"Digital Futures in Teacher Education": Exploring Open Approaches towards Digital Literacy

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Abstract: This paper reports the findings of a project "Digital Futures in Teacher Education" (DeFT) undertaken as part of the third phase of the Joint Information Systems Committee (JISC) UK Open Educational Resources (OER) programme. It builds on previous work (Gruszczynska and Pountney, 2012, 2013) that has addressed attempts to embed OER practice within the teacher education sector, and which has informed practice in teaching and learning in the school system involving digital literacy (Burnett and Merchant, 2011; Davies and Merchant, 2009). A framework for digital literacy is outlined, drawing heavily on socio-cultural models of digital practice (Merchant, 2011), that has the potential to re-imagine teachers and teaching, as well as learners and learning and which, at the same time, address the 'why' as well as the 'how' of digital literacy. This framework takes into account current debates (primarily within the UK but of relevance to European perspectives) focusing on issues of ICT, digital literacy and media literacy in the curriculum, which reflect a tension between digital literacy as a set of skills and competencies on the one hand and understandings that arise from socio-cultural and communicative practices on the other. Current understandings of digital literacy in the context of teacher education and OERs are explored and the potential for *digital literac(ies) for openness* is examined. This draws on data collected in the context of the DeFT project and includes meanings and perspectives on digital literacies as expressed by project participants. The effectiveness of a methodology that prizes reflexivity and participation is examined including a range of voices, including children's voices, in the meaning-making process and recommendations on the basis of the findings are made. In terms of a digital future for teacher education the paper highlights the need for practices, learning packages and tools to continue to evolve, in close cooperation with their potential users, and linked directly to classroom and schools as the site of this production.

Keywords: digital literacy, reflexivity, ICT curriculum, pedagogy, open educational resources

1. Introduction

The importance of new technologies in contemporary social, economic and cultural life has rapidly become an important theme in political debate, in policy development and in social science research. As social practices shape, and are shaped by the rapid diffusion of ever more sophisticated digital devices and applications, we are repeatedly presented with the opportunities and challenges of what have been described as a changing social order. This is a situation in which the communication economy is marked by new configurations of space and time, new levels of connectivity and interaction, and the global circulation of information. The shrinking gap between consumption and production, coupled with innovations in knowledge building and knowledge sharing, present exciting opportunities in many aspects of contemporary life (Warschauer and Matuchniak, 2010). Yet in the public imagination, technology is patterned by discourses of risk, surveillance, and rampant consumerism (Burnett and Merchant, 2011). Children and young people are often cast not only as the most active users of new technology, but also as those at most risk.

It is in this context that educators are challenged to respond to a multiplicity of issues, some of which end up being in direct conflict with one another. A well-worn example of this is the frequent call for them to give their students access to a wide range of popular web-sources, such as YouTube, which in the interest of a particular version of internet safety are repeatedly blocked by institutional firewalls (Davies and Merchant, 2009). But issues of overall purpose co-exist with such practical conundrums. Education systems, through curriculum policy and guidance, often encourage schools to develop quite specific and marketable skills that are intended to have economic traction. In contrast, some leading education theorists and researchers stress the importance of valuing and building upon children and young people's 'digital capital' – the practices and expertise that they

Reference this paper as: Gruszczynska, A., Merchant, G. and Pountney, R., " "Digital Futures in Teacher Education": Exploring Open Approaches towards Digital Literacy" *The Electronic Journal of e-Learning* Volume 11 Issue 3 2013, (pp193-206), available online at www.ejel.org

already possess (Carrington and Robinson, 2009). Furthermore, in many Anglophone countries, the drive to develop competitive school systems through regimes of accountability and high stakes testing has led to a narrowing of curricular objectives. More often than not, these have fixed educators' attention and efforts on simple and measurable individual pupil achievement in 'core' areas such as literacy and numeracy in ways that are hard to reconcile with the digital practices referred to above.

The Digital Futures in Teacher Education (DeFT) project had to acknowledge these broad contextual factors whilst also addressing current debates on the role of Information and Communications Technology (ICT) in the curriculum and its relationship to digital literacies (Gruszczynska and Pountney 2012, 2013). As Merchant (2007) argues, there are a number of competing discourses in the UK that see ICT either as a set of skills (the National Curriculum for ICT, QCA 2000); as a tool or vehicle for learning (DfES, 2004) or as a transformative influence that has an impact on all aspects of schooling (DfES, 2005). These discourses are reflected most vividly in the recent Royal Society report (2012) that suggests that the current delivery of ICT in UK schools is highly unsatisfactory and uninspiring for the pupils, developing only basic skills while excluding the more advanced knowledge and understanding that could be gained through exposure of pupils to Computing Science (The Royal Society, 2012). Interestingly, in this context, digital literacy is defined as 'the general ability to use computers' alongside a set of skills such as the ability to use word processors or database software, with no reference to socio-cultural dimensions of digital literacies. The most recent development in this area, at the start of 2013, was consultation on the new curriculum for 'computing' following the disapplication of the programmes of study for ICT in 2012. In spite of these underlying tensions, the most interesting digital practices in the school sector have emerged from the work of enthusiastic innovators, often working alone, or in collaborative partnerships with researchers, or as part of informal grassroots networks such as 'teach meets'.

