tutors has changed over the period. In the current survey 90% of tutors have some third level experience. This has increased from 2001 where 75% of tutors had some post secondary school qualifications. However, the number of tutors with a dedicated maths qualification remains low (8%) and unchanged since the 2001 survey.
- Over the last ten years the contract status of tutors has moved more towards part time employment with 60% of the tutors currently working part time compared to 35% in 2001. A further 28% of tutors now work full time - this has decreased from 42% in 2001. The percentage of tutors who work as volunteers has also declined from 23% in 2001 to 12% in 2012.

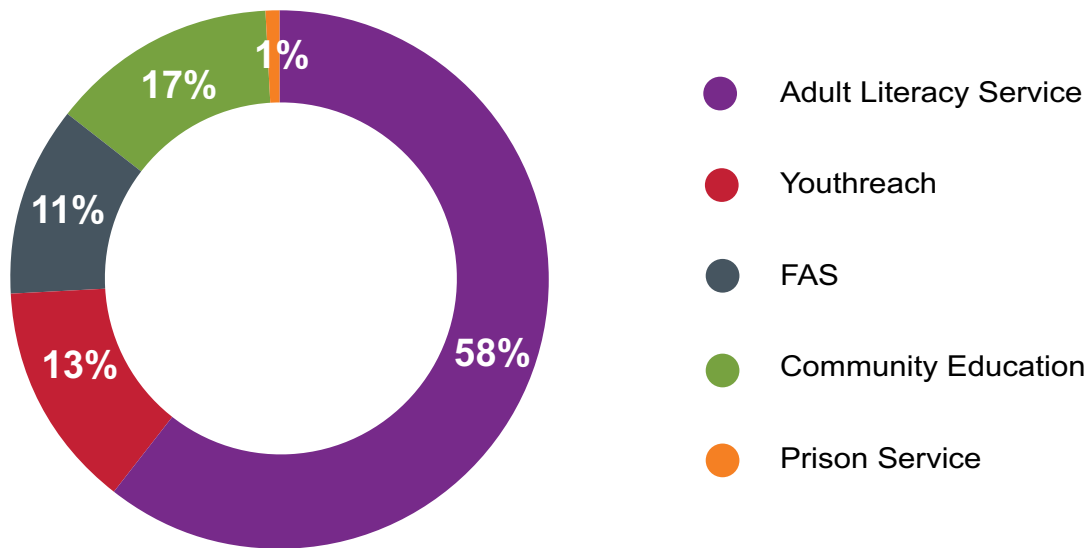


Figure 2: Different types of centres where tutors had taught

The tutors worked in a range of services in which adult numeracy/mathematics tuition is delivered. Figure 2 shows that the majority of tutors (58%) worked in the VEC adult literacy service, smaller percentages worked in the area of Community Education, Youthreach programmes and FAS training centres. A minority worked in the Irish Prison Education Service.

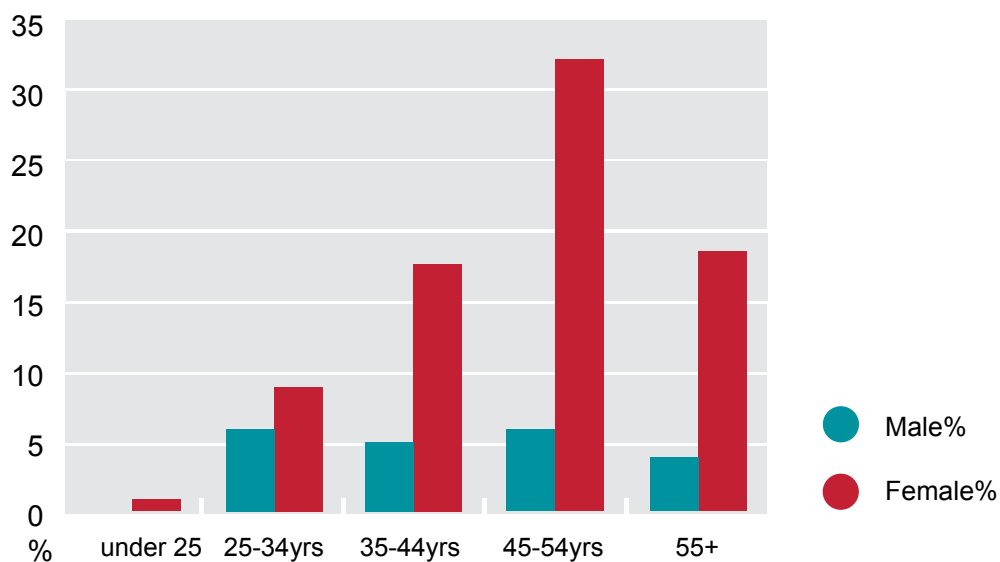


Figure 3: Gender breakdown of tutors

Over half the tutors (51%) were aged 44 years and over. A small proportion of tutors (1%) were aged less than 25 years.

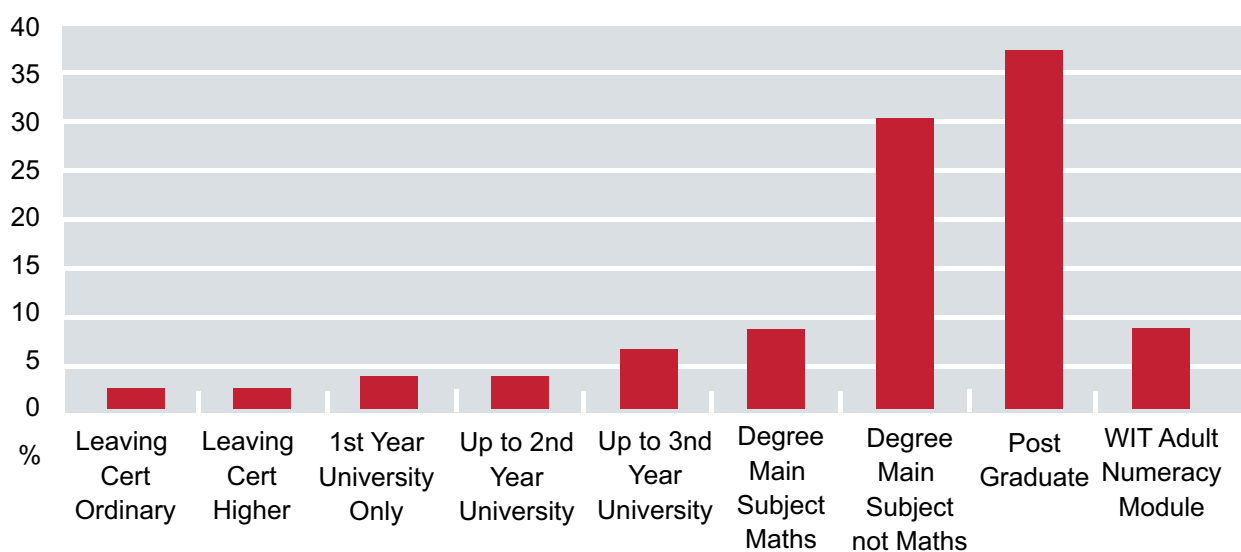


Figure 4: Highest overall qualification obtained by tutors

The profile of the qualifications of tutors (Figure 4) show that over three quarters of those surveyed had a third level qualification. Less than 5% of tutors working in the sector did not attend third level, a decrease of 15% since 2001. Only 8% of tutors who responded had a degree where the main subject was mathematics.

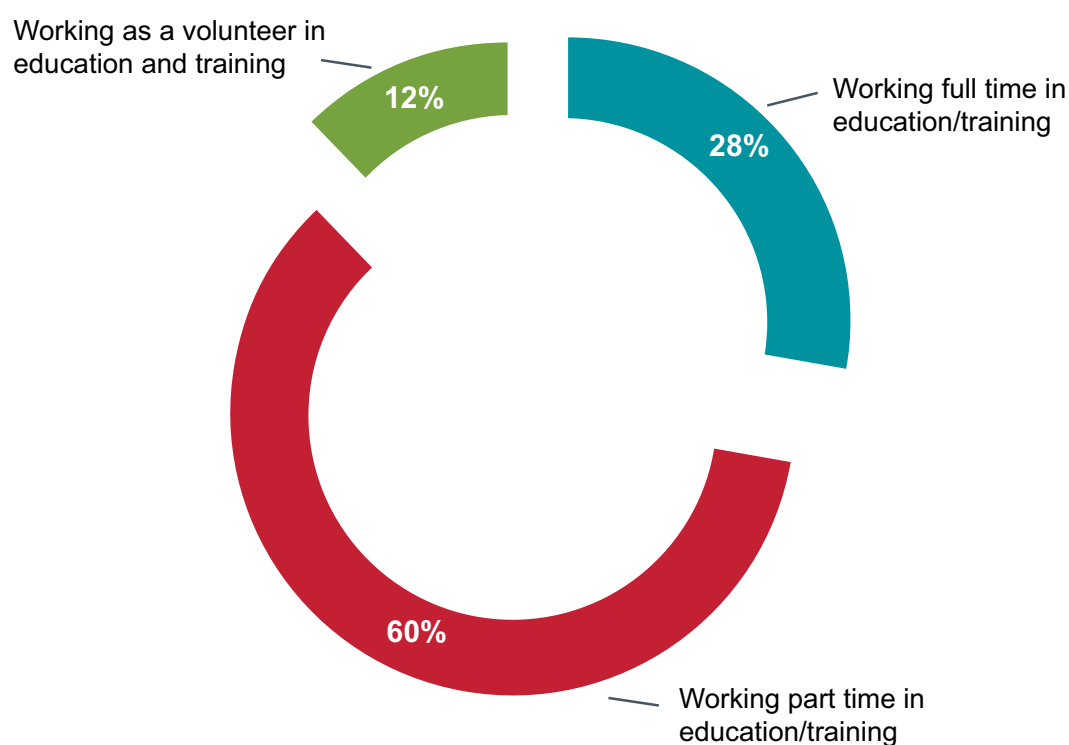


Figure 5: Current contractual position

The contractual status of the tutors indicates that 60% were working part time in adult education/training, 28% were employed as full time tutors and 12% were working as volunteers.

