Institute of Education

**Breaking Barriers:
Research Report**

Using digital technologies for adult literacy teaching, learning and assessment

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Introduction

> 'Information and communication technologies are transforming the way that we read, write, interact, find and make use of information, and make use of public life'. (Warschauer, 2009:123).

This paper explores how the impact of digital technologies is changing society, and, in particular, how the digital environment is changing what we mean by adult literacy. The European Literacy Policy Network (ELINET) suggests a concept of Digital Literacy that is broader than the capacity to use ICT devices. The ELINET position paper on Digital Literacy (2015) distinguishes between digital competence (one of eight key competences important for every European citizen) and Digital Literacy. In line with JISC in the UK, they define digital literacy as looking beyond functional IT skills to include a 'richer set of digital behaviours, practices and identities' (2015:1). The concept of adulthood is a constructed notion and varies across national, cultural and political contexts[1]. This paper will address how current engagement with technology may vary between different populations, including different age groups and those who are employed or unemployed. It will also consider what principles should inform the use of digital technology in teaching and learning, and explore what research tells us about the value of using technology-rich approaches in adult literacy teaching and learning.

Definitions of adult literacy

What do we mean by literacy? In policy discourses, literacy is often presented as an unproblematised set of skills which includes reading and writing[2]. Inclusive models of literacy have challenged this idea, such as Luke and Freebody's four resources model (1999) which emphasised the broad repertoire of reading practices required in today's cultures and economies. The focus on literacy 'practices' and 'events' as described through careful ethnographic research over the last twenty years by proponents of the New Literacy Studies has also enabled us to think about what we do with literacy, not just what we know. The notion of 'practices' has highlighted that there is not just one literacy. We all engage in a multiplicity of literacies in different domains of our lives. ESRC funded research by Ivanic et al (2009) in further education colleges in England and Scotland, highlights how young people on college vocational courses engage in a wide range of different literacies in different domains of their lives, such as home, college and in their part-time employment. Their findings showed that while many of these students on college courses may be perceived by their college tutors as weak students with poor literacy skills, they nevertheless

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[1]In post-compulsory education and training in England, learners who are 16+ are generally defined as 'adult' for purposes of government funding although the compulsory school-leaving age has recently been raised to 18 years.
[2] Some definitions of 'literacy' include speaking and listening, and, in some policy contexts,[Do you mean policy contexts or countries? I know Ireland sees numeracy as part of literacy…] numeracy or the ability to use mathematics is also incorporated into an understanding of 'basic' literacy.

demonstrated a wide range of literacy practices and concomitant skills in their out-of-college lives. The notion of literacy practices helps us to avoid a deficit model of learners where the focus is on what learners appear to lack. The deficit model promotes a notion of duality where students are often defined as 'literate' or 'illiterate'. A social practices model of literacy recognises that learners engage in a wide range of literacy practices in their lives and that these practices vary depending on the context. For example, this research described a learner who was active in setting up and administering meetings in his local mosque, skills that were useful in the context of his vocational course but which were completely invisible to his college tutors.

In this paper, literacy is conceived as a set of skills but also combined with an understanding of how we use literacies in everyday life (Pahl and Rowsell, 2012). This notion of literacy/ies is helpful in exploring the impact of digital technologies on adults. When we consider the wide use of mobile technologies such as smartphones, many adults are already engaging in literacy practices using digital technologies. The 'new literacies', sometimes called digital literacies (Warschauer, 2009) involves reading a range of 'new' text genres, (e.g. instant messaging, email, social networking) and responding to these texts in new and interactive ways.

Use of digital technologies and the digital divide across Europe

> 'Technology has become part and parcel of everyday life almost without people recognizing it'
> Nick Boles, UK Minister of state for Skills and Inequalities, FELTAG Progress Report, Feb 2015[3].

EU digital targets on internet use are compiled to measure effects on human capital[4]. The following is key data from the European Digital Agenda Scoreboard 2015:
- internet users continue to increase, with 75% of the EU population reporting that they used the internet at least weekly in 2014
- for most people, use of the internet is a daily activity, with 65% of EU citizens reporting using it daily in 2014
- Use by disadvantaged people (individuals belonging to at least one of the three groups: 'aged 55-74', 'low education' or 'unemployed, inactive or retired') also continues to rise, with 60% reporting using the internet at least weekly in 2014.

