1. Audience

All readers who are interested in ICT and post-16 numeracy.

Numeracy managers.

Numeracy teachers.

Numeracy teacher educators, who are interested in developing work on using ICT, within numeracy teacher education.

Researchers who are interested in the uses of ICT in post-16 numeracy.

2. Focus

• Outlines research findings on ICT relevant to post-16 numeracy (part B).

• Outlines key points from Cambridge Training and Development’s (CTAD’s) Maths4Life stage one ICT pathfinder (part B).

• Using the reflective practice cycle, presents reflective practice activities which build on the content of part B (part C).

• Gives suggestions for further reading (part D).

• Should be used in conjunction with section 1, background and section 2, reflective practice.

3. Methods

• For methodological details about the CTAD Maths4Life stage one pathfinder, please see appendix 1.

• Remember that the size of the samples and the ways in which they were selected mean that the views expressed in this section are in no way representative of all numeracy practitioners and learners.

• The views expressed are, however, useful in providing a starting point for readers to reflect on aspects of their practice in relation to numeracy, ICT and motivation.
4. Existing evidence

- Key policy documents such as the Smith Report (Smith, 2004), the Tomlinson Report (DfES, 2004) the 14–19 Education and Skills White Paper (DfES, 2005) and the Skills White Paper (DfES et al. 2005) underline the importance of ICT in the teaching and learning of mathematics. This is also emphasised in research (e.g. Hoyles et al. 2002; Hoyles, 2005).

- There is a large body of research on using ICT in schools (e.g. Cox et al. 2004; Passey et al. 2004).

- There is less literature on using ICT with Skills for Life learners.

- There is very little research on mobile learning and adult numeracy learners.

- The potential of ICT in the teaching and learning of adult literacy, language and numeracy has not been fully exploited (Mellar et al. 2004, 2005).

5. Background to the CTAD Maths4Life ICT pathfinder

The CTAD Maths4Life ICT pathfinder aimed to explore whether selected numeracy learners found mobile learning motivational. Nine practitioners who were interested in innovative ways of engaging with numeracy and with learners took part in the project.

The nine practitioners were trained by CTAD in how to use the mobile devices and the mediaBoard, described below in 6. The practitioners used the mobile devices in a range of numeracy activities with learners. CTAD supported the practitioners in their use of mobile technology throughout the pathfinder.

6. Technology

**Mobile devices**
The ICT pathfinder used two mobile devices: P900s and XDAs. These are illustrated below.

**MediaBoard**
A mediaBoard is a multimedia message board which can be used, for example, with a class. Unlike most traditional Internet message boards, learners can add comments by sending text (SMS) messages or pictures (MMS) from their mobile phones. MediaBoards can also be accessed through email and the Internet. A mediaBoard has a central image with zones marked on it. Learners can send messages to a specific zone. A mediaBoard can be used for exploratory, competitive and collaborative learning activities, tailored to different levels.

**P900**
A P900 is a mobile phone. A P900 can be used for multi-media messaging.

**XDA**
An XDA is a type of personal digital assistant (PDA). PDAs used to be called palmtops or handhelds. This project used the XDA produced by O2.
In the ICT numeracy pathfinder, CTAD set up the Darlomaths board (so called because part of the CTAD ICT pathfinder was in Darlington). As illustrated below, this used a map as its base, with different zones marked on it. Activities with the Darlomaths board are described below in ‘numeracy activities’.

7. Numeracy activities

M-learning materials
Learners used CTAD’s numeracy m-learning materials. An example of a numeracy activity is illustrated on the photograph of the XDA above. The materials included numeracy embedded in:

- Health.
- Housing.
- Driving theory.

There were also quizzes to assess numeracy skills.

In this project, the numeracy m-learning materials seemed to work more successfully on the XDAs than on the P900s. It was suggested that this was because the XDAs have a bigger memory.