## Section 2: General teaching experience and specific experience of teaching mathematics/numeracy to adults

Section 2 reports on the experience that current tutors have in teaching adults and in particular, teaching adults numeracy/mathematics. The section also outlines the age groups of the learners that were taught and the range of educational contexts within which the tutors had been practicing. The section also highlights the tutors' specific experience in teaching numeracy/mathematics to adults and the level of mathematics they teach.

### Key insights

- The survey shows that tutors have moved between different types of adult education centres during their career. 50% of tutors had taught within the secondary and primary school system and a small percentage had experience of teaching at third level.
- The survey shows that there is considerable teaching experience within the adult basic education sector. However, there is less experience of teaching mathematics specifically.
- 49% of the tutors have been teaching numeracy/mathematics for five years or less.
- Within adult basic education, mainstream school mathematics, vocational mathematics and customised programmes are delivered. The majority of vocational programmes are accredited at FETAC Levels 3 and 4. However a reduction in the delivery of customised programmes since 2001 was observed.
- The survey highlights a broad range of tutors teaching a broad cohort of students and this reflects the diversity of the provision offered through adult basic education in Ireland.
- The majority of tutors delivered maths at NFQ Levels 3 or 4. Only 23% of tutors reported that they currently teach non accredited customised programmes. This represents a 16% decrease since 2001.



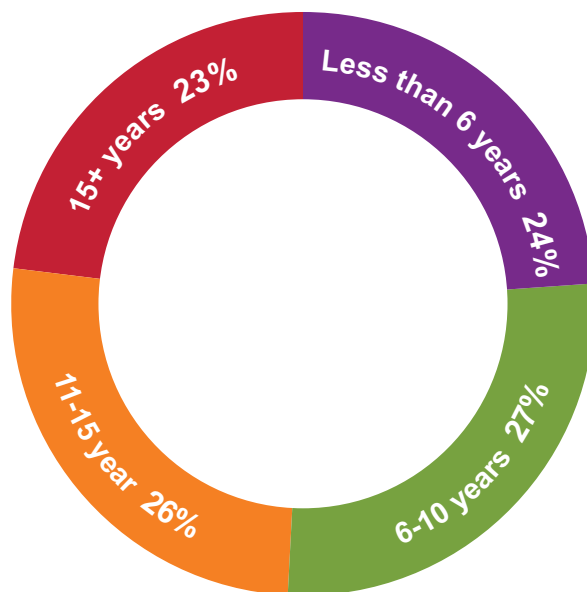


Figure 6: Length of time tutors have been teaching

The survey revealed that nationally there was a spread of tutors with a wide range of experience in teaching. Almost 75% had been involved in teaching for over six years (Figure 6).

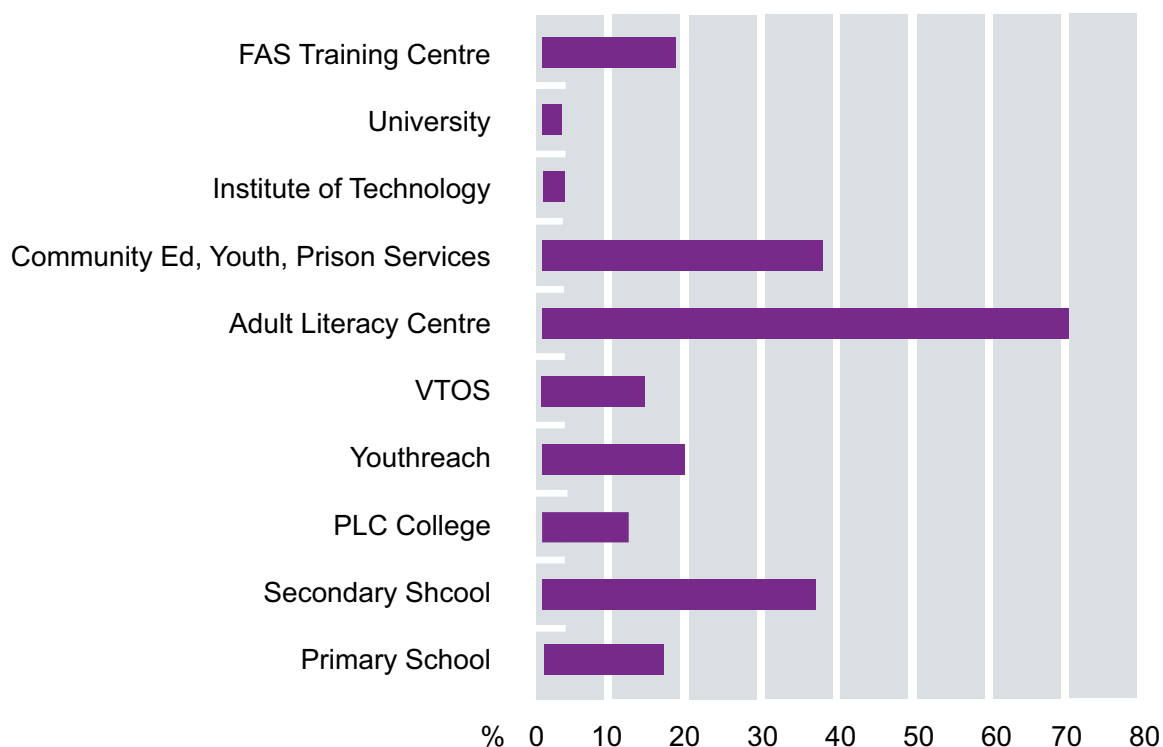


Figure 7: Types of centres tutors have taught in as part of their teaching career

The vast majority of tutors (72%) surveyed taught in an adult literacy centre although tutors in general have taught in a range of centres throughout their career.

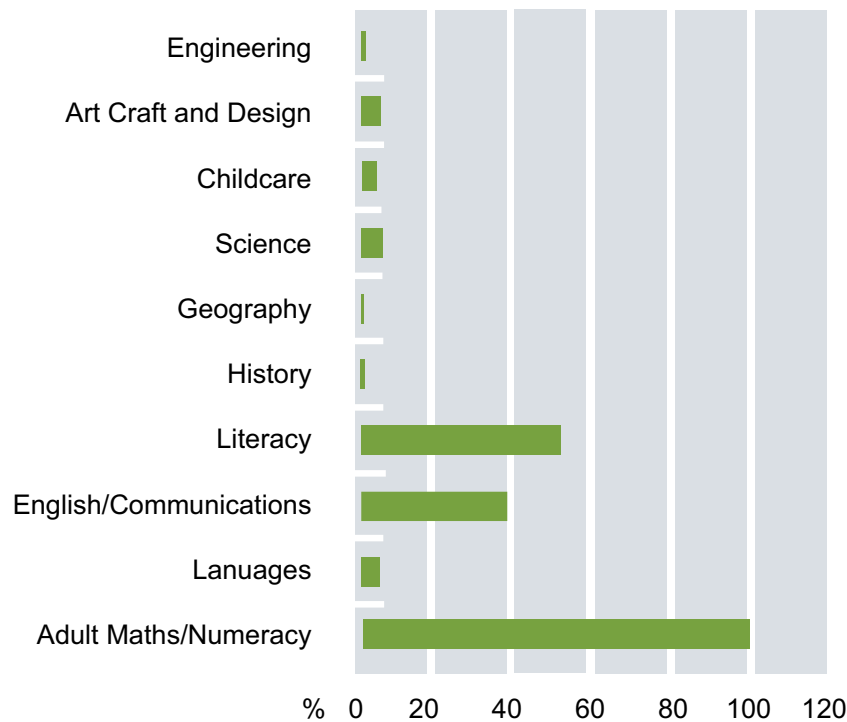


Figure 8: Subjects currently taught by tutors

The majority of numeracy tutors teach numeracy in combination with communications, literacy and other subjects.