In England and Wales, the idea of a curriculum for technology lies in tatters, having been described by the Secretary of State for Education, Michael Gove, as 'flawed' and by others as 'off-putting' and 'dull' (Guardian Newspaper, 2012). In his address to the BETT (British Education and Training Technology) Conference, Gove underscored the political will to push digital literacy in schools, and proposed an 'open source curriculum' to encourage teachers' 'freedom and autonomy'. Alongside this rhetoric, there is recognition that digital literacy is applicable to all curriculum areas as well as in the more specialist domain of Computer Science. How these ideas will inform practice, in the wake of the Department for Education consultation process, remains to be seen. What is of broader interest here, is the way in which new technologies continue to unsettle traditional ways of thinking about curriculum and pedagogy and at the same time, appear to present exciting or radical possibilities for education (Merchant, 2009).

For new teachers, taking their first tentative steps into the complex arena of educational practice, there is very little guidance on technology. In England, and elsewhere, teacher preparation continues to be constrained by a regime of standards and accountability which more often than not mirrors that of the school sector (see above). For all the Information and Communications Technology (ICT) audits and sessions run by specialists, the teacher education curriculum is a narrow one. In addition to this, trainee teachers are likely to have a patchy experience of digital technology in the school context (Burnett, 2009) on account of variations in resource, access and classroom practice. Michael Gove promises to be 'looking at initial teacher training courses carefully in the coming year so that teachers get the skills and experience they need to use technology confidently' (Guardian Newspaper, 2012). We contribute to this debate by exploring how OERs can support teacher development in digital literacy (DL).

Debates about digital literacy have circulated since Gilster (1997) first coined the term. In a more recent development, JISC's framework looks at the 'anatomy' of digital literacy from two different but related perspectives. The first is as a frame for access, skills and practices. This includes the functional access to networks, devices, services, software and content that individuals require to exercise and develop digital literacy. The availability of these to individuals and social groups within society and in particular contexts such as education, is a key factor, especially in light of how, increasingly, the boundaries between work, leisure and education have become blurred. Here, the distinction between a practice and a skill is somewhat ill-defined and one in which media and information literacy are categorized alongside techno-social and academic practice. The second element of this anatomy is the contexts for these practices/skills, including the workplace, learning environments, the personal/social context and community. Key to this second frame is the concept of identity and its manifestation in social networks, lifestyles, learning and work communities (JISC, 2011). Inherent in this are two related sub-systems that are indicated by the labelling of this anatomy: ICT skills and Digital Practices.

A mapping of the DeFT project case studies to this framework highlights the value of this framework for the application of DL technologies to learning activities, but does not allow for the meanings that are made within and through these practices (Gillen and Barton, 2011). This latter view might serve to encourage teachers to engage with digital literacy throughout education, acknowledging, in so doing, how the skills and experience that learners (and their teachers) have or need is changing. Some commentators have argued for a baseline to identify those who are defined as digitally literate. However, it is our contention that this may not be helpful, given the proliferation of technologies each requiring different skills and operation. At the same time, the increasing possibilities offered by new technologies and the diversity of digital practices associated with them have prompted much debate around the growing gulf between literacy provision in schools and the rapidly changing digital literacies in learners' lives (Burnett, 2011, Beemt, van den et. al., 2011). Burnett brings up a number of arguments which attempt to account for this disconnect, such as inadequate access to equipment and competing pressures relating to print literacy. Another oft-cited argument is that pointing to an existence of a stark divide between teachers and pupils in terms of their competence and confidence levels, where the pupils are portrayed as 'digital natives' (Prensky, 2001), who have been exposed to new technologies from a very young age. However, a number of more recent studies critique this proposition and suggest a more nuanced understanding of divisions between individuals' experience of digital technologies, where levels of access and competence/confidence are determined by factors such as societal position, race, and gender, rather than age and educational status (Hargittai, 2010; Jones, 2013; Selwyn, 2004). A further body of research, involving a large scale investigation in Australian Schools, questions if a digital divide even exists or if stakeholders are overreacting (Bennett et al., 2008; Bennett and Maton, 2011).

