

# Using new technologies in adult numeracy teaching

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*This workshop gave participants an opportunity to explore issues in using new technologies in adult numeracy teaching. It included games-based work, WebQuests and teaching, learning and professional development online using WebCT. The workshop drew on work in a recent action research and staff development project in Scotland: 'The Use of ICT in Adult Numeracy Teaching in Scotland'.*

This paper reviews the work of a recent action research and staff development project: 'The Use of ICT in Adult Numeracy Teaching in Scotland', funded by Communities Scotland, and discusses issues in using new technologies in adult numeracy teaching. We shall start with a brief sketch of the background to the project, outlining the state of play with respect to adult numeracy education in Scotland, before going on to describe the project and review some of the material produced and ideas and issues raised.

## Background: Numeracy as part of adult literacies in Scotland

'Adult literacies' in Scotland have developed apace in recent years, especially since the Adult Literacy and Numeracy in Scotland (ALNIS) Report. The report defines adult literacies as: 'the ability to read, write and use numeracy, to handle information, to express ideas and opinions, to make decisions and solve problems, as family members, workers, citizens and lifelong learners' (Scottish Executive 2001).

The ALNIS Report led to a strategy aiming to raise adult literacy and numeracy levels and more than double capacity for teaching and learning, including a national tutor training framework and a new curricula framework. The 'development engine' for this activity is based in Communities Scotland, under the aegis of the Minister of Communities in the Scottish Executive, the devolved government of Scotland. By 2008, £65 million will have been invested in adult literacies in Scotland through Community Learning Partnerships. The strategy is built on a social practice model of literacies rooted in social contexts, valuing and building on people's own literacies and developing knowledge, skills and understanding of literacies which relate to their lives. The aim of the strategy is to: attract new learners; motivate learners; encourage self direction in learners; offer new ways of teaching and learning; increase access and extend learning hours; offer a range of learning styles. The new Scottish curriculum framework is process-based and offers a guide to good practice in adult literacies.

The ALNIS Report emphasised the need to maximise the potential of ICT in adult literacies provision in Scotland. The Learning Connections website identifies a number of issues that need to be addressed for this to happen:

1. Access to ICT facilities is not uniform throughout the country.
2. Staff skills in using computers and other technological devices vary.
3. The quality of ICT software and resources vary.
4. Cost and organisational factors can sometimes restrict the use of ICT.

([http://www.communitiescotland.gov.uk/Web/Site/cl/al\\_ict.asp](http://www.communitiescotland.gov.uk/Web/Site/cl/al_ict.asp) accessed 28 Jan 2005)

Meanwhile, a recent report for Learning Connections, Communities Scotland, 'Adult Numeracy: Shifting the focus' (Coben, 2005), noted that despite the growing need and demand for numeracy skills, often involving ICT, in the workplace and elsewhere, numeracy was in danger of slipping 'out of focus' in agendas dominated by adult literacy concerns.

### **'The Use of ICT in Adult Numeracy Teaching in Scotland' project**

In response to these concerns, an action research and staff development project entitled *The use of ICT in Adult Numeracy Teaching in Scotland* was commissioned by Learning Connections, Communities Scotland and ran from January to March 2005 (Coben et al 2005). The project was a collaboration between experts in the Universities of London and Edinburgh working with adult literacies tutors with an interest and/or experience in using information and communication technology (ICT) for numeracy teaching. The project team comprised: Diana Coben and Ian Stevenson of King's College London; Harvey Mellar and Maria Kambouri of the Institute of Education, University of London; and Nora Mogeey of the Media and Learning Technology Service (MALTS), University of Edinburgh. The project was directed by Diana Coben and run under the auspices of Prue Pullen of Learning Connections, Communities Scotland.

It was thought that the use of ICT in adult numeracy teaching is in its early stages in Scotland and accordingly the project aimed:

- To gain some idea about the interest and activity in the use of ICT in adult numeracy in Scotland;
- To open up discussion and stimulate action research in the use of ICT in adult numeracy;
- To begin to identify staff development needs in the use of ICT in adult numeracy;
- To begin to identify locally-based resources and solutions to issues raised in the project.

The project was interactive and practical and involved reflection on participants' present and/or future use of ICT in numeracy work in an adult literacies context in relation to various research-based models of engagement with ICT and approaches to teaching, drawing on participants' own experience and existing examples of ICT use in adult numeracy as well as in schools or elsewhere, where these appear to be relevant.

The eleven participants were all adult literacies tutors with an interest and/or experience in using ICT for numeracy teaching. They had a wide range of experience in community settings and Further Education (FE). At the start of the project they completed a short questionnaire detailing their use of ICT in adult numeracy teaching (Appendix 1). Three one-day meetings were then held at the University of Edinburgh, led by members of the research team. In the periods between these face-to-face meetings, participants designed and undertook action research projects with adult numeracy learners.