Using photographs
Using the P900s and XDAs, some learners took photographs of examples of where they saw mathematics in everyday life. One practitioner highlighted how the concept of taking photographs of mathematics needed exploring with some learners:

They [the learners in her class] all seemed happy to take part, but didn’t at first understand how they could take maths photos in Newcastle. We explained to them about angles, squares, rectangles, etc. We also showed them some photos cut out of newspapers and asked them what maths they could see. Once they had got the hang of looking for shapes, rather than only numbers, they could see a lot of maths.

Learners then posted the photographs on the Darlomaths board. The example of car parking charges below was sent to the car park zone of the Darlomaths board [see section 3.2].

The photographs of mathematics in everyday life were used to stimulate discussion about mathematics. Learners in an English Speakers of Other Languages (ESOL) class also generated their own questions about the photographs they had taken. Questions included:

- How long ago was Eldon Square built?
- What is the area of the rectangle?
- How big is the area of the window?
- How many windows are there?
- How long is the Gate building?
- What time is it in Central Station?

Flexibility
Practitioners and learners reported welcoming the flexibility of the mobile devices, in terms of:

- What they could be used for. They were used for both ‘closed’ (the numeracy quizzes) and ‘open’ activities (e.g. the activities related to photographs).
- Where they could be used. They were used in a wide range of places, from bedrooms to buses, the street and the college.
- Who they could be used with. They were used alone, with a friend and as part of group and whole class teaching.

It is probably fair to say that the flexibility of the devices, as illustrated above, opens up rather than determines possibilities for the teaching and learning of numeracy or mathematics.
Practitioners’ comments on the mobile learning devices included:

- They (the learners) were interested in this project from the start, took part enthusiastically, were helpful and cooperative, and generally did very well.

- Using cameras and mediaBoard broadens learners’ understanding of maths and where to find maths.

- Learners thought that their children would enjoy using the gadgets and the quizzes. Children were telling their mum how to use the gadget.

Learners’ comments included:

- You realise that maths is all around you, not just in classrooms (about taking photographs of mathematics in everyday life).

- They’re good to carry around with you and you could use them when you have some time, like on the bus.

- It’s better than doing something on paper – you sometimes learn more on a machine than on paper.

Issues
Unsurprisingly, there were some technical issues during the project. These included:

- Losing data when batteries ran down.

- The absence of immediate technical support, on some occasions when it was needed.

However, not all the difficulties which had been anticipated materialised. It had been thought, for instance, that:

- Some learners might use the mobile phones for long-distance calls.

- Some of the devices would go missing.

In this project, neither of the above happened.

8. Future work
The findings of this project indicate that there is scope for future research and development activity on mobile technologies and numeracy or mathematics. The teaching and learning activities used in this project could be developed and tried out in further contexts. CPD could support the use of mobile technologies. CPD could be wide ranging, spanning, for instance, the technicalities of using the mobile devices and their implications for curriculum and pedagogy. Schemes of work could be developed on incorporating mobile devices into numeracy or mathematics teaching. As the use of mobile technologies in teaching and learning increases, research could be conducted on the extent to and ways in which practitioners’ and learners’ views of themselves and of numeracy or mathematics education alter.
### Part C. Reflective practice activities

**9. Guidance**
For the reflective practice activities below, you will need to use:

- Section 2 of this publication, on reflective practice.
- The account above of the CTAD Maths4Life stage one pathfinder.
- The practitioner reflective log below.

Remember that the practitioner reflective log is not prescriptive. It’s a flexible tool to help you reflect, plan and take action. You can use some or all of the generic and specific questions. Feel free to add your own generic and specific questions, where appropriate. Remember also that you can complete the log in the way you prefer. That might be, for example, by using prose or mind maps (see section 2). If you do not find writing a helpful tool for reflection, then you could use selected questions from the log, as the basis for discussion activities with colleagues.

The specific questions in the log below are targeted to practitioners working with numeracy learners. If you wish, you can adapt the specific questions to potential, rather than actual, numeracy learners.