2. Towards an open- source curriculum for teacher development – the role of OERs

As we have seen, there is a pressing need for teachers to engage with digital literacies throughout education, and increasingly the understandings and experiences that learners and their teachers have, and need, is changing as technology itself changes (Davies and Merchant, 2009). Open educational resources (OERs) are teaching and learning materials, freely available online for anyone to use, customise and add to, and as such, offer a powerful way of addressing this dynamic situation (Atkins et al., 2007). This paper arises in the context of the UK-wide Open Educational Resources programme, which took place between 2009 and 2012 and was a collaborative endeavour between the Higher Education Academy and Joint Information Systems Council (JISC), with funds provided by the Higher Education Funding Council for England (HEFCE). The authors of the paper adopt the definition of OERs offered in the context of the programme:

…teaching and learning materials (…) freely available online for everyone to use, whether you are an instructor, student or self-learner (…) [these] resources [are] contained in digital media collections from around the world (JISC/HEA 2010).

Of relevance to this paper is a broadened definition of OERs, proposed by Mackintosh (2011), which identifies three interrelated dimensions: educational values (i.e. barrier-free access to the resources), pedagogical utility (anyone accessing OERs should be able to reuse, revise, remix and redistribute the resources) and technology enablers (i.e. OERs should be in a format that ensures that they are 'meaningfully' editable). This means that potential (re-)users of OERs are positioned not as mere consumers but as active participants in the process of creating and sharing the resources (Tosato and Bodi, 2012). Whilst there have been three phases of OER funding for Higher Education to date, there remains little coordinated development of resources for the UK school sector. A notable exception has been the work of the British Educational Communications and Technology Agency (BECTA). The BECTA-funded project 'Repurpose, Create, Share' aimed to create and share digital resources across participating secondary schools and the National Education Network (Hemsley, 2008).

In terms of issues of relevance to the school sector, most existing research focuses on the implementation of OERs in developing countries. This includes initiatives such as the High School BLOSSOMS (Blended Learning Open Source Science or Math Studies Initiative) project in the Middle East Region (Larson and Murray, 2008) which examined low-tech solutions to overcoming barriers to accessing OERs. Similarly the Teacher Education in Sub-Saharan Africa project (TESSA) undertaken by Open University examined issues involved in supporting user communities to harness and integrate OERs for their own systems and cultures (Thakrar et al., 2009; Wolfenden, et al. 2010, Murphy and Wolfenden 2012). In a European context there is a strong recognition of the need to meet the professional development needs of teachers:

The teaching professions now face rapidly changing demands, which require a new set of competences….The growing availability of online content and open educational resources provides new opportunities to pupils and students, but also to teaching professions (EC, 2012:6).

Furthermore, it is evident that the implications of the increasing use of technology for learning, including the need for a level of competency that makes the use of technology for learning possible has the potential to foster inequalities of access and opportunity. The EU Key Competence Framework (Europa, 2010) supports this view stating "*… transversal skills will be valued more than the specific bodies of knowledge that schools have traditionally taught*". This paper questions whether these transversal skills are yet to be addressed by current conceptions of digital competence; that these conceptions are provoked by an impulse to consume technology and not necessarily to apply it; and that these conceptions are reinforced by a narrow view of the use of tools for learning and teaching. Together these restrictions have a multiplier effect on practice that if not addressed can continue to limit the potential for 'digital competence as a human right' (Ferrari, 2012) in which the possibilities for teachers are closed before they can be captured in their imaginations.

In the UK context, OERs could make a significant contribution to work on digital literacies in teacher development. There are two reasons for this. Firstly, in the UK, as elsewhere, there is a diversity of models of teacher preparation, including university-school partnerships and programmes that are entirely school based. This means that trainee teachers, or for that matter early career teachers, are likely to need access to support materials at different stages in their preparation for teaching and at a variety of points during their academic or professional study. The flexibility offered by OERs fits well with this diversity of provision. Secondly, the field of digital literacy itself is characterised by its fluidity as new devices become available and new programmes and applications are developed. The

rapid changes in the curriculum structures of compulsory schooling (see above) increase this sense of fluidity. We suggest that the adaptability and reusability of OERs has considerable potential in this complex situation and might contribute to an open source curriculum for teacher development.

