

Using ICT in Adult Numeracy Teaching

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This paper reports on an action research and staff development project with adult literacy tutors in Scotland, who designed and undertook action research projects with adult learners in various settings across Scotland, supported by the team. The projects reflected a wide range of topics geared to learners' interests and demonstrated a range of uses of ICT. All the tutors reported that using ICT had enhanced their numeracy teaching.

'The Use of ICT in Adult Numeracy Teaching in Scotland' was an action research and staff development project with tutors from across Scotland who designed and undertook action research projects with adult learners in various settings across Scotland. They used information and communications technologies (ICT) in their numeracy teaching in settings which spanned community-based provision, the voluntary sector, Scotland's Colleges, the workplace, university outreach and a prison. The project aimed to explore, extend and improve the use of ICT in adult numeracy teaching in Scotland, in keeping with the *Adult Literacy and Numeracy in Scotland* (Scottish Executive, 2001) and *Shifting the Focus* (Coben, 2005) reports. It was funded by Learning Connections, Communities Scotland¹¹ and was conducted in two phases (Phase 1 ran from January to March 2005 and Phase 2 ran from November 2005 to December 2006) by a research team based in London and Edinburgh¹². The tutors were supported by seven one-day

¹¹ Since the end of the project, Learning Connections has been integrated into the Directorate General for Education of the Scottish Government, as part of the Lifelong Learning Directorate:
<http://www.scotland.gov.uk/learningconnections>

¹² The project team comprised: Professor Diana Coben, King's College London (co-Director); Dr Jim Crowther, University of Edinburgh; Dr Maria Kambouri, Institute of Education, University of London; Dr Harvey Mellar, Institute of Education, University of London; Nora Mogey, Media and Learning Technology Service (MALTS), University of Edinburgh; Sheena Morrison, Sheerface Ltd. (Development Worker); Daniel Sellers, Learning Connections; Dr Ian Stevenson, King's College London (co-Director). The workshop was presented by Diana Coben and Sheena Morrison on behalf of the team.

workshops at the University of Edinburgh, together with online activity and face-to-face support from the project team. The project culminated in presentations by the tutors and the research team at the Third National Adult Numeracy Seminar, held at the Stirling Management Centre on 6 December 2006.

Our starting point was the claims made for using new technology to teach adult literacy and numeracy, as follows:

- ICT is a powerful tool to raise levels of literacy and numeracy;
- Computers and multimedia software provide attractive ways of learning;
- The Web enables access to the best materials and the most exciting learning opportunities;
- Offers a new start for adults returning to learning;
- The Internet and digital TV technology can reach into the home;
- Learners who use ICT for basic skills double the value of their study time by acquiring two sets of skills at the same time.

(DfEE, 1999)

We set out to explore how true this might be in the context of adult numeracy teaching in Scotland. Our research questions were:

- What uses of ICT can we identify and demonstrate to support adult numeracy learning?
- Do adult learners learn using ICT to support numeracy learning?
- Does ICT add to the motivation, concentration and persistence of learners?
- Does it help us reach the 'harder to reach' learners?
- How should numeracy learning be assessed?
- How may the training and support offered on this project best be extended to other numeracy tutors across Scotland to promote the effective use of ICT?
- What are the contexts in which the learners live and work and how can these best be reflected in their numeracy programme?

Our support strategy involved supporting tutors to develop action research projects with and for adult learners, exploring the use of a wide variety of ICT, promoting self-reflection, sharing ideas and expertise through face-to-face meetings and online discussion, providing staff development in the use of a range of technologies and their application to adult numeracy, developing online and electronic media-based teaching and learning materials and guidance for tutors on using ICT in adult numeracy, based on their action research projects, for use in the wider adult numeracy field.

Action research in the project

The tutors tailored the use of ICT in their numeracy teaching to the perceived needs and interests of the learners with whom they worked through their action research projects, as follows:



- *Using Numbers in an Office, Dot Butler, West Fife Enterprise Ltd.* This project aimed to enable learners to perform administrative office tasks involving numbers, and to follow written and verbal instructions using technology, especially sound.