As such, the Digital Agenda targets on internet use have been met before their target date of 2015. However:

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[3] http://feltag.org.uk/wp-content/uploads/2012/01/FELTAG-REPORT-FINAL.pdf
[4] https://ec.europa.eu/digital-single-market/en/news/digital-agenda-scoreboard-2015-most-targets-reached-time-has-come-lift-digital-borders

- 18% of the EU population have still never used the internet. The main reasons for non-use are lack of interest, lack of skills and cost factors
- 40% of the population are described as having 'insufficient' digital skills
- The large and growing demand for ICT professionals in the economy is leading to a skills gap projected to reach 825 000 unfilled vacancies by 2020. The biggest gaps are expected in Germany, the UK and Italy.

Use of digital technologies in everyday life has become ubiquitous. However, whilst the figures for internet use and the availability of basic broadband are expanding at a fast rate, there are still those of the wrong side of the 'digital divide' (Bynner et al, 2008:2). Across Europe ranking of countries with the highest and lowest rates have changed little and the digital divide on internet use is largely driven by education levels and age[5].

Demands of the workplace

In modern workplaces, literacy implies digital literacy. By 2020, 90% of jobs will require some digital skills[6]. Reading print is necessary in order to fully understand a text but it is not sufficient in this digital era. For individuals who struggle with print reading and writing, this presents a double divide (Bynner et al, 2008). Most adults develop their digital skills 'on the job' – but if poor literacy reduces employment opportunities, it therefore also reduces the opportunities to develop the digital skills required by employers, creating a vicious circle.

The digital divide is also a problem for low-skilled workers: even if employed, they may lack on the-job opportunities to develop the digital skills they need to move into higher occupations. Older adults may also find themselves the victim of the digital divide as the skills required to remain in employment do not remain stable but instead evolve to meet the demands of new technologies.

In general terms, the increased use of ICT has changed the nature of employment with fewer routine office jobs available as computers replace many routine cognitive tasks. This change in the employment structure, often described as a 'hour glass' economy, has created a larger gap between the skills required for high level knowledge based occupations and the type of non-routine manual jobs often found in the service sector.

Citizenship demands

It is generally acknowledged that the presence of good literacy skills is essential for active citizenship and participation in society. However, the growing expectation that Europeans will access government and other services online, has emphasized the

[5] http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/573884/EPRS_BRI(2015)573884_EN.pdf
[6] European Parliamentary Research Service Briefing December 2015

increasing importance of good digital literacy skills. To enable all adults to access public services, these online services need to be highly accessible and adults with literacy difficulties need support to ensure that they are not discriminated against in the provision of services. The Digital Agenda Scoreboard 2015 acknowledge that online public services are not yet fully accessible for adults who are less digitally skilled members of the population.

The literate environment

Digital literacy can be seen as both similar and different from traditional literacy. In discussing digital technologies, we also need to understand the 'literate environment' in the twenty-first century. In contrast to print-based texts, we increasingly engage with a wide range of digital texts for different purposes and different audiences. These digital texts are increasingly multi-modal, combining modes such as colour, moving and still images, etc. For example, microblogging such as texting may include use of punctuation and emoticons to signal key messages to the reader. Whilst our languages always change over time, the interactivity enabled by Web 2.0 technologies has hastened this process, requiring a wider range of skills when engaging with digital rather than print-based texts.

Why digital technology is important in education

Increasingly, for many young people, there is a dissonance between their wide use of digital technologies out of school and the overwhelmingly print-based reading required in most school environments. This same experience is also reflected for many young adults in college and community settings. In contrast to this, FELTAG (Further Education Learning Technology Action Group) highlight how digital technology can personalise learning, offering adults and young people greater control of what, how and when they learn, and how and when they are taught and assessed. Digital technology can be used to support peer-to-peer learning, emulating how adults learn in the workplace and it also has the power to attract adults who are unlikely to access more traditional classrooms.

What does the research evidence tell us

Learning technology is defines as 'the broad range of communication, information and related technologies that can be used to support learning, teaching and assessment' (Source: http://www.alt.ac.uk/about-alt/what-learning-technology). There is some evidence for both primary and secondary age children, that digital tools can improve literacy development. However, there is a wide variation in both the quality of these tools and in how they are used as part of the teaching and learning process, and research is still limited in this area. This underlines the important point that technology is not a substitute for teaching.

In relation to adult learning, we now have some theoretically informed, evidence-based ideas about the best ways to teach literacy to adults. However, we still have many more questions than answers in relation to digital literacy.

The UK government commissioned an evidence review of learning technology in English (adult literacy), maths and ESOL/ELT provision which was published in November 2014. They aimed to find out what the evidence-base tells us about the value of using technology-rich approaches in adult literacy, numeracy and ESOL/ELT delivery.