One outcome of this is a reliance on a facility with technology that the authors of this paper broadly describe as *digital literac(ies) for openness*. This approach extends the notion that OERs possess a pedagogical utility (Mackintosh, 2011) to examine the landscape in which teacher identities are being constructed, socio-culturally and socio-politically as part of a pedagogic discourse (Bernstein, 1990). Teachers' responses to the pedagogical potential of technology are seen to be shaped by a regulative discourse (ibid.) and by complex models of compliance and autonomy (Pountney, 2003) that may not necessarily result in practice that might be termed innovative (Merchant, 2005). The inclusion of open educational resources for learning and teaching within teacher education programmes to date, for example, is primarily focussed on finding and using resources rather than modifying and creating new ones. This emphasis on 'make and mend' arises partly from the reality of busy teachers' lives and can limit the potential to move beyond the simplistic 'goals to means' paradigm that tends to dominate technology use in schools (Underwood and Dillon, 2011). Accordingly, a view emerges of teachers' work as 'bricolage' (Hatton, 1989) - as the ad hoc material manipulation of resources and the 'craft' in the use of 'whatever is to hand' (Levi-Strauss, 1974: 17). Teachers' capacity to move beyond this positioning of their role as '*bricoleurs*' relies to an extent on their agency to imagine pedagogy and the curriculum: how they might become, or aspire to being, '*designers*', perhaps. The implications of this for teacher education are explored in the following sections of this paper and are illustrated from the DeFT project case studies.

3. The project and its findings

The DeFT project team, based at Sheffield Hallam University and the University of Sheffield, designed OERs, in the form of an Open Textbook (Connexions, 2009), to address the opportunities and challenges of creative and innovative uses of digital literacy in the school and teacher education sectors. The team worked with teachers in primary and secondary schools in South Yorkshire to develop case studies of digital practices in schools - practices which included the use of mobile devices, digital video, Web2.0 applications, and school intranets. Course tutors and teacher education students were involved in trialling and developing the OERs which comprise resources that support effective practice with digital literacy for teachers at all stages of their careers.

The two key outputs of the project, released under Creative Commons licence, were:

1. The Open textbook (see Figure 1 for screenshot of homepage)- an Open Resource on Digital Literacy for Educators, Teachers and Schools which explores the challenges of involving learners with digital literacies; incorporating the two core elements: digital literacies in the context of professional development and digital literacies for creative learners. The OT comprises 100,000 words arranged in 6 chapters and contains 2 'alternative' tables of contents: 1) Key Questions; and 2) Digital Literacy for Teachers. It also has a unique Thinking Space function that allows users to 'like', 'tag', 'annotate' and 'export' content to a personalised open textbook (under development). (see www.digitalfutures.org)

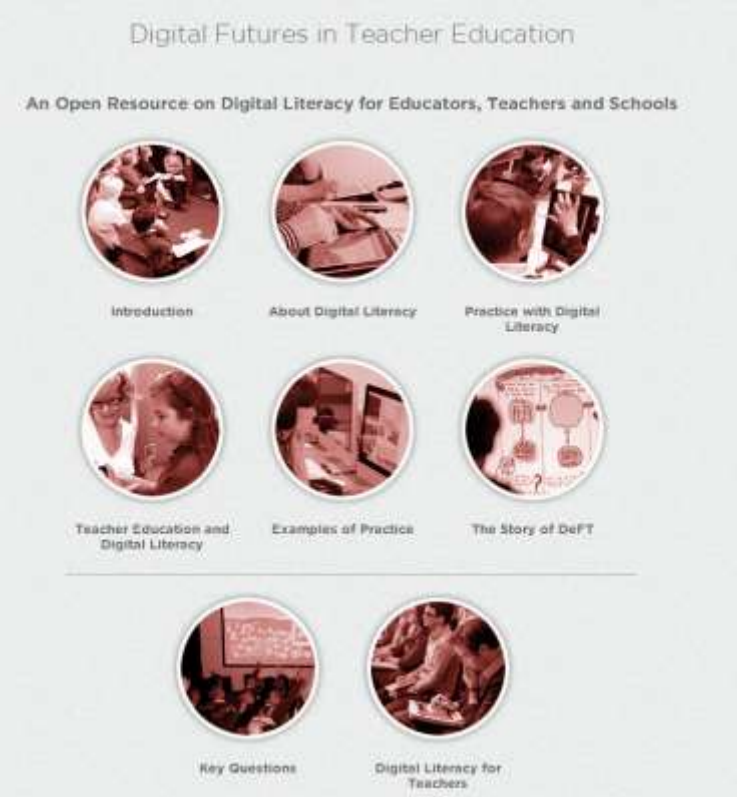

Figure 1. Screenshot of the Open Textbook hopemage

2. Digital Bloom - in the DeFT project Digital Bloom became a focus for exploring the intersections of digital literacy and creativity. Participants were encouraged to reflect on the relationship between creativity and learners' digital literacy practice, both inside and outside formal education institutions. The central metaphor for these activities was 'Digital Bloom': an abstract concept represented by a field of flowers (see Figure 2), where each flower reflects an individual understanding of digital literacy and the field symbolises the social layer (see the case study below). In this public meadow the project team and partners reflected on digital literacy. The Digital Bloom application has been used by several schools in 'private' meadows (see www.digitalbloom.org).