- *Home Energy Saving and Adult Literacy and Numeracy, Ana Calixto, Edinburgh University Settlement Community Learning Centre.* This project aimed to: increase the numeracy and literacy skills of

the participants while raising awareness about energy efficiency and affordable warmth; co-develop, with the learners, numeracy and literacy resources to aid understanding; and gain practical skills in the area of energy saving in the home. Learners' self-stated goals included 'learning how to save energy at home', 'understanding how to read a gas/electricity bill' and 'revising and learning new numeracy skills'.



- *Everyday Numeracy, John Cameron, Adult Literacy and Numeracy Team, South Lanarkshire.* The main focus of this project was to introduce everyday numeracy, through ICT, to learners who had little or no

previous experience of using ICT as a medium for learning. The intention was to renew enthusiasm for the learning process and show the importance of numeracy in everyday life. Learners were encouraged to use spreadsheets, word-processed documents, digital images and presentation software to interpret what numeracy meant to them. The project was intended to show the practical application of numeracy and ICT for learners, particularly those with previous bad experiences of numeracy teaching.



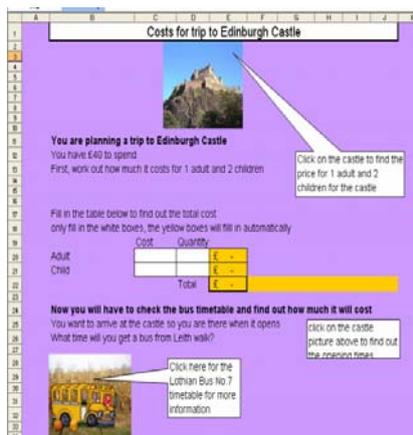
- *Cooking and Numbers, Nancy Craig, Dundee Council.* The aim of the project was to engage with learners and raise their awareness of links between numeracy, ICT and life skills and to encourage them to identify any numeracy skills they would like to improve.

- *ICT and Numeracy Tutor Training, Nancy Craig, Dundee Council.* This project aimed to provide literacy and numeracy tutors with access to a range of ICT numeracy materials appropriate for use with adult learners to help them improve their numeracy skills.



- *Financial Inclusion – An Intermediate One Numeracy Accreditation? Marjorie Drew, Midlothian Adult Literacy and Numeracy Initiative (MALANI) in partnership with Jewel and Esk Valley College.* This project aimed to produce a contextualised ICT resource on financial inclusion that would both attract and retain adult numeracy learners. The project explored the following questions: Can ICT be used to attract learners to numeracy courses on financial inclusion that historically have been badly attended, despite research showing a need for and an interest in these? Can an ICT-based numeracy course on financial inclusion be used for SQA accreditation? Will a contextualised ICT-based course on financial inclusion enhance the learning of numeracy?

- *Politics and Numbers, Suzi Gibb and Louise Clark, Bethany Christian Trust, Edinburgh.* This project aimed to produce ICT and numeracy resources for ‘hard to reach’ learners. This included identifying political issues in the



community which affect learners and basing numeracy and ICT tasks around these topics. In the past, learners tended to focus on improving their reading and writing and often did not see the relevance of numeracy work. The tutors described this as an ‘invisible need’ because learners may not realise the impact that numeracy has on their lives. They tried to overcome any lack of interest and fear of working

with numbers by using numbers in a meaningful way.



- *Blogging for Numeracy, Carol Gibbons, Clydebank College.* This project aimed to investigate the use of blogs in the teaching of core skills numeracy in a college setting. It was hoped that blogging would motivate the students and enable them to see the relevance of numeracy to their vocational interests.

- *Sums for Fun, Shirley Jones, Shetland College.* This project aimed to encourage the use of ICT in delivering numeracy through family learning, while giving families the confidence to work together. The researcher accessed resources to help children with numeracy homework using computers and helped parents to do the same.