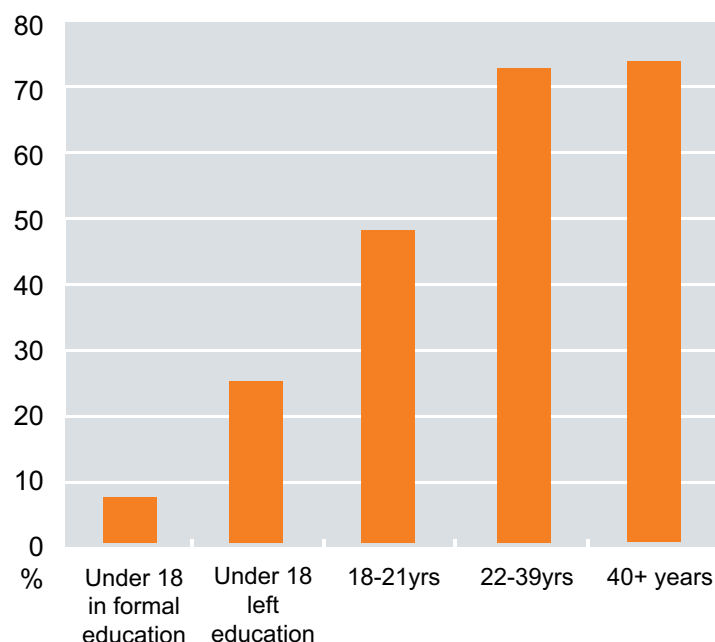


Figure 9: Age range of learners

Most learners in numeracy provision delivered by numeracy tutors are over 23 years of age. However, learners under 18 who have left education also access numeracy provision through FÁS, Youthreach and the adult literacy service.

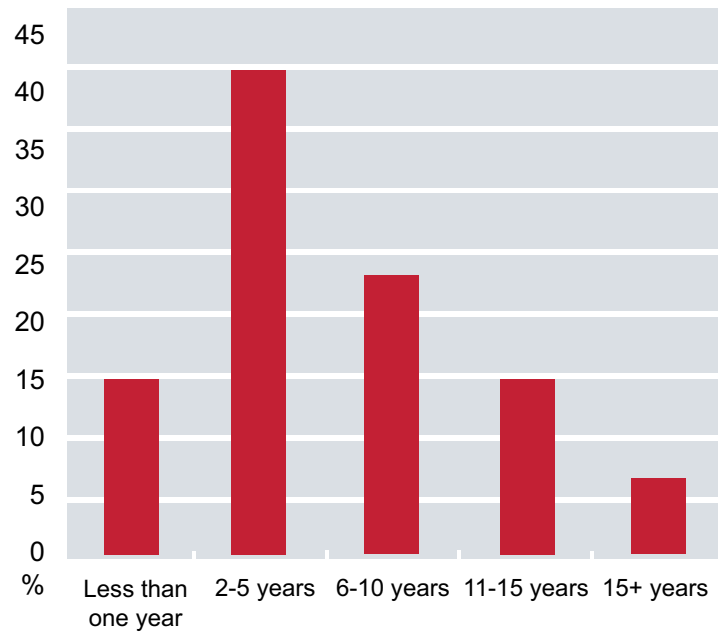


Figure 10: Number of years teaching adult numeracy/mathematics

Tutors surveyed have considerable experience in teaching, over 75% of tutors have been teaching for over 6 years. However tutors have less experience in teaching adult numeracy/mathematics with more than half those surveyed teaching adult numeracy/mathematics for less than five years (Figure 10).

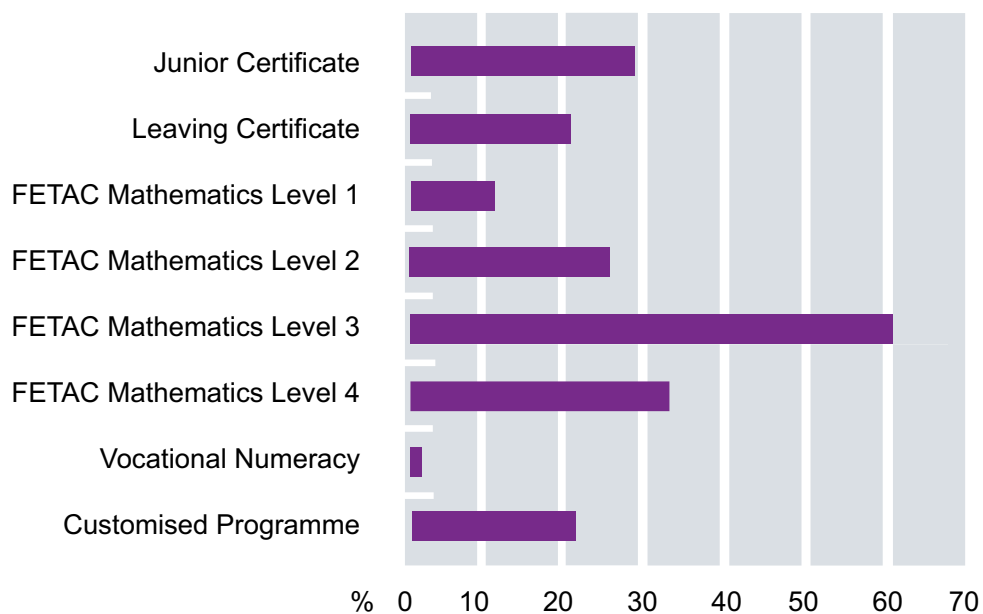


Figure 11: Level of numeracy/mathematics tutors are teaching

The survey showed that accredited mathematics from mainstream vocational and customised programmes was delivered throughout the sector (Figure 11). Customised numeracy provision is only delivered by 23% of the tutors surveyed. The majority of adult numeracy/mathematics provision was delivered at NFQ Levels 1 to 4.

## Section 3: Teaching practices

This section describes the teaching approaches used by tutors when teaching numeracy/ mathematics to adults. It also identifies the main factors that influenced how tutors teach adults.

### Key insights

- About half of the tutors reported that their current teaching is influenced by their own school experience. There was very little agreement amongst tutors regarding the impact that their third level experience had on their teaching practices. A similar number reported that their third level experience had the most and the least influence on teaching practice. From the data it is unclear the influence that the Higher Diploma in Education had in providing the right skills for teaching adults.
- Almost all the tutors who completed in service training reported a positive impact on their teaching practice.
- Similar to the survey in 2001 numeracy tutors in the current survey reported that adult learners have a complex about mathematics.
- Tutors recognise that adults require a different teaching approach than learners in full time mainstream education. Although traditional methods of teaching for example, blackboard and chalk and talk are used in adult classrooms, there has been an increase in project work, group work and integration of technology since 2001. However, the use of other teaching practices has not changed significantly.

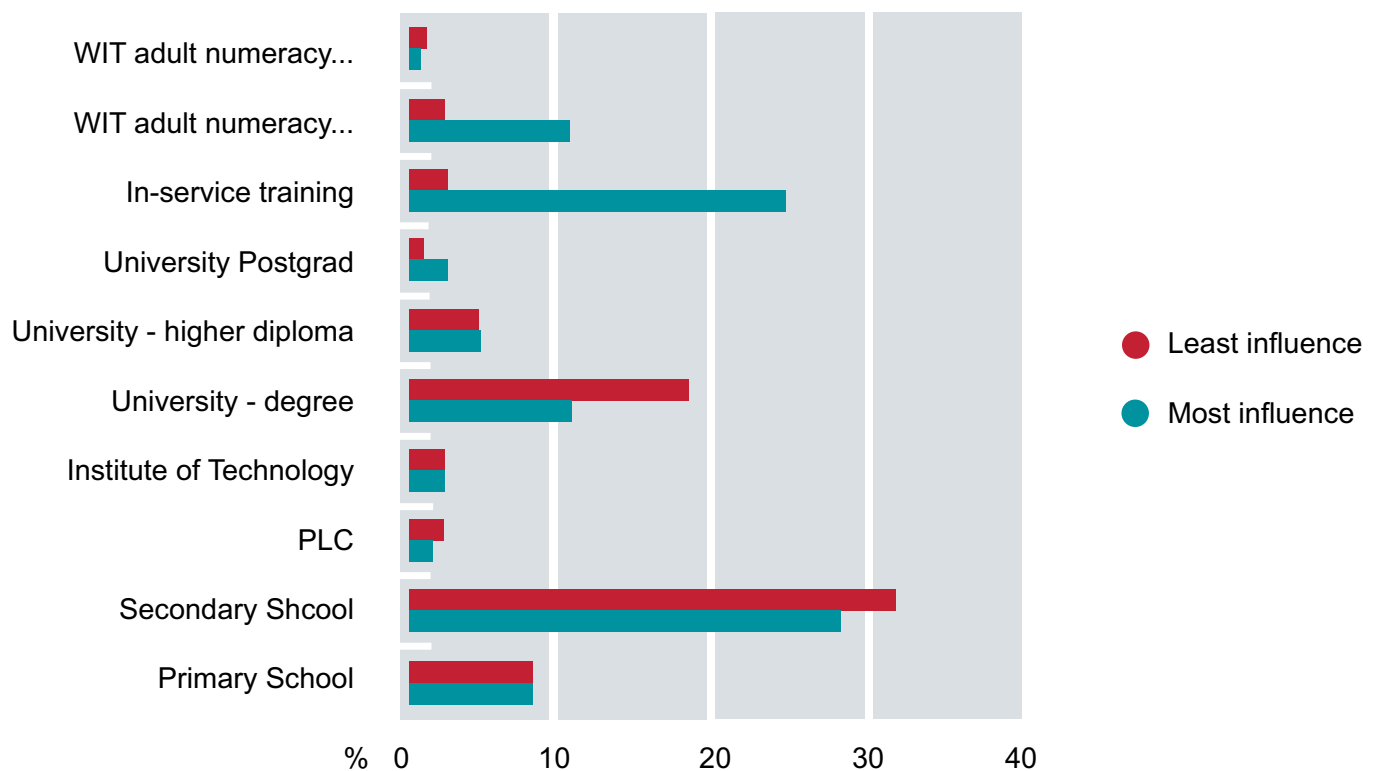


Figure 12: Qualification that had least / most influence on tutor practice

Of the tutors surveyed 25% reported that the way in which they teach had been influenced by the in service training they completed. An equal proportion of tutors felt that their third level experience had both been the most and the least influence on their teaching practice. Overall the education experience which has had the least and most influence on teaching practice reported by tutors during this research is very similar to that reported in 2001.