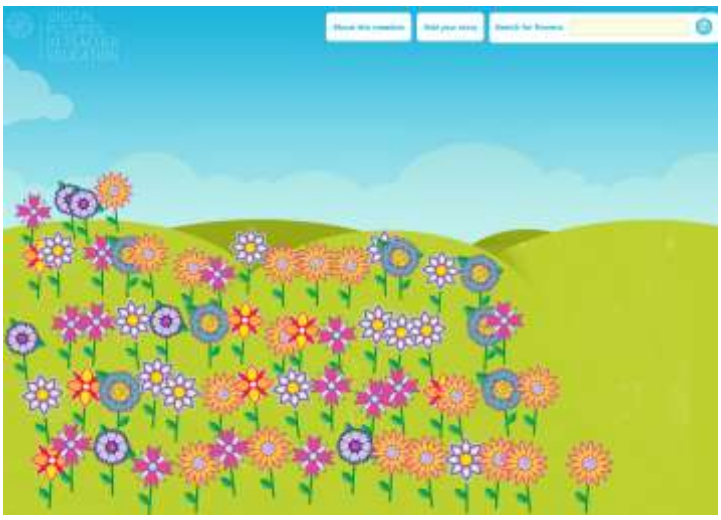

Figure 2. Digital Bloom meadow

The emphasis of this project on practice - and in particular digital practices and social aspects of digital literacy - was realised through a methodology that aimed to enrich practice by empowering teachers and teacher educators to reflect and critically engage with their own practice and their own communities, wherever appropriate. This heightened the potential for the exchange and development of practice and expertise through the system of the open textbook resource and learning package. With regard to teacher competences this project addressed first order (teaching) skills, and second order (teaching about teaching) skills. One key outcome was the preparation of new teacher training courses in digital literacy and the use of OER for learning and teaching in formal and informal settings.

An important part of the DeFT project methodology was to involve teachers and students, trainee teachers and university colleagues as equal partners in exploring the possibilities of digital literacy. This produced a temporary learning community that in itself provides a useful model for developing practice in this area (Davies & Merchant, forthcoming). To achieve this we adopted a reflexive approach (see also Gruszczynska, 2012), which informed the project methodology. A guiding principle, therefore, was that through structured reflection, teaching practices can be critically reviewed and hence better understood. This helped in articulating approaches to digital literacies which mapped onto the experiences of project participants. In terms of practical realisation of that approach, all project participants (core team, teachers, course tutors and students) contributed to a series of reflexive tasks in which they responded to prompts provided by the project team at five points in the project lifecycle. These prompts varied slightly for each of the groups in acknowledgement of their particular working context. Participants were encouraged to offer their responses in a variety of formats such as text, audio or video, depending on personal preferences. The reflections then informed the development of the Open Textbook and became its integral part. One of the clear messages coming out of the reflections is that the subject of digital literacy, although not new, needed to be unpacked and scrutinized in the context of education. The enthusiasm that the project engendered in those who took part is remarkable, and the reflections demonstrate that the project has broadened and supported new perceptions of digital technologies.

The responses were collated to identify emerging themes and to gain a sense of developing understandings of digital literacy. A digest of these reflections was shared amongst participants shortly after each stage, thus contributing to a cumulative sense of meanings generated by the group. The emphasis on reflexive tasks draws on a body of research on teacher inquiry teaching (Cochran-Smith and Lytle, 1993) in which teachers research their own practice, generating new knowledge by identifying and responding to dissonances within their practice (Timperley et al., 2007). This enrichment approach became an integral part of the school-based work of the project. Here the project team and participating teachers constructed case studies of their work. Teachers in 10 different schools were involved in this phase and worked in different contexts (from the early years through to secondary/high school) with students from a range of socio-economic and cultural backgrounds. In the following section, we examined the meanings and perspectives on digital literacies as expressed by teachers in two of the participating schools through their classroom work and their reflections. In recognition of the methodological difficulties of generalising from case study research (Lincoln and Guba, 1984), we have simply chosen 2 examples to illustrate the range of the work undertaken.