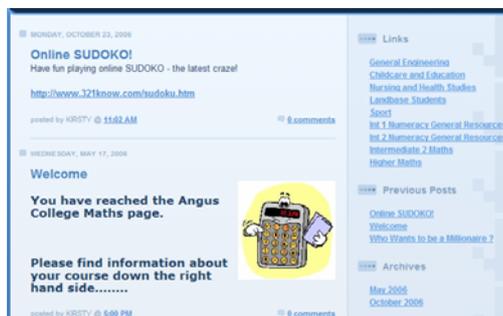
- *Show Garden, Zoe Kennedy and Joe Lennon, British Trust for Conservation Volunteers (BTCV), Scotland, Ayr.* This project aimed to explore the use of ICT and numeracy in garden design, encourage group discussion in numeracy learning inspired by ICT, and create a show garden for public display.



- *Using ICT to Embed Numeracy into Workplace Learning, Sheila Maher, Workers' Educational Association (WEA), Inverness.* This project aimed to develop and deliver a new non-accredited numeracy course to workplace learners who have

recently completed a ten-week basic ICT course.

- *Introducing Vocationally Relevant Numeracy Blogs to the Classroom, Kirsty Paterson, Angus College, Arbroath.* This project aimed to make numeracy learning more fun and to show learners that numeracy can be related to their vocational course and outside interests. It also set out to allow the tutor to demonstrate that ICT and numeracy can be used successfully together, making the ICT learning more directed to learners' vocational interests but also directly related to the numeracy performance criteria to be delivered. Finally, it aimed to provide independent opportunities for learners to take more responsibility for their own learning.



- *Can ICT Help to Make the Teaching of Numeracy More Vocationally Orientated? Angela Smith, Dumfries and Galloway College.* This project aimed to discover whether ICT would make numeracy a more palatable subject for

poorly motivated students and to develop vocationally-orientated ICT numeracy work through using WebQuests. It also aimed to develop a format that would increase learner-tutor interaction (as opposed to a self-teaching method for learners).

- *Teleporting a Tutor, Owen Smith, Inverness College.* This project aimed to investigate the teaching of numeracy at a distance using videoconferencing. The key problem addressed was the lack of a teacher at Intermediate 2 numeracy as well as the lack of a learning support workshop for basic numeracy in Fort William. Technology was used to bridge the distance, adapting teaching methods where necessary.



- *Understanding Electricity and Gas Bills, Neil Sutherland, Fife Council.* This project aimed to give community adult learners both an understanding of all aspects of bills for checking purposes and confidence in selecting or changing suppliers.



- *Money Matters Behind Bars, Trisha Tilly, Stirling Council/Cortonvale Prison.* This project aimed to produce a course of material for prisoners about handling money in real life situations while introducing as much ICT input as possible to provide variation and challenge, and to support motivation.

We shared some examples from these action research projects in our presentation at the conference, including embedding sound into the learning; using blogs in vocational learning; creating interactive spreadsheets; and using topics of interest to learners in creative and interactive ways.

The tutors' reports of their action research projects, together with the teaching materials they produced, are available on the Adult Literacies Online (ALO) website www.aloscotland.com. The full and final report of the project overall (from which this paper is drawn) is available as a pdf on the NRDC website www.nrdc.org.uk (Coben et al., 2007).

The project needs to be seen not only as a research project (what do we now know that we did not know before?) but also as a capacity enhancement project (what skills, knowledge and understanding do tutors have now that they did not have before?). These aspects are identified and discussed separately below and in the project report but in reality they were integrated throughout the project. It should also be borne in mind that what is referred to here as 'the project' consisted of an overall project within which were nested the tutors' individual action research projects, listed above.

Enhancing teaching capacity through action research

The quality and diversity of the work developed through the tutors' action research projects and the tutors' increased skills and confidence in using ICT in their numeracy teaching amply demonstrate the benefits of an approach tailored to local circumstances

and geared to enhancing tutors' capacity to use ICT to teach numeracy. The tutors' experience and training with respect to both numeracy and ICT varied greatly at the outset of the project. By the end of the project, all the tutors reported that ICT had enhanced their numeracy teaching. Their action research projects reflected a wide range of topics geared to learners' interests and demonstrated a range of uses of ICT.