These action research projects included:

- A survey of tutors, guidance and learning staff;
- Preparation of materials for teaching numeracy;
- A project aiming to identify issues related to using ICT in a community organisation working with homeless people, on the topic of money;
- A review of the process of integrating ICT in numeracy sessions for adults in receipt of benefits;
- An exploration of the use of: commercially made programs; learning resources and other information on the internet; spreadsheets (Excel);
- An introduction to EMERGE, a staff development project that aims to further develop the skills and expertise of curriculum staff in Scotland's Colleges, and raise levels of confidence in using ICT to support student learning;
- A review and trial of commercially available numeracy programs for students wanting to improve their time skills.

Throughout the project, the project team and participants presented examples of ICT/Numeracy in use for discussion and critique; these were available online on WebCT between the sessions, together with research and practical resources, including guidance on doing action research. The research team also analysed data produced in the project together with participants.

## Results

### Using software with learners with learning difficulties

One experienced community tutor was new to ICT and explored a range of commercial software with individual learners with learning difficulties to find out its potential. She recorded her findings with four students:

Student A, working at our most basic level, lacked confidence and required constant repetition. But he found it 'interesting to use', liked the moving pictures – but wanted a tutor near him and some 'real things' to work with as well.

Student B wanted to know about digital time, was quiet in the group, and kept within his 'comfort zone', but found it helpful because the programme gave a choice of answers, was more interesting than paper and pen and easier to do on a screen.

Student C wanted to regain understanding of time intervals and the 24 hour clock, was 'very short tempered', but liked the clear teaching section and lack of writing and could 'easily manage without a tutor'.

Student D was working at a higher level, wanting additional practice and valued its speed and interest, but needed a tutor for explanations and would only use [ICT] for practice.

The tutor concluded that over the three months of the project, Student A became willing to work longer without assistance, Student B communicated better in the group – and there was no obvious change in Students C and D. This project demonstrated that different learners with different needs were able to use ICT to fit their different learning styles when the tutor has the time and interest to explore its potential.

### Exploring software to support learning

Several college-based tutors explored with their learners a range of software available either commercially or on college VLEs. One tutor summarised the benefits as follows:

- Some students enjoy working with computers and numeracy seems less tedious and boring using the different applications.
- Understanding numerical information given on websites makes numeracy more meaningful and relevant.
- Graph drawing is easy and very satisfying.
- Very useful for practising an idea with a student who has difficulties, where instant feedback is given.
- Perhaps a more motivating method for a student who has missed a class and needs to review what has been covered.
- Gives more practice in computer usage – an essential skill nowadays.

She summarised the negatives as follows:

- Some students would rather study from paper-based packages which they can pick up easily when time allows.
- Computer resources not always available.
- Commercial programmes can be very expensive and are usually not available outside the learning centre.
- It is all too easy for some students to divert to "more interesting websites".
- The use of websites as an aid can be very time consuming for both tutor and student.
- It is much easier and less effort for a tutor to pick up a pre-prepared booklet which has clear directions.

Another tutor explored computer-based learning for less easily motivated learners - including car mechanics. Here most learners enjoyed a range of web-based activities including working within budgets to identify spare parts to kit out a car. However, one learner insisted on taking home and working on a printed copy and the tutor concluded that many but not all students are motivated by ICT and 'the interest has to be there for learning to progress'.

### ICT with Nursing students

One tutor offered her group of nursing students the opportunity to use ICT to carry out an investigation required for their final numeracy outcome. They used: file management; word processing and tables; the Internet for research; Excel for graphs; and email for communication. After finding both the investigation and the ICT initially challenging,

students came to see the activity as a chance to acquire a range of incidental skills, valued the links between the different Core Skills (in Scotland the Core Skills are: Numeracy; Working with Others; Communication; and Problem Solving) and took pride in the final results. There were a few students who showed signs of frustration at the complexity of the task and the ICT element may have exacerbated this.

### Using WebQuests

Another college tutor, working with less easily motivated learners, developed two WebQuests to offer practical, relevant and interesting projects. A WebQuest is a task oriented project based on information on selected web sites and learners were offered two – one based on planning and costing a holiday, the other on working out the expenses for a day out at the zoo. The holiday WebQuest gave learners the following task:

Imagine you have just won £2,000 to spend on a holiday. However, there is a catch!  
You are required to investigate, research, and document exactly how you will spend the £2,000.  
Also, during your holiday, you must

- visit a tourist attraction which is not free
- find a graph showing the average temperatures of the country
- answer the given questions on the Excel spreadsheet
- state the currency and exchange rate.

Students were asked to:

- Complete totals and itemised accounting sheets, splitting costs into at least three categories and entering expenditure on separate Excel sheets
- insert a temperature graph for their country and draw a pie chart to show expenditure, based on their Excel sheets
- and create a table to show the various costs of their chosen tourist attraction.

Learners enjoyed tackling these tasks, researching information and using their numeracy on relevant tasks. Motivation and persistence at the task were good – and other members of the project were keen to try a similar approach with their learners.