4. Developing digital literacy in the context of schools and teacher education

Case study data were archived on a project wiki and included notes from school visits, interactions between researchers and teachers at project meetings, as well as supporting material from blogs and reflexive tasks. During the lifetime of the project, the wiki was password protected; it was

openly released as one of the outputs of the project and is now available from deftoer3.pbworks.com; this was consistent with our approach, based on engagement with openness and reflexivity.

Here, we use this case study material to illustrate tensions and understandings of digital literacy in practice. For ethical reasons fictitious names have been used for both schools and teachers in the accounts. The first case study depicts the work undertaken by a primary school teacher and her Year 2 class (6-7 year olds) at Mondrian Primary School in Sheffield. The second case study is based around the work of an English and Media Studies teacher working at the Warhol School in Rotherham (9-16 year olds).

The work in Mondrian Primary School focused on the use of the iPad 'Brushes' app, and emerged from project collaboration with Sheffield Children's Festival – a local cultural event which celebrates the creativity of local children. As part of this work, the children participated in an artist-led workshop in which they drew digital flowers using the Brushes app. The flowers were then incorporated into a mural developed by a graphic designer. Following the workshop, children were invited to offer their comments via the class blog, where the project team members asked them questions about their experience. The teacher leading on this case study also offered her reflections on the process through participation in project reflexive task (see above). Her comments emphasise children's confidence with technology and the speed with which the children picked up the basic principles of using the mobile devices and the app:

> *Children as young as 4 in reception were using them [i.e. iPads] with ease, moving between apps and the home screen quickly and without concern for the equipment itself. They were confident and surprisingly competent. When I sat down and showed them how to use the app, I went through it all, then handed them over. It wasn't until 5 mins in when I realised I'd forgotten to tell them how to turn them on…. It was then that I realised they really didn't need me at all!*

In this account, the children are positioned as self-reliant, and there is little perceived need for teacher intervention. This teacher then subsequently added, that on the basis of this pre-workshop trial, she decided to amend the lesson plan for the workshop so that it no longer included a basic introduction to using iPads preferring instead to allow children to start using 'Brushes' straight away.

In this particular case, the children had access to iPads in the classroom for about two weeks and some of them could also use them at home. Most of the children when they talked about the work focused their enjoyment of the workshop. For instance one child commented *'I loved having a go on the iPads it was so much fun I can't wait to go on them again'*, with another adding that they loved the experience *'because they [i.e.] iPads are cool'*. Other children were similarly enthusiastic and described the iPads as *'APSULUTE AMAZING!!!'* (original spelling) and 'magical'. In this way the children's comments emphasised the playful nature of the experience (Robinson and Willet, 2008) and a certain level of fascination with the technology, in referring to the iPads as *'magical'.* On a related note, when the teacher offered her account of the workshop, she commented being surprised by how focused the children were throughout the session and that for the entire hour you could *'hear a pin drop'*, which was usually not the case during other art classes! In this account, the technology becomes a transparent medium which offers a chance for the children to engage in an activity which is so enjoyable that they maintain high levels of focus effortlessly. A similar approach to digital literacy is illustrated through the case study of work at Warhol School which focused on the use of digital video for enhancing pupil communication and critical thinking skills.

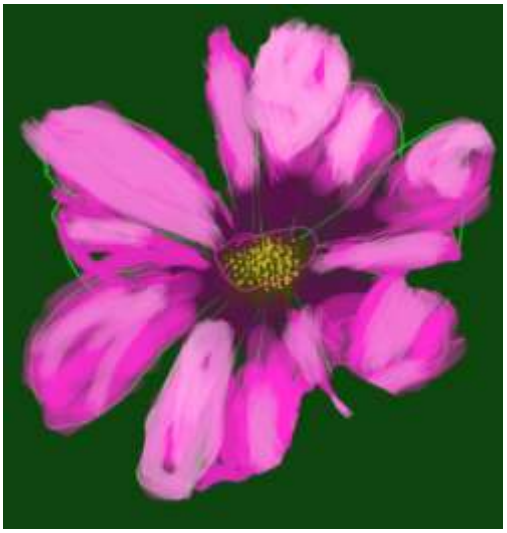

Figure 3. An example of an i-Pad flower drawn by children at Mondrian

The second case study offers an insight into the understandings of digital literacies and openness in the context of teacher training where a tutor on the Post Graduate Certificate in Education (PGCE) course at one of participating universities, invited her students to reflect on digital-literacy issues within their practice, and engaged them in a discussion on digital literacy and OER issues. The key element of the work was based on student participation in a reflexive exercise where they were asked questions aimed to elicit their perceptions of digital literacy and OERs.