Table 2: Teaching practice used by tutors

	Always %	Usually%	Rarely %	Never %
Blackboard, Chalk and Talk	27	50	13	10
Practical work	44	50	6	0
Rote learning	4	14	45	36
Project work	18	51	26	4.5
Group work	28	53	16	2
Technology (excl calculators)	21	39	31	9
Investigational work	14	41	35	10
Problem solving	50	46	4.1	0
Consolidation	36	59	4.5	0.5
Self directed learning	16	44	34	6
Guest speaker	3	4	21	72
Internet/online resources	18	47	28	7

Tutors recognised that adult learners require different teaching approaches than those in the mainstream school system. The range of teaching methods varied between tutors with the majority using blackboard, chalk and talk, consolidation, problem solving and group work in their class room. 65% of tutors make use of internet and online resources to support their teaching (Table 2).

Table 3: Approaches to teaching adults learners and younger learners

	Strongly agree %	Slightly agree %	Neither%	Slightly disagree %	Strongly disagree%
A different approach is required when it comes to teaching adults	80	14	3	2	1
The chalk talk and practice approach works well when it comes to teaching adults	26	31	21	11	9
Adult learners are more demanding than learners in fulltime mainstream education	20	26	25	13	15
Adult learn best when treated as equals	89	11	0	0	0
Maths is the one subject adults have a major complex about	57	32	7	2	1
HDip in education gives you skills you need for teaching adults	4	12	45	19	20
WIT module gives skills you need for teaching adults	6	17	63	9	6

The majority of tutors recognise the need for a different teaching approach when teaching adults and adults often have a complex about mathematics and learn best when treated as equals. Of those that expressed an opinion 39% felt that the Higher Diploma in Education does not provide the necessary skills to teach adult numeracy/mathematics. However, a greater number of tutors who expressed an opinion about the WIT numeracy module at Levels 6 and 7 indicated that this programme did give them the skills needed for teaching adults.

## Section 4: Training

This section explores the amount and type of Continuing Professional Development that tutors have completed or feel is required to support them in their role as a tutor in adult basic education. Tutors also outlined the way in which they would like CPD to be available to them.

### Key insights

- The majority of tutors have completed some training in teaching adults however, they have had less training in teaching adults numeracy/mathematics specifically. A high proportion (40%) of tutors completed no CPD over the last three years.
- Over 60% of tutors reported that they did not have enough training in teaching mathematics to adults and of these, 15% reported that they had no training at all in this area.
- Although tutors recognise the importance of developing a more profound understanding of elementary mathematics, they favoured CPD that would provide the opportunity to build confidence in their teaching, to use a range of teaching approaches and to be able to develop resources to suit learners.
- The majority of tutors expressed a preference for a training programme that is accredited and delivered part time and supported by technology. The credits gained on the course should help build towards a postgraduate teaching qualification in adult numeracy/mathematics.

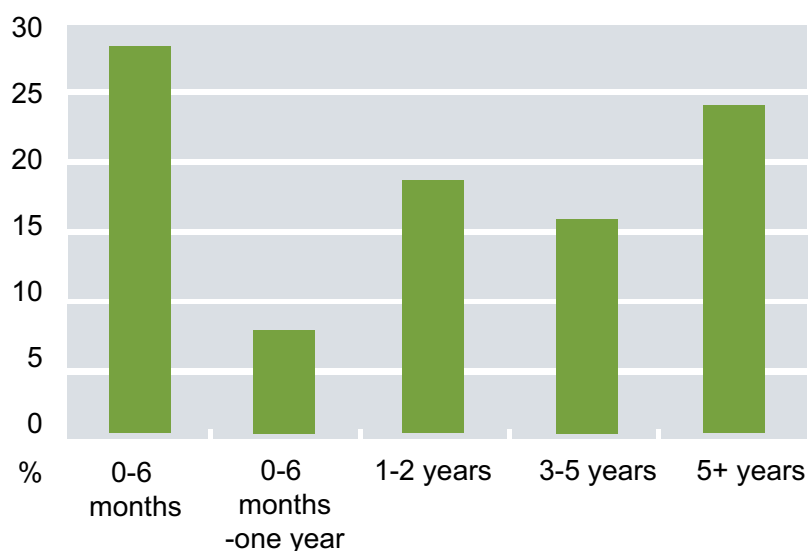


Figure 13: Length of time since completed CPD

The majority of tutors have completed some form of CPD in teaching mathematics; however 40% of tutors have not completed CPD for over three years (Figure 13).



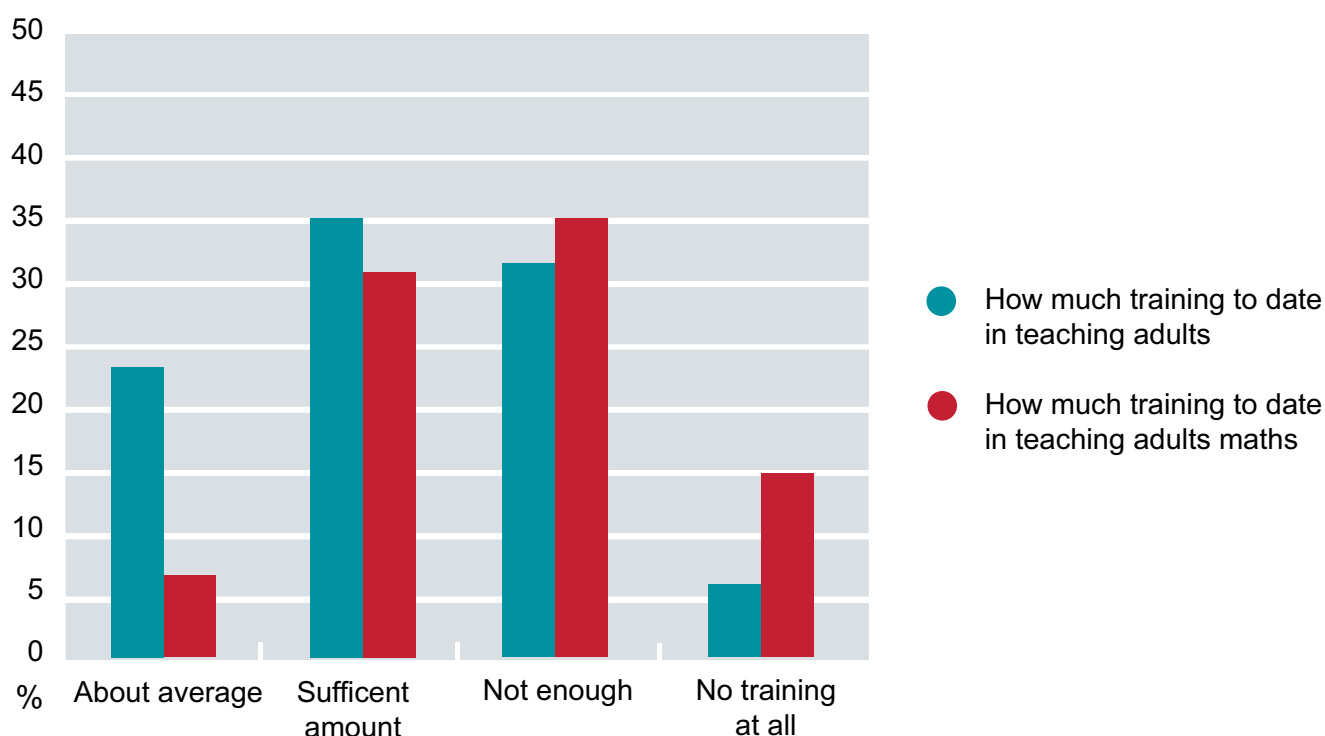


Figure 14: How much training tutors have received to date

The type of CPD which tutors have accessed can either be directly related to teaching adults or specifically related to teaching adults mathematics. Over 60% of tutors reported that they felt they had sufficient training to teach adults. However, only 36% of tutors felt that they had a sufficient amount of training to specifically teach mathematics.