### Overall

Tutors on the project benefited from the opportunity to share experiences, learn from each other and have the support to experiment with the potential for ICT. Their conclusions were generally positive and they were less sceptical about the potential of ICT. Yet, there was an awareness that tutors had much to learn, that mastering the ICT sufficiently to produce these results had taken time, and that ICT would not suit all learners. Most tutors were keen to develop more knowledge and felt that they and their learners had enjoyed and benefited from these projects.

## The research team's recommendations

At the end of the project, the research team recommended to Learning Connections Communities Scotland that:

- tutors should be encouraged and facilitated to use ICT in their numeracy teaching;
- ICT-use should be integrated into tutor training and staff development programmes in Scotland. In particular, this should include the use of ICT as a delivery mechanism, ICT as a complement to instruction and ICT as an instructional tool in numeracy teaching (Ginsburg, 1998);
- tutors should be supported in their teaching contexts over an extended period of time, and have release time, if they are to develop new approaches effectively;
- it would be beneficial for development officers or mentors to visit tutors in their teaching contexts to share good practice and support changes;
- at an institutional level colleges need to accept ICT as an integral part of teaching and learning, and set aside time for staff development (Scrimshaw, 2004);
- further research could include the role of peer mentoring in developing tutors' confidence and competence with ICT, and the impact of college leadership on ICT policy and changing tutors' practices;

- a further action research and staff development project should be undertaken extending the use of WebCT, combined with regular face-to-face meetings. This should include a wide range of ICT (including, for example, m-learning, electronic portfolios, simulations and games). Outcomes from such a follow-up project could include online and electronic media-based teaching and learning materials and guidance for tutors on using ICT in adult numeracy teaching;
- more research work is needed on the specific ICT/numeracy demands of the contexts the learners are living/working in, and tailoring of teaching to those needs (though this can be done outside the action-research/tutor context - the tutors working with learners are likely to have particular insights);
- assessment procedures in numeracy and ways in which using ICT necessitates changes in the structure of assessment, especially in colleges, should be an important part of any further research, as also should the issue of learning outcomes: are ICT skills separate from numeracy skills?
- work is needed on the development of appropriate pedagogies using ICT to teach numeracy - particularly collaborative approaches.
- tutors should be encouraged and enabled to use a wider range of technologies in their teaching.

## Conclusion

Although the research team found that a relatively narrow range of technologies is being used at present, there is clearly a great deal of interest in using ICT in adult numeracy teaching, a commitment to developing resources and approaches and the skill and imagination to produce worthwhile and exciting materials and approaches. However, there is also anxiety about the resource implications of doing so. At the outset of the project, most participants reported using ICT in teaching numeracy as a delivery mechanism and as a complement to instruction. There was some evidence of movement towards tutors using technology as an instructional tool.

Feedback from participants in the project was very positive. One of the most exciting benefits lay in its providing tutors with the opportunity to exchange ideas with each other, both face to face at the three meetings, but also through ongoing activity in WebCT. Tutors valued having the time and support to investigate the use of ICT in their teaching, meeting other numeracy tutors, sharing ideas, learning from each other, questioning and extending learning and teaching methodologies and finding new ways of engaging sometimes reluctant students. Feedback from learners was also positive about the use of ICT in their adult numeracy education.

## Postscript

As this paper goes to press, we are pleased to be able to announce that a new Phase 2 of the project will start in November 2005. We look forward to reporting on this at a future ALM conference.

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## Appendix 1: Questionnaire to participants

1. Are you currently using ICT in your numeracy teaching?
  - a. If so:
    - i. what ICT are you using?
    - ii. how are you using ICT in your teaching?
      - to support you in achieving numeracy goals?
      - to teach numeracy (e.g., using an intelligent tutoring system to teach numeracy)?
      - is ICT the main focus of your teaching, with numeracy a subsidiary element?
    - iii. how do you know if you're succeeding in your use of ICT in numeracy teaching?
  - b. If not, why not?
    - i) Would you use ICT if it were available?
    - ii) What ICT, if any, do you think would be most useful for adult numeracy teaching?
2. What are you trying to achieve in terms of numeracy learning?
3. What are you trying to achieve in terms of ICT learning?
4. What do you think teaching is and how do you conceive of yourself as a tutor of adult numeracy?
5. What experience do you have of ICT in your life beyond teaching? How do you see the ICT demands of the workplace and the ICT demands of everyday life?
6. What do you consider is, or should be, the relationship between ICT and adult numeracy teaching?
7. How do you consider that ICT skills in a numeracy context and/or numeracy skills in an ICT context should be assessed?
8. What training and support would enable you to make use, or make better use, of ICT in your adult numeracy teaching?
9. What resources are you aware of that would help you to make use, or make better use, of ICT in your adult numeracy teaching?
10. How is ICT being used in adult *literacy* teaching in your area?

Thank you. We look forward to working with you.

Diana Coben, for the project team  
Project: 'The Use of ICT in Adult Numeracy Teaching in Scotland'  
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