Innovative uses of ICT in numeracy teaching on the project included incorporating sound into worksheets (particularly valuable for ESOL3 and literacy learners), WebQuests, mind mapping and blogging, with imaginative use of software such as word-processing and spreadsheet programs to make numeracy more meaningful, accessible and attractive to learners. Personal USB sticks for learners gave them a sense of personal control and enabled them to share ideas easily with their fellow students and to transfer their work onto other computers if they wished.

The project also sought to establish an online community of practice in using ICT for adult numeracy teaching through the virtual learning environment (VLE) WebCT (see Glossary). This had limited success. However, for some things, such as acting as a shared repository of materials and work in progress, and disseminating expert advice (e.g., a legal expert fielded questions on the copyright issues around producing materials arising from the project), WebCT worked well.

Reflection and analysis

We mapped tutors' uses of technology in their action research projects onto the framework developed by Diana Laurillard (Laurillard, 2002). In Laurillard's terms, the main types of technologies used in the project were 'narrative' (for attending and apprehending) and 'interactive' (for investigating and exploring). The use of narrative media included the use of ICT as a motivator, to hold the learners' interest while they practised their skills. The use of interactive media included the use of websites with numeracy activities put into meaningful contexts (e.g., gardening) for learners. ICT was used to 'see' numeracy in a modern real-world context. This is the start of a process that could lead to rethinking what numeracy involves in the information age, e.g., seeing what the ICT/numeracy demands are in ordering a train ticket online rather than buying it at the station. Several of the action research projects adopted a critical perspective on numeracy, seeing numeracy as knowledge that empowers people for life in their societies, beyond the skills of daily life. ICT was also used for communication (e.g., a video link for a tutor based far from his learners).

There was little use of what Laurillard calls 'adaptive' or 'productive' media. Adaptive media (which involve supporting experimentation and practice) include software such as games and simulations. Productive media (for articulating and expressing) are those in which the learner builds something; this could include modelling and creating hypermedia¹³. It should be noted that the uses of adaptive and productive media require more complex pedagogies, not necessarily more complex technologies (although these may be more complex). For example, the tutor might use a word-processing program to create interactive exercises for the learner so that the learner's activity is 'interactive'. Learners using a word-processing program to create their own hypermedia materials could be seen as using 'productive' media in Laurillard's terms. The absence of such

¹³ Hypermedia denotes the linking of graphics, sound, text and video elements in ICT.

approaches in this project is perhaps not surprising given the relative paucity of examples of the use of these strategies in literacies work outside the project. Neither is this situation unique to the literacies context: Laurillard comments on the lack of exploitation of the productive capabilities of electronic media in teaching and learning generally.

Overall, the use of ICT appeared to be dominated by tutors' existing approaches to teaching numeracy, which were extended into new areas rather than fundamentally changed: in that sense ICT failed to dent the mould.

The outcomes of our project should be understood as the result of tutors in very diverse contexts adapting ICT to suit their particular contexts, abilities and experience, and balancing the use of ICT against other pressures, in particular, those of time and money and their own capabilities with respect to using ICT in their numeracy teaching. While there is general agreement that the development of the use of adaptive and productive media geared to adult literacies learners would be very useful, existing ICT resources are mainly either aimed at children (i.e., the content is appropriate but the presentation is not) or undergraduates (i.e., the presentation may be appropriate but the content is too complex).

New forms of games, simulations and modelling tools are needed for adult literacies learners, taking account of any literacy or language needs they may have. ICT offers exciting opportunities to take such approaches to teaching adult numeracy further into the territory of Laurillard's communicative and adaptive media. This project has laid the groundwork for such interventions. It has made an impressive start, demonstrating that together, ICT and numeracy can and do make a whole that is greater than the sum of their parts, but more remains to be done.

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