The NRDC review (Litster et al, 2014) found a small evidence base, suggesting that there was very little high quality research available related to the effectiveness of technology use in adult basic skills delivery, either in the UK or internationally. There was some encouraging evidence on the impact of interventions on students' motivation to learn and on engagement levels, but there was no evidence that suggested that outcomes were improved as a result. There was also some evidence from small scale studies on the value of using technology-rich approaches with students with learning disabilities. Digital assessment can differentiate and personalise learning with adaptive assessment tailoring the next learning activity to the learner's progress in real time. However, due to heterogeneity in the learners groups, it was also not possible to draw many strong conclusions and further research is needed in this area. Digital tools have been found to offer benefits for children with specific learning difficulties and disabilities. A separate review of assistive technologies focused on reading writing, spelling and speech, found that the majority of interventions tested did contribute to improved outcomes for children (Shamir and Margalit, 2011).

The NRDC review also highlighted the lack of 'learner voice' and the need for future research to pay more attention to what learners are saying about their experience. The evidence on technology for English for Speakers of Other Languages (ESOL) was more extensive, probably reflecting the wider interest in the use of technology with language learning. Another recent study (Kukulska-Hulme et al, 2015) on the use of mobile pedagogy for English language teaching offers a helpful guide to teachers and incorporates a wide range of teaching and learning strategies appropriate for adult literacy learners.

Online reading

Whilst, digital texts may often appear to be shorter and more dynamic than many print-based texts, there are also different challenges. Digital literacies such as online reading are more complicated than print reading and call for a broader range of skills such as navigation, finding relevant texts of interest, synthesising information and critically evaluating texts (OECD, 2011).

Researchers have found that while good print reading comprehension skills are often associated with strong online comprehension skills this is not always the case – poor

print readers may be strong strategic thinkers and better able to navigate the web than their peers who are stronger print readers (Leu et al, 2007)

Schwab's small scale research with adult literacy learners and their teachers in a London college highlighted the value that learners placed on reading online. Learners were acutely aware of the 'social capital' attached to reading on the internet. It offered a wide range of free information, an opportunity to problem solve and practice reading and writing in an engaging way with instant feedback. It offered access to internet shopping, and the ability to adjust the size of print in a way that was not possible with print literacy. Teachers, on the other hand, were less confident in teaching computing skills alongside reading skills. They needed to support learners by demystifying the process of reading online.

Writing online

Chen et al (2011), cited in Litster et al, (2014) compared computer and paper-based administration of writing assessments. They found that all respondents performed better on paper than with computers. The authors speculated that the differences in performance may be explained by the different cognitive demands required of the different modes and that this may be evidence that writing on a computer is more demanding in terms of cognitive processing. They suggested that adults needs to be given a choice of composition medium if the purpose of an assessment is to measure how well adults write, regardless of medium.

The internet appears to be encouraging writing over reading (Brandt, 2015). As a productive environment it allows its users to produce, transmit and reproduce text alongside a range of multimodal content. The range of communication has also increased. For example, the range of genres represented in blogs, texting and microblogging encourage more informal styles of writing.

Three dimensions of Digital Literacy – the ELINET definition

The Elinet position paper on Digital Literacy suggests that digital literacy includes 3 interrelated dimensions of literate practice:
1. The operational dimension
2. The cultural dimension
3. The critical dimension

The Elinet network suggest that the operational dimension includes the skills and competences that enable people to read and write in diverse digital media including spoken and written language, still and moving images, sounds, screen design, etc. The cultural dimension refers to a repertoire of digital literacy practices in specific social and cultural contexts such as maintaining social, educational and professional relationships and identities online. The critical dimension recognises that resources are selective and operate as a means of social control. For example, we need to

understand how companies set up and control our access to specific online platforms. Being critically literate with digital media also includes developing the ability to use digital tools creatively.

Using literacies in and out of the classroom

Technology bridges the divide between formal and informal learning environments. Digital environment foster strong peer cultures and collaboration allowing learners to experience a sense of ownership of their learning and creations. Broadening curricula to include the use of multimodal elements in digital environments are shown to have positive effects on language acquisition for second language learners. Digital literacy not only widens the concept of literacy, in adding multimodal media, but also deepens it. Digital environments require a strong meta-cognitive awareness, including an understanding of online safety and the competence of 'learning to learn'. At the same time, we need to support learners to become more critical readers and writers, and to enable them to take more control over the learning process.

Assessing digital literacy

Assessment of digital literacy should assess an adult or young person's ability to problem solve, critically evaluate and synthesise information from different sources. However, one of the biggest perceived barriers to change is paper-based assessment (FELTAG, 2013) and most assessment instruments and practices are unsuitable for testing and developing digital literacies (Carpentieri, 2011). For example, simply putting text on to a computer screen is not enough as this merely measures off-line reading comprehension online.