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### Practitioner reflective log

#### Cycle 1

<table>
<thead>
<tr>
<th>Stage of cycle</th>
<th>Practitioner questions, responses and comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>REFLECTION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Generic</strong></td>
<td></td>
</tr>
<tr>
<td>What do I do?</td>
<td></td>
</tr>
<tr>
<td>What evidence is there of learners’ responses?</td>
<td></td>
</tr>
<tr>
<td>What works well and why?</td>
<td></td>
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<tr>
<td>What does not work well and why?</td>
<td></td>
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<tr>
<td>What would I like to try out and why?</td>
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</tbody>
</table>

*Add your own generic questions, if appropriate.*
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<tr>
<td><strong>Stage 1</strong></td>
<td><strong>REFLECTION</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Specific</strong></td>
</tr>
<tr>
<td></td>
<td>What types of ICT (e.g. PCs, laptops, Tablet PCs, interactive whiteboards, mobile technologies, mediaBoards etc.) do I use in teaching numeracy?</td>
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<td></td>
<td>When do I use ICT in the teaching and learning of numeracy?</td>
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<td></td>
<td>Do I use ICT for whole class teaching, group work, pair work and individual work? Why/not?</td>
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<td></td>
<td>Do I promote the use of ICT for numeracy activities outside as well as inside the classroom?</td>
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<td></td>
<td>Do I use ICT for collaborative learning in numeracy?</td>
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<td></td>
<td>Do I encourage learner discussion and questioning through the use of ICT in numeracy? If ‘yes’, how? If ‘no’, why not?</td>
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<td></td>
<td>Do I use a sufficiently wide range of technologies? Why/not?</td>
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<tr>
<td></td>
<td>Do I use a range of teaching styles, when using ICT in teaching numeracy? Why/not?</td>
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<td></td>
<td>When using ICT to teach numeracy, do I take into account a range of learning styles? Why/not?</td>
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<tr>
<td></td>
<td>What evidence do I have of the extent to and ways in which the use of ICT motivates learners?</td>
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<td></td>
<td>What constraints are there in my use of ICT in the teaching and learning of numeracy (possible constraints might be, for instance, the curriculum, accreditation, budget, etc.)?</td>
</tr>
<tr>
<td></td>
<td>What would I like to try out in my use of ICT in numeracy teaching? Why?</td>
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<tr>
<td></td>
<td><strong>Add your own specific questions.</strong></td>
</tr>
</tbody>
</table>
Section 4
Numeracy and ICT

**Stage of cycle** | **Practitioner questions, responses and comments**
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**Stage 2** | Planning
Try out what you have planned
- Give brief details on, for example:
  - Session date:
  - Session focus:
  - Number of learners in session:
  - Any other relevant information:

**Stage 3** | Action
Using your stage 1: reflection, detail your planning for stage 3: action.

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**Cycle 2**

**Stage 1** | Reflection
What did I do/say in the session?
What evidence was there of learners' responses?
What worked well and why?
What did not work well and why?
What would I like to try out again and why?
What would I like to try out that's new and why?

**Generic**

Add your own generic questions, if appropriate.
### Stage of cycle | Practitioner questions, responses and comments
---|---
**Stage 1** REFLECTION | **Specific**
To what extent, and in what ways, did my uses of ICT seem to motivate numeracy learners?
E.g. Did I use different teaching strategies, in conjunction with ICT? (If ‘yes’) What were they? What impact did they seem to have on numeracy learners? (If ‘no’) Why not?

Did I use ICT for differentiation? (If yes) How? What impact did this seem to have on learners? (If ‘no’) Why not?

What further ideas about using ICT in the teaching and learning of numeracy would I like to try out next time?
E.g. Would I like to try out a different type of ICT next time? (If ‘yes’) What type of ICT? Why? (If ‘no’) What are my reasons for this?

*Write your own specific questions, based on the first reflective practice cycle.*

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**Part D. Further reading**
If you would like to find out more about numeracy and ICT, you may want to read two NRDC publications:
