

OCR Teaching in the Lifelong Learning Sector – Qualification Units

Unit 34 – Level 5 Developing Numeracy Knowledge and Understanding

Level 5

QCA Accreditation Number T/500/9961

Unit description

Unit aims

The aim of this unit is to develop mathematical and pedagogical knowledge and understanding.

Credit value 15

Unit synopsis

This unit is about:

- The application of learning and teaching theories and strategies
- The origins and status of mathematical knowledge and its effect on curriculum development
- The identification of numeracy skills and knowledge for different contexts and other subjects
- The application of subject knowledge to learning and teaching strategies for wide range of learners' needs
- The nature and argument of proof in mathematics
- The use, interpretation, representation and misrepresentation of data
- Definition and/or representation of different concepts in mathematics and numeracy
- Development own practice as a numeracy teacher.

Examples of teaching and learning strategies

The following teaching methods and learning strategies are appropriate to the delivery and development of the knowledge, understanding and skills covered in this unit. A variety of these should be used to provide a model of good practice to the candidate. This list is not exhaustive:

- Small group discussion
- Directed study and research
- Lecture
- Resource based learning
- Question and answer
- Discussion
- Lecture and exposition
- Games
- Debate.

Guidance on delivery for centres

For many candidates this may be the first opportunity to explore in depth the application of teaching and learning theories to numeracy, to consider the nature of argument and proof in mathematics and the impact of the origins of mathematical knowledge on the maths curriculum.

Appropriate methods of delivery:

- Provision of individual learning plans
- Provision of guidance on the qualification and progression routes to further development
- Provision of opportunities for learning e.g. discussion, tutorials, workshop activities etc
- Provision of ongoing mentoring to the candidate, including review and feedback on learning experiences and development of competence
- Observation of peer-to-peer discussions of groups of candidates or of discussions with colleagues
- Observation of candidates working within a partnership.

Professional discussion with the assessor will test the knowledge requirements, where these are not already met through the activities described above.

Guidance on assessment for centres

The assessment can include:

- Written assignment
- Case studies
- Research projects
- Student assessments
- Individual learning plans
- Lesson plans
- Written review of students' progress.

This is a level 5 unit and thus the candidate must demonstrate complex skills and knowledge in this particular area of language acquisition and use. The ability to recognise and develop thinking across these criteria is to be encouraged but it does mean that written evidence whilst allowing succinctness and clarity of thought will need to be of sufficient depth and breadth to meet the level 5 standards. There is an expectation that the written work will be presented at the appropriate level.

Suggested reading:

Askew, M. et al. (1997) *Effective Teachers of Numeracy* London: Kings College.

Atkinson, T. and Claxton, G. (2000) *The Intuitive Practitioner: On the Value of Not Always Knowing What One is Doing* Maidenhead: OUP.

Benn, R. (1997) *Adults Count Too – Mathematics and Empowerment*. London: NIACE.

Casey, H. et al. (2006) “You wouldn’t expect a maths teacher to teach plastering...” *Embedding Literacy, Language and Numeracy in Post-16 Vocational Programmes – the Impact on Learning and Achievement* London: NRDC.

Coben, D. (2003) *Adult Numeracy: Review of Research and Related Literature*. London: NRDC.

Coben, D., O’Donoghue, J. and Fitzsimons, G. (eds) (2000) *Perspectives on Adults Learning Mathematics: Research and Practice*. London: KAP.

Cohen, L. and Manion, L. (2002) *Research Methods in Education* (5th ed) London: Routledge.

Harris, M. (1997) *Common Threads – Women, Work and Mathematics*. Stoke: Trentham.

Hillier, Y. (2005) *Reflective Teaching in Further and Adult Education* (2nd ed) London: Continuum.

Miles, T.R. and Miles, E. (eds) (2004) *Dyslexia and mathematics*. London: Routledge.

Roberts, C. et al. (2005) *Embedded Case Studies. Embedded Teaching and Learning of Adult Literacy, Numeracy and ESOL* London: NRDC.

Serra, M. (1989) *Discovering Geometry: An Inductive Approach* London: Key Curriculum Press.

Sierpinska, A. (1996) *Understanding in Mathematics*. London: Macmillan.

Swan, M. (2006) *Collaborative Learning in Mathematics, A Challenge to our Beliefs and Practices*. Leicester: NIACE.

Journals

Educational Studies in Mathematics

Journal of Vocational Education and Training
Journal for Research in Mathematics Education
Research in Post-Compulsory Education

Websites

www.ocr.org.uk

www.qca.org.uk

www.dfes.gov.uk

www.lluk.org.uk

www.ncetm.org.uk/ The National Centre for Excellence in Teaching of Mathematics (NCETM) – excellent resource which includes a professional development portal

www.nrdc.org.uk National Research and Development Centre for research into all areas of adult numeracy (and literacy and ESOL)

www.Maths4Life Resource: 'Thinking Through Mathematics, strategies for teaching and learning' DfES 2007.

www.dfes.gov.uk/readwriteplus Adult Numeracy Core Curriculum and related documents

Assessment Criteria, Knowledge and Evidence Linked to Practice

1.

	Assessment Criteria	Knowledge	Evidence Linked to Practice
1.1	Apply knowledge of teaching and learning theories to numeracy and maths in order to improve practice.	The application of generic learning and teaching techniques to the numeracy curriculum.	<p>Written evidence which:</p> <ul style="list-style-type: none"> • presents a critical analysis of an understanding of the origins of mathematical knowledge • includes possible links with research involving teachers of other subjects across organisations and settings • includes an analysis of popular perceptions of mathematics including its origins and status and how this affects the learning and assessment of numeracy.
1.2	Analyse the effect of the origins and status of maths knowledge on mathematics curriculum development.	<p>Examples of theory and research related to the role of assessment in developing numeracy skills, knowledge and understanding.</p> <p>Models of learning styles and their application to numeracy learning and the roles of deep and surface learning.</p> <p>Concepts of 'right' or 'wrong' in mathematics/numeracy and links with radical and social constructivism.</p> <p>The different interpretations of 'mathematics' and 'numeracy'.</p> <p>The origins and status of mathematical knowledge such as absolutist/fallibilist philosophies and their relation to how mathematics/numeracy is taught.</p> <p>The curriculum developments and changes to e.g. GCSE mathematics, functional mathematics, the Adult Numeracy Core Curriculum.</p>	

2.

	Assessment Criteria	Knowledge	Evidence Linked to Practice
2.1	Identify relevant numeracy skills and knowledge needed in particular contexts in collaboration with teachers of other subjects across the organisation where appropriate.	How to design, select, adapt activities and resources in collaboration with colleagues in other vocational areas in order to develop the numeracy skills and knowledge needed in particular contexts.	<p>Written evidence which:</p> <ul style="list-style-type: none"> • illustrates a range of activities and resources from different subject areas for the teaching of two different numeracy skills • includes a rationale or justification for these activities and resources • shows a knowledge and understanding of the wide range of ways of defining or representing different concepts in mathematics and numeracy • shows collaboration and discussion with teachers in those different areas.
2.2	Contribute to the development and improvement in quality of numeracy learning and teaching in vocational and other subjects.	<p>How numeracy practices are situated within organisational policy, planning and implementation processes.</p> <p>How to develop and employ appropriate approaches to numeracy concepts to meet specified learning outcomes and the needs of learners.</p>	
2.3	Apply subject and specialist pedagogical knowledge to adopt appropriate learning and teaching strategies for a wide range of learners' needs.	<p>The connections between different areas of the numeracy curriculum and how an understanding of these connections could be facilitated.</p> <p>How to use subject specialist theories and research to help the selection of appropriate teaching strategies that relate to curriculum goals and learner needs and how activities can be extended for learners who would benefit from developing their skills.</p>	

3.

	Assessment Criteria	Knowledge	Evidence Linked to Practice
3.1	Summarise the nature of argument and proof in mathematics, including the language of proof, its origins in geometry, and the role of algebra in	<p>The language of proof.</p> <p>The origins of proof in geometry.</p>	<p>Written evidence presenting tasks designed to illustrate:</p> <ul style="list-style-type: none"> • the use, interpretation and misrepresentation of data

	generalising.	The role of algebra in generalising. The use of generalised statements as a predictive/identifying mechanism in given situations.	<ul style="list-style-type: none"> the role of algebra in generalising the nature of argument & proof (d) a comparison of the proof of geometrical theorems by Euclidean geometry and e.g. transformation geometry an expression of different ways of defining or representing concepts in numeracy.
3.2	Analyse the use, interpretation, representation and misrepresentation of data.	The four stage handling data cycle.	
3.3	Compare the wide range of ways of defining or representing different concepts in numeracy.	The representation and misrepresentation of data and its analysis. Different ways of defining or representing concepts in numeracy.	

4.

	Assessment Criteria	Knowledge	Evidence Linked to Practice
4.1	Use a range of numeracy organisations and publications in order to review current research and developments.	How to access a range of organisations and resources. How research into numeracy and mathematics can inform learning and teaching.	Written evidence that: <ul style="list-style-type: none"> identifies organisations in the UK that are involved with mathematics and numeracy and their role indicates the reading of one or more publications which outline current research and developments in the teaching of mathematics/numeracy shows how to use specialist organisations and publications to develop practice as a numeracy teacher.
4.2	Use international, national and local research together with own and learners' insights to inform numeracy learning and teaching.	The relationships between international and national policies and initiatives and teaching.	