Use of digital technology with different groups

The NRDC review (Litster et al, 2014) questioned how engagement with digital technology may vary between different groups of learners, including different age groups and learners who identified as employed or unemployed. Technology is perceived by all learners and particularly those from disadvantaged backgrounds, as empowering and engaging (Carpentieri, 2011).

In one US study (Thomas, 2009), unemployed women were engaged in an online literacy programme. Participants reported positively on the value of having computers in their homes as it increased autonomy and helped them overcome their fear of computers. However, the evaluation evidence was limited in scope and no comparisons were made with employed learners.

A number of studies have found evidence that older learners are at a disadvantage when using new technologies whereas young adults are morehighly motivated to learn using phone-based games and game-based training.

Digital environments are often both multimodal and multilingual. Including multimodality through using digital environments has shown positive effects on the acquisition of the language of instruction for minority or migrant students Mills, 2010, cited in Carpentieri, 2011)

Principles to inform the use of digital technology in adult literacy teaching

The NRDC review (Litster et al, 2014) was tasked to identify what principles should inform the choice of and use of technology within adult education contexts. They devised a set of questions which provide a framework for the analysis of learning technology interventions. The framework can be used in understanding and comparing interventions and groups factors under two headings: technology and implementation. The question framework is reproduced in Appendix A.

The SAMR model[7]

Dr. Ruben Puentedura developed the SAMR (substitution, augmentation, modification and redefinition) model as a way for teachers to evaluate how they are using technology in the classroom with the aim of redefining the learning experience and encouraging more student-centred learning and opportunities for learner collaboration. At the substitution level, there is no functional change in teaching and learning as computer technology is just used to perform the same task that was performed before the computer was present in the classroom. For example, a print-based worksheet is reproduced online. At the augmentation level, technology is used as an effective tool to perform routine tasks. For example, a teacher could create an online quiz which offers immediate feedback on learning, rather than students having to wait for the teacher to give feedback. At the modification level, there is significant functional change. For example, alongside writing an essay, classroom activities can include the making of an audio recording and soundtrack which can be played in front of a real audience. At the highest 'redefinition' level, the technology is used only in order to support students' learning. For example, students learn whilst creating a high quality video with discussion and questions being mainly student generated.

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[7] http://elearning.tki.org.nz/Professional-learning/Teacher-inquiry-into-e-learning/SAMR-model

Conclusion

There is a continuing need for more extensive good quality research on the use of digital technologies to support adult literacy teaching, learning and assessment. In exploring how the use of digital technologies changes how we use literacies in different domains of our lives, we are still far from having an adequate evidence base which would allow us to draw policy conclusions. Because technology is changing so rapidly and because academic research is a slow process, research on a particular type of software may well be out of date by the time it has been published,. In this area researchers struggle to keep up with real world developments.

Looi et al (2011), cited in Hylen, 2015, usefully characterize three levels in the education sector: macro, meso and micro. At the macro level are Ministries of Education and policy-makers. On the meso level are research institutions, technology companies and non-governmental organisations. At the micro level are the educational providers, teachers and learners who implement policies and programmes in educational contexts, including classrooms. Hylen (2015), in a literature review prepared for the European Commission on mobile learning and social media in adult education, points out that, in relation to initiatives on the use of social media in education, most activity has been at the meso and micro level and that there has been a lack of interconnection between the macro level, on the one hand, and the meso and micro levels on the other hand. In order to capitalize on the potential of digital technologies for both formal and informal learning, we need to ensure that all levels of the education sector are involved in future initiatives in order to evaluate programmes and evidence best practice; to develop pedagogical guidelines, support and training for teachers; and to support all learners by offering increased opportunities to use digital technologies for both formal and informal learning. In particular, we need to capitalize on the potential of informal learning in adult literacy classrooms to ensure that adult literacy learners have the opportunity to engage in digital literacies that are most useful to them. In order to create innovative projects, we also need infrastructure, digital learning materials and approaches, professional development for teachers and a pedagogical vision.

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Appendix A

What principles should inform the choice of and use of technology in adult skills delivery?

Technology
- To what extent is the chosen technology sensitive to the different ICT skills of learners, and to the differences in experiences and attitudes between younger and older learners?
- To what extent does the chosen technology enable learning to be tailored to the needs of the individual?
- To what extent is the chosen technology blended with traditional forms of instruction?
- To what extent does the chosen technology allow for, or facilitate, learning situated in real world practices?
- To what extent does the chosen technology effectively scaffold learning?
- To what extent does the chosen technology encourage collaboration between students?

Implementation
- What is the role of the teacher?
- Do teachers have the skills and knowledge that they need?
- How effective is induction in preparing students for learning?

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