Table 4: The importance of different types of training

Designing resources and activities to suit all levels	58
More profound understanding of elementary maths	24
How adults learn in general	15
How adults learn maths in particular	40
Ways of applying maths in different contexts	53
Problem solving	29
Coping with maths anxiety in adult learners	41
Using technology to deliver maths	52

Tutors prioritised opportunities to build confidence in developing resources and applying mathematics in different contexts; understanding how adults learn mathematics; coping with mathematics anxiety and integrating technology into their teaching and learning. They placed a lower priority on developing a profound understanding of elementary mathematics; how adults learn in general and problem solving (Table 4).

Table 5: Tutor views on a new training package needs

	Strongly agree %	Slightly agree %	Neither %	Slightly disagree %	Strongly disagree %
Enable tutors develop knowledge, skills and confidence to use range of approaches	76	18	4	1	0
Help to develop their own resources to suit adult learners at all levels	67	24	6	1	2
Develop a profound understanding of elementary maths to act as foundation for delivery in classroom	61	27	7	1	3

Tutors highlighted the need for future CPD to provide them with equal opportunities to learn appropriate teaching methodologies and skills in developing their own resources to suit adult learners as well as building their understanding in elementary mathematics.

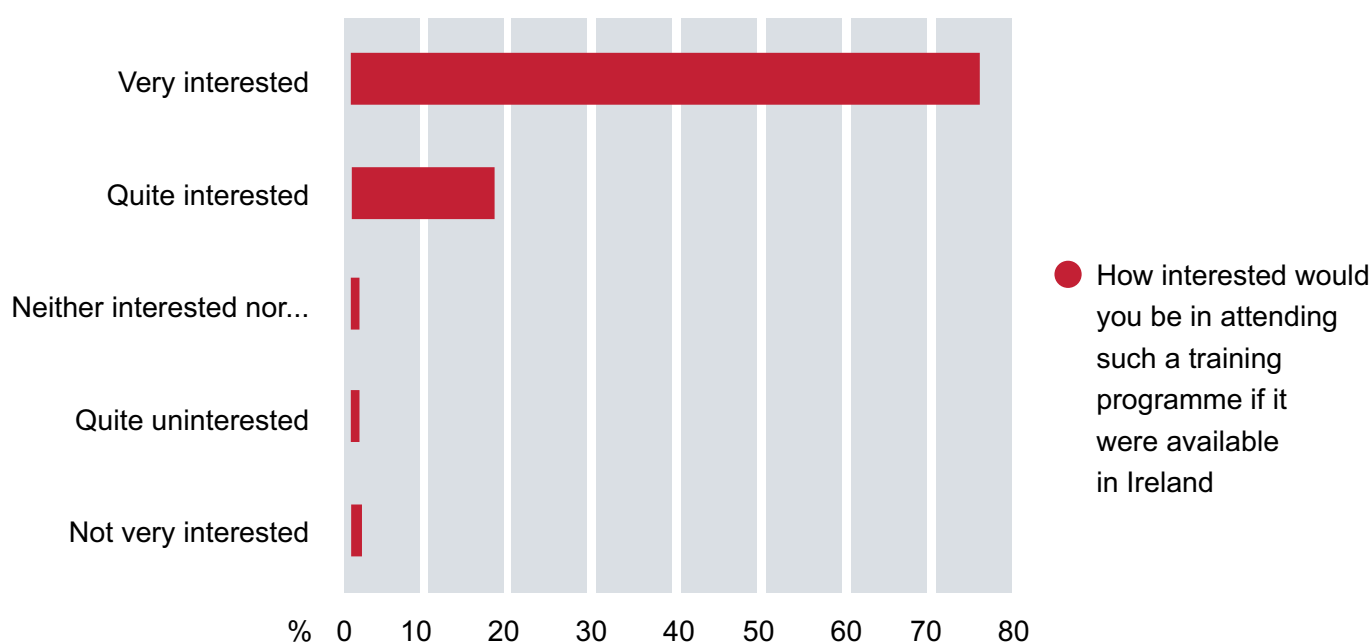


Figure 15: Interest among tutors in attending a training programme

The vast majority (95%) of tutors indicated interest in accessing further CPD if available.

Table 6: Interest in attending training programme delivered in a range of ways

	Very interested %	Quite interested %	Neither %	Quite uninterested %	Not very interested %
Full time block of learning (for example, 6 weeks)	14	16	13	15	42
Part time in service days	52	34	4	5	5
Part time evening/ weekend course over an extended period	33	33	11	6	17
Available by distance learning with workshops and/or tutor support	47	26	11	5	10
Interactive online (computer based) course self taught	41	21	13	13	12
The training programme is not accredited	10	16	33	16	25
The training course is university accredited	61	16	17	1	5
The training programme is accredited by university and gives you credit towards the higher diploma in Education	51	14	27	8	0

Tutors favoured CPD delivered as part time provision with some distance or interactive online support. There was a very strong requirement that the course be accredited and that the credits achieved would count towards a postgraduate teaching qualification or equivalent.

## Section 5: The Relationship between mathematics and numeracy and attitudes towards mathematics and teaching mathematics

In this section tutors responded to a number of statements about numeracy and its relationship with mathematics. Tutors' attitude to mathematics and beliefs about mathematics are also explored.

### Key insights

- Adult numeracy tutors conceptualise numeracy as mathematics in use in everyday life and work.
- Tutors believe that you can become numerate without doing mathematics at school.
- Tutors believe that doing mathematics at school does not necessarily make you numerate.
- The majority of tutors believe they have a natural ability with mathematics.
- Over a quarter of the tutors surveyed acknowledged they struggled with mathematics at school.

Table 7: How tutors describe numeracy

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
Numeracy is the ability to perform basic numeric operations	66	29	2	1	0
Numeracy is being able to interpret the numbers in text like the newspaper and on medicine	63	3	3	1	1
Numeracy is being able to do the Mathematics that you meet in your everyday life and work	86	12	0	1	1
Numeracy is being able to interpret information in simple graphs and tables	51	31	12	4	1
Learning maths at school makes you numerate	7	20	30	25	18
There are different levels of numeracy (Basic numeracy – complex numeracy)	57	25	15	3	0
Everybody has distinct numeracy skills that they need to cope with their everyday life and work	68	25	6	1	0
People today need to be more numerate than their parents and grandparents	44	16	26	10	4
If a person can live their normal everyday life, whether they are a rocket scientist or working in a shop. If they can cope with whatever number work they need in their own life, then they are numerate.	28	40	17	12	4
You have to be taught or teach yourself to become numerate	22	31.	28	16	3
You can become numerate without going to school	30	34	22	11	3
Numeracy is a word used because the word mathematics often frightens people	22	29	24	18	9

These data in Table 7 above highlight that tutors in the main view numeracy as the ability to do mathematics in everyday life and work. They recognise that numeracy skills vary from individual to individual. They did not always agree that learning maths in school makes a person numerate, as 43% of tutors expressed some disagreement with this statement and 65% indicated some level of agreement. Half of those surveyed felt that numeracy was a word that was used because the term mathematics can cause some anxiety.

Table 8: Tutor attitudes towards mathematics

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
Mathematics was one of my favourite subjects when I was in school	48	25	6	11	10
When it comes to numbers I seem to have a natural ability	42	28	14	10	6
Mathematics made me very anxious at school	8	17	13	16	46
I would describe myself as having middle of the road ability when it comes to maths	22	27	8	24	19
I really struggled with mathematics at school	6	6	11	19	58

In terms of tutors' personal view of mathematics, 75% acknowledged that mathematics was their favourite subject in school and felt they had a natural ability to do mathematics. A quarter of tutors reported that mathematics made them very anxious at school and 12% reported that they struggled with mathematics at school themselves.

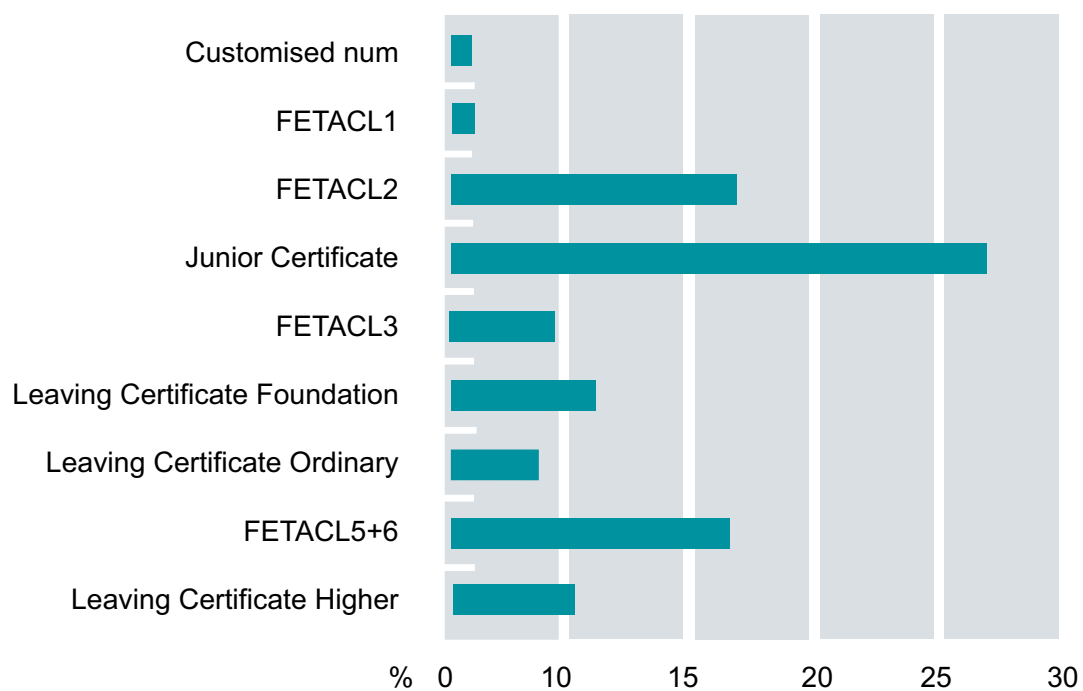


Figure 16: The degree of comfort tutors had in teaching different levels of mathematics

Generally the tutors were less comfortable delivering higher levels of mathematics (Leaving Certificate Honours and FETAC Level 5 or 6) than other mathematics provision. 15% of tutors were only comfortable with delivering customised numeracy programmes. The majority of tutors were comfortable with delivering mathematics provision to FETAC Level 3.

## Section 6: National Framework of Qualifications

This section is an extension to the 2001 survey to reflect the development in the Vocational Mathematics Framework that has occurred over the last ten years. In particular, the questions were designed to explore with tutors how mathematics programmes are developed, the level of collaboration between numeracy/mathematics tutors within centres, their perception and understanding of the FETAC system of accreditation and delivery and its suitability for their learners.

### Key insights

- Whether or not tutors collaborate on the development of FETAC programmes is dependent on the centre to which they belong.
- Within some centres, tutors work collaboratively and share some resources for the delivery of FETAC mathematics programmes.
- Tutors understand the FETAC system of accreditation and believe that having accreditation available is very important to learners.
- Tutors believe that the FETAC components reduce the flexibility they have in meeting individual learner needs.

Table 9: Attitudes towards training and collaboration

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
In my centre all those delivering FETAC maths components are involved in the development of the maths programme	22	15	24	19	20
In my centre adult numeracy and maths tutors work collaboratively and share resources	26	26	14	18	16
I would like to complete in-service training to build my confidence in my own mathematics	48	24	14	6	8

The survey data indicated different approaches to the development of the approved FETAC programme within a centre. A similar number of tutors expressed disagreement as much as agreement with the statement that 'in my centre all those delivering FETAC maths components are involved in the development of the maths programme' (Table 9). More than half the tutors indicated that they collaborated with their colleagues in the delivery of adult numeracy/mathematics provision and shared resources. In general tutors expressed the need for CPD that would build their own confidence in mathematics.



Table 10: Attitudes towards the development of FETAC components

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
The development of FETAC components at levels 1-4 meet the needs of my learners	25	34	15	13	13
The development of FETAC component programmes are very work intensive	56	27	14	2	1
I understand how the FETAC system of accreditation works	62	28	4	2	4
I have attended in-service training in relation to delivering FETAC maths components	24	20	11	13	31
The new FETAC components reduce the flexibility I have in meeting individual learner needs	38	26	27	4	5

Tutors acknowledged that the development of FETAC mathematics programmes is very work intensive. The vast majority understand how FETAC accreditation works and agree it is very assessment driven. Fewer than half the tutors have attended in service training specifically in relation to delivering FETAC mathematics components. 60% of tutors indicated that the FETAC components at Levels 1 and 4 meet the needs of their learners but indicated that the flexibility they have in meeting individual learner need is reduced when delivering FETAC accredited components.

Table 11: Degree of confidence in delivering FETAC components

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
I feel confident in delivering FETAC level 1 Quantity and Number	73	11	14	0	2
I feel confident in delivering FETAC level 1 Pattern and Relationship	71	11	14	1	3
I feel confident in delivering FETAC level 1 Shape and Space	71	10	15	1	3
I feel confident in delivering FETAC level 1 Data Handling	70	14	14	0	2
I feel confident in delivering FETAC level 1 Problem Solving	72	12	14	0	2
I feel confident in delivering FETAC level 2 Quantity and Number	73	11	14	1	1
I feel confident in delivering FETAC level 2 Pattern and Relationship	70	9	18	1	2
I feel confident in delivering FETAC level 2 Shape and Space	69	11	17	1	2
I feel confident in delivering FETAC level 2 Data Handling	69	12	16	1	2
I feel confident in delivering FETAC level 2 Quantitative Problem Solving	69	12	16	2	1
I feel confident in delivering FETAC level 3 Application of Numbers	70	17	7	3	3
I feel confident in delivering FETAC level 3 Functional Mathematics	64	20	9	3	4
I feel confident in delivering FETAC level 4 Mathematics	43	16	18	8	14
I feel confident in delivering FETAC level 4 Functional Mathematics	39	20	19	8	14

The majority of tutors were confident in delivering mathematic components in Levels 1-3 and less so at Level 4. This reflects the finding in Figure 15 which showed that the majority of tutors are most comfortable delivering FETAC components at Level 3.

Table 12: Attitudes towards FETAC and accreditation

	Strongly Agree %	Slightly Agree %	Neither Agree nor Disagree %	Slightly Disagree %	Strongly Disagree %
Funding for many courses in my centre is increasingly linked to FETAC accreditation	40	20	37	2	1
I have less opportunity to customise a program for an individual learner than had in the past	30	35	24	7	4
Having a programme that is accredited is important to my learners	32	45	14	5	4
There is a lot of learner assessment associated with FETAC accreditation	54	33	12	1	0
The amount of administration associated with FETAC programmes is appropriate	7	21	15	22	35

Of those that expressed an opinion, the vast majority of tutors indicated that FETAC accreditation is increasingly linked to programme funding for their learners. They also highlighted the importance of accreditation to meet their learners' needs. Tutors indicated that the assessment load to gain FETAC accreditation was high and required a great deal of resources to effectively administer (Table 12).



# Chapter Four

## Discussion and conclusion

The preceding chapters of this report presented the design, methodology and findings of a survey with adult numeracy/mathematics tutors in Ireland. In total 166 tutors currently teaching adult numeracy/mathematics took part and the results were analysed and presented in Chapter 3. The findings of this report provide an up to date profile of the tutors of adult numeracy in the adult basic education sector in Ireland. The survey reflects upon and is an update on previous work carried out by Maguire in 2001.

### About the tutors

The findings show that adult numeracy/mathematics tutors are mainly mature females (45+ years) with a third-level qualification, working on part-time contracts. Interestingly, although the gender and age profiles of the tutors have not changed over the decade, there are more tutors who have a third level qualification (15%) and who are on part-time contracts. This change demonstrates change in the sector and indicates a more professional part-time workforce than that of 2001.

The research has highlighted that the percentage of tutors with a third level qualification has increased over the decade however the small percentage of tutors with a specific degree in Mathematics remains low (8%) and this percentage has not changed since 2001. The low numbers of tutors with a dedicated mathematics qualification within the sector gives rise to some concern, especially in the context of recent developments within the post-primary school sector. Research on out of field teaching in the post primary sector which found that 48% of teachers did not have a mathematics teaching qualification, has led to intensive national programmes of professional development for out of field teachers (Ní Ríordáin and Hannigan, 2009). These findings are similar to those of Morton et al, 2006 in the United Kingdom, who found that those delivering adult numeracy/mathematics, work part-time and did not have a specific qualification in adult numeracy/mathematics teaching.

The data shows that the majority of adult numeracy tutors deliver FETAC mathematics components at Level 3 with a smaller number also delivering at Level 4. These components are situated on the same level of the National Framework of Qualifications ([www.nqai.ie](http://www.nqai.ie)) as the Junior Certificate (Level 3) and the Leaving Certificate (Levels 4 and 5).

It was clear from the data collected that tutors of adult numeracy/mathematics in Ireland have extensive experience of teaching. Over 50% of tutors have experience of teaching in the mainstream school system, either at primary or secondary level. However there is recognition that a different teaching approach is required when teaching adults especially teaching mathematics to adults who may suffer mathematics anxiety.

Although the majority of tutors held the belief that they were 'a maths person' and that they had a natural ability for mathematics, one fifth of those who responded acknowledged that they themselves had mathematics anxiety. Adult numeracy tutors beliefs and attitudes to mathematics and the way in which they interpret the concept of numeracy, numerate behaviour and mathematics will influence the kind of numeracy provision they deliver to their adult learners. In the absence of CPD these beliefs and attitudes are with the tutor in the adult/numeracy mathematics classroom and can strongly influence their teaching practice (Bishop, 1988).


## **About provision**

As adult numeracy/mathematics education has developed, the sector has moved from a more customised provision for adult learners to a recognised accredited framework. A similar shift in the qualification profile of those delivering adult numeracy/mathematics has been observed.

Developments such as;

- an integrated progressive vocational framework (FETAC Level 1 and Level 5) for adult mathematics,
- the increase in the qualification of tutors,
- more accredited provision, suggest that Ireland is now further along the numeracy concept continuum (described on p14) and is located on the lower phase of the integrative phase (Maguire, 2003).