The first question focused on understandings of digital literacy in a professional context. For the most part, the students subscribed to a definition of literacy that focused on skills, for example being able to use a variety of technologies in a competent manner. They also commented on the ways in which the PGCE course gave them a better understanding of how they might embed digital practices in their teaching to make the classroom environment more engaging and inclusive. While they reported mainly positive experiences from placements, they also mentioned frustrations related to inconsistent access to software and hardware.

The second question addressed student attitudes to sharing resources online and with their peers and/or pupils. Most students indicated that they were indeed sharing their teaching materials:

I have shared my resources with my course mates in a Facebook group. I have also shared them with the department at my placement school (on the MLE). I did this because I use others' resources so I think it is fair to share myself.

Others elaborated on the benefits of sharing for professional practice, arguing that it stimulated good teaching:

A teacher who shares is an efficient and reflective teacher – by sharing you are not reinventing the wheel but constantly improving it.

I think sharing good practice is a good part of developing professionally and using tried and tested resources – adapting them, differentiating them, reinventing them – saves time and often improves the quality of learning for students when I have run out of creative ideas!

While students were happy to share resources within their immediate network – peers on the course, teachers on placements – they had a number of reservations when it came to releasing their resources openly online and sharing them with a potentially unknown audience:

I am always willing to share my resources with other members of staff in school and have done this on a regular basis at my current placement. I have shied away from sharing materials online contexts, however, as I always feel a little protective of the things I produce because I invest a lot of

time in making resources, and don't feel entirely comfortable at present to make it freely available for anyone to download. (I like knowing who is using it!)

Others mentioned concerns about receiving negative feedback and the time investment needed to upload resources online, with a small minority concerned about pedagogical issues and the potential risk of stifling creativity through excessive reliance on resources 'off the shelf':
These data revealed issues relevant to the embedding of OERs in the context of teacher education. Importantly, within the group there was little awareness of the term itself, despite ample evidence of a well-developed culture of sharing. At the same time, while trainee teachers seemed keen to share their resources online with their immediate network, they were much more reluctant to share beyond the circle of people they know and, for instance, release the materials openly to educational repositories. For the most part, they cited fear of negative feedback to explain their reluctance; some also commented on perceived lack of control once resources were shared more widely. It is therefore crucial to raise awareness among trainee teachers and their educators about OERs, to dispel misconceptions and also to demonstrate how resources could be shared to maximise the benefits for producers and consumers. By releasing teaching resources into a well-respected educational repository, teachers could receive professional recognition from a wider community of practice and useful feedback, which could in turn, help to improve their practice and continue gaining valuable competencies in the area of digital literacy for openness, identified as a crucial future key competence by the authors of this paper. As indicated previously, there is a pressing need for teachers to engage with digital literacy throughout education, and increasingly the skills and experience that learners (and their teachers) have or need is changing (Davies and Merchant, 2009). At the same time, new teachers to the profession, in all subject areas, are increasingly expected to have access to and become adept users of digital technology.

The accounts of many of the project participants reflect the tension between understandings of digital literacy as a technical competence, and a communicative practice. Conceptualising digital literacy as a technical skill was often seen as reductive and potentially problematic, particularly since this approach did not allow for exploring the creative possibilities offered by technology. For instance, during the first project meeting, one of the PGCE (Postgraduate Certificate in Education) tutors involved with the project expressed his concern about the amount of time that often needs to be spent on instrumental aspects of technology before there is space for more creative approaches, adding that at times educators *'fetishise technology when a piece of pen and paper will work just as well'*. At the same meeting, a teacher pointed out that technological mastery tended to reduce learning with technology to operational skill rather than application, and that this did not translate well into sophisticated uses of tools at the disposal of learners:

> *What do you think a child does when you give them an iPad? Watch what they do: they get the camera, take a picture of themselves (…) they will do that for hours and hours and hours. Now where's the digital literacy in that?'*

Furthermore, emphasizing technical issues to the exclusion of authentic uses of digital literacy meant that the debates often focused on barriers and limitations, rather than enablers. In this sense understanding of digital literacy as a skill set was quite disempowering for teachers who worried about their own competence levels and felt relatively de-skilled in comparison to their pupils. Overall, the project participants were keen to move away from a reductive approach and adopt a more sophisticated one which favoured understandings of digital literacy embedded within socio-cultural practices. For instance, when talking about the rationale to embed digital literacy within their teaching practice, the student teachers suggested that:

> *[I]t is important to amalgamate ideas related to digital literacy into lessons, it makes sense in the context of 'the way everything is heading'; the world is moving on, (…) it is best that the kids are informed and understand when they are being manipulated by*

> *Facebook etc. This way, if they are properly informed, they can get the best out of the tools they are using*

This approach highlights raising the awareness of learners to be able to appreciate and negotiate the complex landscape of digital technologies (Burnett and Merchant, 2011) and to move from being passive consumers of technology to becoming more active and empowered consumers/ producers (Bruns, 2008). Thus, the above quotes illustrate the multi-faceted aspects of digital literacies and the process of meaning-making where project participants are constantly re-evaluating their understandings of digital literacy both for themselves and others involved in the project.

A number of key issues emerge from these data and underscore some current themes in the field. These could be summarised in the form of the following recommendations for exploring the potential of digital literacy in teaching and learning. Digital literacy:

- offers alternative ways of representing, ideas and experiences, and this is attractive to educators when it allows for ways of capitalising on student learning within (and across) the curriculum
- can promote high levels of student engagement and enjoyment. This often includes playful approaches which are seen as highly motivating
- often seems to present children and young people as experts, either because it draws on their existing experience, or because they are thought to be quick to adapt to new technologies
- has both technical and expressive dimensions. The relationship between these dimensions is contentious both from ideological and pedagogical perspectives
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5. Discussion

In a relatively short length of time, ways of thinking about digital technologies in schools seem to have shifted in the UK. When the Deft project began in September 2011, it was pretty clear that the ICT curriculum was the last place to look for interesting digital practices. But as the academic year has unfolded, competing conceptualizations of digital literacy surfaced. Using literacy as a shorthand for the kinds of knowledge and competences that are applied for making meanings in the real world shifts the focus to the outcome of an educative process (formal or informal) in which literacy is 'the knowledge and skills learners acquire' (Buckingham 2003: 4) that are bundled together (Livingstone 2005). This has implications for the socio-cultural understandings associated with the term literacy and is contextually bound with the discussions and cases of practice in this paper.

Some of these are not too far away from the ideas first put forward by Gilster (1997:290) who suggested that DL is:

> *'a set of skills to access the Internet; find, manage and edit digital information; join in communications; and otherwise engage with an online information and communication network. In simple terms, digital literacy is the ability to properly use and evaluate digital resources, tools and services and apply it to their lifelong learning process.' (Gilster, 1997:220).*

Yet, current work in fields such as literacy studies, media, popular culture and information studies continues to offer rich and competing views of what is central to an understanding of digital literacy. Alongside this, the relatively young field of educational technology itself is informed by a range of disciplines and knowledge domains (Czerniewicz, 2010) in which education professionals and scholars are faced with a range of perspectives in which concepts, terms and relations and research procedures are ill-defined (Alexander et al, 2006). This explains, to some extent, the sheer diversity of existing accounts of digital literacy (Lankshear and Knobel, 2010) and highlights the difficulty in addressing this in teacher education. In the context of the DeFT project, our engagement with the case study material has focused on a socio-cultural perspective: 'the constantly changing practices

through which people make traceable meanings using digital technologies' (Gillen and Barton, 2010:9).

In the project schools, work was not exclusively driven by digital technology, but of course it always contained that element. More often than not, it was embedded within wider formal and non-formal learning. From this point of view, digital communication played a part in a wide variety of different kinds of learning - in classrooms and outside of classrooms; in art projects; in community projects; writing projects; and in English and media projects. These interpretations of digital literacy move us away from thinking about an ICT curriculum, since what we have seen is a widespread interest in exploring the 'digital in the curriculum' - the sorts of practices that might work, and the kinds of barriers that might need to be overcome.

The project has identified digital practices and ICT skills as a problem space in which accounts of digital literacy and the (re-)use of open resources are incomplete or only partially realised in school contexts. With the advance of technology new issues concerning access, publication and ownership of open educational resources are emerging. The process of developing an Open Textbook on Digital Literacy for Teachers (see http://www.digitalfutures.org), in itself an OER, has exemplified these issues. While 'openness' covers a range of concepts in relation to teaching and learning practices we aim to make a clearer connection between OERs and digital literacy and offer ways of exploring this further. In terms of a digital future for teacher education it is important that practices continue to evolve in which learning packages and tools are developed in close cooperation with their potential users and that are linked directly to classroom and schools as the site of this production. Within this is the need to re-examine digital literac(ies) for openness in the context of the debate around technology in pedagogy and in the curriculum in order that a better understanding of what is emerging (or shifting) can be achieved.

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