An increase in the provision of numeracy in the adult basic education sector is evidenced by the increase in the number of tutors who have been teaching adult numeracy/mathematics for five years or less, an increase from 45% in 2001 to 55% in 2012. This increase in provision reflects the expansion of the literacy service in terms of funding and numbers of students. Since the publication of IALS in 1997, the adult literacy budget has increased from €1 million to €13.5 million in 2001 and almost €30 million in 2011. In 2001 the student population stood at a little over 22,000 compared to over 55,000 in 2011 (DES, 2011). However, despite this increase in provision numeracy still lags far behind that of literacy provision in the adult literacy service. This increase also reflects the development of specific numeracy provision over the last ten years. These developments include for example, the introduction of FETAC Levels 1 and 2 standards on the National Framework of Qualifications which means that numeracy provision is captured separately to literacy provision. This is further supported by the finding only 20%



of tutors reported that they currently teach non accredited customised programmes. This has decreased by 16% since 2001.

Over the last decade one of the most significant developments has been the increase in the availability and range of technology to support teaching and learning including the NALA writeon.ie distance learning website. This research showed that adult numeracy/mathematics tutors have integrated technology into their teaching and learning alongside more traditional teaching methods. The use of technology by tutors has increased from 34% of tutors in 2001 to 60% in 2012. The integration of numeracy along with other core subjects such as communications and literacy provide opportunities for tutors to integrate discussion, group and investigational projects. The use of literacy approaches, especially at the lower levels on the National Framework of Qualifications in teaching adult numeracy/mathematics have been used successfully in adult basic education (Tomlin, 2002).

At the annual NALA/ITT Dublin Numeracy conference (May 2012) one of the key concerns expressed by adult numeracy/mathematics tutors was the challenge of remaining learner centred while meeting the requirement for accreditation (Assessment Workshop, Maguire 2012). This concern is supported by the findings of this research. Tutors acknowledged that they had less flexibility to meet the individual learner needs while completing an accredited programme. They also recognised that accreditation was important to their learners. Tutors also reported that increasingly funding for programmes that they deliver required accreditation to be available to participants.

It is clear from this research that there is a consensus among the tutors that numeracy is being able to do mathematics in everyday life. However, there is no single concept held by tutors about the relationship between mathematics and numeracy. Tutors expressed some level of agreement with all the statements presented to them. The development of the concept of numeracy and its relationship to mathematics has been outlined in the literature review. How a tutor conceptualises numeracy directly impacts on the type and kind of provision that is available to their learners.

## About NALA and CPD

NALA continues to offer training education and training workshops to practitioners through seminars, workshops and on adopting a blended learning approach in the classroom and integrating literacy and numeracy with other teaching and learning. NALA's distance learning website [www.writeon.ie](http://www.writeon.ie) was launched in September 2008. It offers learning and accreditation options at Levels 1 and 2 on the National Framework of Qualifications for Ireland. As a result of demand from practitioners NALA organises training sessions around the country. These 3 hour training sessions are free and are designed to introduce tutors, organisers and other practitioners to the content and structure of the site. During 2012 180 different learning centres had used [www.writeon.ie](http://www.writeon.ie) for accreditation<sup>5</sup>.

NALA's integrating literacy and numeracy work with further education and training programmes supports providers to build literacy and numeracy development into their courses and at all levels<sup>6</sup>. In 2010 NALA organised a numeracy conference entitled **Count me in: developing numeracy teaching and learning** at which the Director of the National Council for Curriculum and Assessment (NCCA) presented Project Maths to adult literacy and numeracy practitioners. From 2011 onwards NALA, in cooperation with ITT Dublin has organised an annual national numeracy conference to provide a forum for practitioners to acquire up to date training and information pertaining to numeracy practice and tuition in Ireland.

In 2012 NALA assisted FÁS to implement a strategy for integrating literacy, numeracy and vocational learning in Community Training Centres (CTCs). NALA worked with the National University of Ireland Maynooth (NUIM) to organise and support a NALA-NUIM accredited training for CTC instructors and managers in integrating literacy at NFQ Level 7. NALA has also developed teaching and learning resources in cooperation with the National Centre for Excellence in Mathematics and Science Teaching and Learning. These modules will be used in FÁS Functional Mathematics modules at Levels 3 and 4 (NALA, 2012).

These education and training opportunities provided by NALA alongside the inclusion of numeracy modules into the NALA/WIT programme at NFQ Level 6 and Level 7 have gone some way to provide much needed training to adult numeracy practitioners. They will be useful in guiding future CPD initiatives.

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<sup>5</sup>In 2012 numeracy awards at Level 2 and Level 3 accounted for approximately 34% and 15% respectively of the overall total of awards to writeon learners.

<sup>6</sup>See NALA's Integrating Literacy: Guidelines for Further Education and Training (2013).





## About training requirements

Over 60% of tutors reported that they did not have enough training in teaching mathematics to adults and of these, 15% reported that they had no training at all in this area. The percentage of tutors who have not completed adequate CPD is concerning. This would seem to indicate that many tutors currently delivering adult numeracy/mathematics in Ireland may not have had, or may not have availed of an opportunity to keep abreast of changes that have been implemented over the period. For example, the development of new FETAC components in mathematics or how the resources and approaches developed through the introduction of Project Maths ([www.projectmaths.ie](http://www.projectmaths.ie)) in the school sector could be used to support their own teaching and learning. Both developments have placed a strong emphasis on helping students appreciate how mathematics relates to daily life and to the world of work.

In addition, without dedicated CPD in adult mathematics education, tutors own teaching is influenced, in the main, by their own school experience. The age profile of adult numeracy/mathematics tutors would suggest that this school experience would have developed an abstract, de-contextualised view of mathematics.

One of the key benefits of CPD is the opportunity it provides to tutors to share practice and experience with their peers. This is particularly important for numeracy tutors who frequently work fairly independently within centres. Tutors who had completed in-service training on adult mathematics education highlighted the positive impact this training had on their teaching practice.

Although tutors recognise the importance of developing a more profound understanding of elementary mathematics they favoured CPD that would provide the opportunity to build confidence in their teaching, to use a range of teaching approaches and to be able to develop resources to suit learners. This is typical of how teachers in general view the role of in-service training. Teachers often place a higher emphasis on practical teaching approaches that they can use immediately ('fish on the plate') rather than a more in-depth understanding that can inform their teaching practice in the longer term ('how to fish') (Cooney and Krainer, 1996).

The majority of tutors expressed a preference for a CPD programme that is accredited and delivered part time and supported by technology. Tutors recognised the need to work towards a qualification for teaching adult numeracy/mathematics. Tutors had a preference for CPD which would enable them to gain credits and help build towards a postgraduate teaching qualification.

## Final note

In its broadest terms, the research set out to identify training needs/requirements among tutors providing numeracy tuition to adult learners in a number of settings nationally. This research has shown that tutors of adult numeracy are a diverse group with a range of qualification and experience in teaching and in teaching adult numeracy/mathematics. The findings indicate that tutors of numeracy play a challenging and pivotal role in ensuring effective adult numeracy provision is available to adult learners.

Many of the tutors in the sector are employed by the Vocational Educational Committees (VECs)<sup>7</sup>, who have recently been advised that under Section 30 there is a requirement within the Teaching Council Act 2001 that a teacher has to be registered in order to be paid a salary from State funds. Centres of Education, also defined under the 1998 Act, are not recognised schools. However the requirement for registration with the Teaching Council does extend to further education.


The longer term implication seems to suggest that in time, adult numeracy/mathematics tutors will be required to have some specific qualification in mathematics and in teaching and/or adult education.

This research can make a significant contribution to informing the type of CPD that needs to be put in place to meet both the needs of the adult numeracy/mathematics tutors and any future legislative requirement. With regard to the specific training needs of numeracy/mathematics tutors outlined in this report it is recommend that NALA convene an expert group in order to address the following issues:

1. The further development of accredited numeracy provision for adult numeracy/mathematics tutors in Ireland should be based on identified need as outlined in this report.
2. The qualification requirement of adult numeracy tutors should be agreed by all service providers and relevant government agencies. It should recognise that the profile of adult numeracy tutors is different to that of mainstream teachers.
3. The kind of CPD required by tutors as indicated by this survey has not changed significantly since 2001. At that time a model of accredited professional development that would meet the needs of adult numeracy tutors in Ireland was developed (see Appendix 1). This model should be re-examined in light of changes in the provision of the NALA/WIT numeracy modules, on-going in service training and in response to training needs of tutors outlined in this report.

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<sup>7</sup>The 33 VECs nationally are currently being amalgamated to 16 Education and Training Boards (ETBs).

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4. The question 'is there a need for an agreed national definition of numeracy'? Should be posed to the expert group.
  5. If a broad concept of numeracy is used to measure Irish adults numeracy skills and competence we should insure the type of provision available to adults reflects this.

In conclusion the research carried out in this study presents the findings from a survey of numeracy/mathematics tutors working with adult learners in Ireland in 2012. The survey is based on a similar survey carried out in 2001. It provides up to date information on developments and/or changes in sector over the last decade. The research is timely in light of the Irelands participation in PIAAC and any results that impact on adult numeracy provision in Ireland.



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# Appendix 1

## A Model of Professional Development for Adult numeracy/mathematics tutors (for discussion – taken from Maguire, 2003)

The model proposed for the professional development of adult numeracy tutors has a central core that is comprised of seven elements. The underpinning philosophy central to this core, views numeracy as a broad dynamic concept and espouses the practice of numeracy teaching as being professionally challenging, complex and meritorious in its own right. A core element addresses the six roles of the adult numeracy practitioner (as a student of numeracy, a tutor of numeracy, a collaborator with other practitioners, as an agent of change and as a lifelong learner). The core also has elements which aim to develop the tutors 'mathematical eyes', and building on adult learning principles, recognises that tutors themselves are adult learners in the context of professional development; it envisages a pedagogy to be employed in the professional development of tutors which will be congruent with the pedagogy that tutors should use with their own learners. In addition another element of the core aims to challenge tutors to examine the beliefs, attitudes and values they take with them to the classroom. The final core element aims to encourage participating tutors to reflect on and evaluate their current practice and to set further goals for their own professional growth.

## The Core Elements of the Model

### Underpinning Philosophy

The model of professional development put forward is underpinned by the concept of numeracy described in PIAAC (OECD, 2009). This view of numeracy means that teaching numeracy is a complex, multidisciplinary process that is going to require that the tutors receive specialised training to be able to deliver it effectively. This model of professional development advocates this broad, dynamic view of numeracy and incorporates a vision of the practice of numeracy teaching as being professionally challenging, complex and meritorious in its own right.

The role of the adult numeracy tutor

The model identifies six roles of an adult numeracy tutor. The six roles are as follows:

- A student of numeracy

- A tutor of numeracy
- A student of teaching
- A collaborator with other tutors
- A modulator of change working within a particular socio-political environment
- A lifelong learner

The structure of any model of professional development must incorporate six precepts that recognise that tutors themselves are simultaneously:

### **Student of numeracy**

Tutors through professional development build their skills and knowledge and increase their own understanding (for example of basic mathematics).

### **Student of teaching**

Tutors need to develop understand the theory and practice that underpins good teaching practice.

### **Tutor of numeracy**

Tutors are required to 'teach' mathematics to other learners and must develop the confidence to cope with a truly student centred approach in their mathematics teaching with all the 'lack of control' that that brings.

### **Collaborators with other tutors**

The tutors should be working in a collaborative environment interacting with other tutors in a process of continuous improvement that shares experience and captures best practice.

### **Modulators of change working within a particular socio-political environment**

Tutors are modulators of change at two levels. Firstly, tutors have to interpret changing policies and often interpret them in the absence of any guidance from their service providers and implement these changes in their own classroom. Secondly, tutors must recognise the particular socio-economic circumstances from which their students are drawn in any given situation, and having done so, facilitate progressive change within their adult learners.



## **Lifelong Learner**

The whole process of professional development is set in the context of 'lifelong learning'. Professional Development for tutors is not once-off affair but will require an ongoing process of continuous development and learning.

## **Develop tutors mathematical eyes**

The model proposes that improving a tutor's ability to deliver adult numeracy requires that a tutor 'develops their mathematical eyes'. The tutor and the students generally come from different socio-economic and life experience backgrounds, thus their perception of the mathematics in the environment around them tend to be very different. In the past this has led to tutors choosing inappropriate and unsympathetic examples of mathematics to which their students do not successfully relate. To address this difficulty in the model of professional development put forward, the tutors themselves must first develop their own mathematical eyes. This means that the tutors who are surrounded by mathematics in their everyday lives, as a first step in developing their eyes, must recognise their own everyday use of mathematics. Having done that, when encountering their adult learners they must attempt to recognise the mathematics the students use in their lives and differentiate that from their own experience. Then with the appropriate training they should select a common ground to which both they and their learners can relate in a meaningful and constructive way. Developing the tutors' mathematical eyes also incorporates the development of a deeper understanding of mathematics. With successful professional development, tutors will move from a view of mathematics as decontextualised, abstract skills and formulae, to a view of mathematics as an integral part of their own and their learners' lives.

## **Build on adult learning principles**

The next fundamental characteristic of the model is that it must incorporate the principles of adult learning. Central to this aspect of the model is the recognition that it affords to the tutor as being an adult learner themselves. The andragogical model used for the purposes of the professional development model put forward outlines the following assumptions about adult learners.

1. The need to know- adults (tutors) need to know why they need to learn something before undertaking it
2. The learners self-concept – Adult (tutors) have a self-concept of being responsible for their own decisions, for their lives. Once they have arrived at that self-concept they develop a deep psychological need to be seen by others and treated by others as being capable of self-direction. They resent or resist situations in which they feel others are imposing their wills on them

3. The role of adults experience – The difference in the quality and quantity of individual adult (tutor) experience has several consequences for adult (tutor) education including: heterogeneous groups, experience as a resource, closed mindset in ways that can act as a barrier to new ideas.
4. Readiness to learn – Adults (tutors) become ready to learn those things they need to know and be able to do, in order to cope effectively with their real life situations
5. Orientation to learning– Adults (tutors) are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or to deal with problems that they confront in their life situations. Adults (tutors) learn new knowledge, understandings, skills, values and attitudes most effectively when these are presented in the context of application to real life situations (i.e. in their classroom).
6. Motivation – While adults (tutors) are responsive to some external motivators (better jobs, promotions etc) the most potent motivators are internal pressures (the desire for increased job satisfaction, self-esteem, quality of life, etc) (Knowles, 1990)

### **Incorporate pedagogy congruent with the pedagogy desired for their own teaching**

The way tutors are trained must in turn fit in with the way that the tutors will teach their learners. The training process must incorporate a single approach that links both teaching and learning and assessment in an integrated way. In other words, during professional development tutors must learn in a way consistent with the way one would expect them to teach.

### **Challenge tutors to examine the beliefs, attitudes and values they take with them to the classroom**

Every individual, without necessarily being aware of it, carries with them all kinds of preconceived opinions and attitudes, which they have picked up in their own life experience and of which they may be more or less aware. It is important that the model of professional development put forward should encourage tutors to consciously question and examine these issues so that they have an appropriate level of self-understanding, which they can then bring to bear in how they interact with their learners. It should be borne in mind that the tutors, as adults themselves, will also bring preconceived opinions and prejudices with them and unless the tutors first recognise and understand their own baggage, they will not be able to help their learners with theirs.

## Incorporate a process of evaluation and set goals for future professional development

Like any other process of professional development, the model put forward incorporates a process of continuous improvement and updating of skills and knowledge of tutors. To that end the core of the professional development model proposed incorporates a process of evaluation and goal setting to encourage tutors to reflect on and evaluate their current practice and to set further goals for their professional growth.

Professional development that results in meaningful and long-lasting qualitative change in an adult numeracy tutor's thinking and approach to teaching is an autonomous activity chosen by the tutors to develop better ways of knowing and teaching (Clarke, 1994). Policy makers, service providers, tutor trainers and tutors must recognise that such change does not happen overnight. The Concerns- Based Adoption Model (Hord et al, 1987) describes seven stages of concern that adults experience in coping with, adapting to and promoting change. These stages have been further adapted by the author to describe the stages of concern that teachers of mathematics exhibit in response to change and have been incorporated into the model of professional development proposed by the author for tutors of adult numeracy. (Connected Mathematics Project <http://www.mth.msu.edu/cmp/ProfDev/Overview.htm>).

- **Self-concern** - what is this new change and how will it affect me?
- **Task-orientated concern** - How do I implement this change and what do I need to do to make this change happen with my students?
- **Impact-orientated concern** - How are my students learning? Are they learning more and are they learning better. How do I work with others who are also implementing these new ideas?

In addition, any programme of professional development developed from the model put forward must also recognise:

- that there are impediments to change (Tutor, Organisation and Political etc)
- the complexity in changing tutor beliefs/attitudes. It does not simply happen from a desire or a request to change (Weiglass, 1994). Changes in tutor beliefs about teaching and learning derive mainly from practice, as a result, such changes will follow the opportunity to validate, through observing positive student learning, information supplied through professional development

- tutors as true partners in the process (by driving their own PD). Fenstermacher and Berliner (1985) suggested a framework for classifying professional development according to four continua that relate to issues of ownership:
  - how the programme was initiated (externally –internally)
  - the purpose of the programme (compliance – enrichment)
  - the level of participation (all tutors – one tutor)
  - the reasons for participation (mandated- voluntary)

The more bottom-up the profile the easier it will be to meet the conditions for ‘valued’ professional development that will be worthwhile and will bring about enduring change for the better in adult mathematics education in Ireland. The model of professional development proposed will, if successfully operationalised, enable the development of autonomous, confident tutors who are professionals in the field of adult numeracy.



## The National Adult Literacy Agency

The National Adult Literacy Agency (NALA) is an independent member-based organisation, working on improving adult literacy in Ireland since 1980. We are:

- the voice of adults wishing to improve their literacy skills, and
- committed to raising adult literacy levels.



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[www.simplyput.ie](http://www.simplyput.ie) (Plain English website)

[www.makingcents.ie](http://www.makingcents.ie) (Financial literacy website)

[www.healthliteracy.ie](http://www.healthliteracy.ie) (Health literacy website)

[www.helpmykidlearn.ie](http://www.helpmykidlearn.ie) (Family learning website)

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