Digital Technologies for Children's Literacy: Users, Contexts, Content and Outcomes

Laura Benton

University College London

London, UK

l.benton@ucl.ac.uk

Asimina Vasalou

University College London

London, UK

a.vasalou@ucl.ac.uk

Elisa Rubegni

University of Lincoln

Lincoln, UK

erubegni@lincoln.ac.uk

Natalia Kucirkova

University College London

London, UK

n.kucirkova@ucl.ac.uk

Wolmet Barendregt

University of Gothenburg

Gothenburg, Sweden

wolmet.barendregt@ait.gu.se

Daniel Gooch

Open University

Milton Keynes, UK

daniel.gooch@open.ac.uk

Abstract

Literacy is an important foundational skill that is acquired in early education. There is a proliferation of digital technologies designed to support children's literacy (DTCL). Yet due to the diversity of pedagogical lenses guiding their design, many questions remain such as: under what conditions do these technologies benefit children's learning? Is there a digital-physical divide when it comes to books? How do we define impacts? The aim of this workshop is to engage with and inform both designers and researchers working in the area of DTCL. We encourage theoretical, critical and pragmatic perspectives that bear on how these technologies are designed, developed and studied. Our goals are i) to consolidate current research and evidence on DTCL, (ii) identify the gaps in this area, and (iii) to map out future actions for planning more impactful research for DTCL.

Author Keywords

Education technology; interaction design; literacy; reading; writing; children; learning; digital readers; children's publishers.

ACM Classification Keywords

K.3.1 [Computers and Education]: Computer Uses in Education – *Computer-assisted instruction*.

Background

Literacy is a necessary skill for learning and participation in social life. Foundations for literacy are acquired in early years and primary school, and are woven into a lifelong engagement with literacy. Yet, many children leave secondary school without the necessary knowledge and practice in reading and writing [10]. While illiteracy is endemic in developing countries, literacy levels have been found low also in developed countries. In England, for example, 25% of young adults have poor literacy compared with an average of only 9% in the top performing countries in Europe [5]. Recognising the importance of securing these foundational skills, in recent years there has been a proliferation of *digital technologies for supporting children's literacy* (DTCL) and accordingly, there is an emerging body of evidence to show how these tools support children's literacy and shape children's learning or motivation (e.g. [9]). The goal of this workshop will be threefold: i) to consolidate current research and evidence on DTCL, (ii) identify the gaps in this area, and (iii) to map out future actions for planning more impactful research for DTCL. Our focus will be on young children acquiring literacy skills - i.e. early readers within primary school.

All of the workshop organisers have first-hand experience in designing and studying the use of digital technologies for children's literacy. Drawing from the challenges we have faced in the design process, as well as the available design and research evidence, we have identified four main priority areas that will guide the workshop.

Whom do we impact and where?
Many of the current DTCL are designed for children. The designer's task is to present appropriate learning materials and scaffold the child's literacy development within the technology e.g. [9]. Yet, literacy learning in the early years is not a solitary activity. Shared book reading is linked to early literacy acquisition, and academic achievement [2]. Co-reading has proved to have an impact on language skills development, especially when adults follow specific pedagogical approaches for engaging children, as described for example in Whitehurst [4]. Moreover, there is evidence to suggest that even when children reach the point where they can read independently, reading with a parent or another child continues to foster child language skills and motivation [6, 9].

Current design tends to focus on the child rather than the social milieu in which reading happens. In addition, there is a bias on the kind of learner targeted. Much of the commercially available DTCL focus on early readers (up to 5 years) supporting them in acquiring pre-literacy skills and early phonics knowledge. One reason for this could be parents' willingness to purchase these technologies for younger children. Another may be the simpler learning domain at this initial stage of reading, which gives way to clear and attainable guidelines for interaction design. However, becoming a skilled reader is not limited to these early ages as it is a complex cognitive process that requires repeated practice. This process becomes all the more complex in light of cognitive profiles that mediate this acquisition process, e.g. dyslexia, as well as socially shaped barriers, e.g.

poor instruction, lack of home learning opportunities, language of instruction different from children's native language. In the workshop, we will critically examine the current focus of digital technology on younger children acquiring literacy, problematize extant definitions of the learner, and identify new learners and contexts that future research could consider.

What is the place and role of technology?
The workshop will consider specific dimensions of one significant DTCL, e-books and digital readers. In examining how physical books may compare to their digital counterparts, related research has often focused on the instrumental dimensions of reading, such as access, efficiency or effectiveness [7]. Despite the longstanding presence of technologies for digital reading, however, statistics show that the digital publishing market has not overtaken sales of *printed physical books*. Furthermore, last year in the UK, physical book sales increased while digital book sales fell [1]. It is thus unlikely that digital technologies will entirely replace non-digital resources for literacy such as books. In the workshop we will identify where digital technologies can offer the most value, the instrumental, pedagogical and experiential dimensions of each mode, the boundaries and synergies between them, and develop new questions regarding the integration of physical-digital in everyday life and in education.

What is the role of industry is shaping the impact of digital tools for literacy?
To engage and motivate children in acquiring literacy skills, DTCL must incorporate appropriate and useful functionality *alongside* high-quality content that is tailored to the cognitive level and interests of the child

[3]. For instance, in the case of children learning to read, schools have made significant investments in a multitude of physical reading schemes especially adapted for fine-grained reading progression. These schemes include levelled content that has been created to include specific word and sentences structures, vocabulary, text complexity and subject matter [8]. The availability of this content in a digital format is patchy and varies significantly between publishers, with schools required to make further investments in content if they want to utilise the support offered by digital technologies such as e-readers [4]. Moreover, digital rights management on this content discourages new digital designers from developing apps for reading given the lack of good content that can accompany these apps. There is much scope for change within the digital publishing industry to meet the needs of educational institutions who provide this content for children. In the workshop, we will identify ways in which interaction designers can influence the potential reforms of these content providers within publishing industry.

What outcomes do we hope for and how do we get there?
The term 'literacy' is open to different interpretations - some researchers associate it with the cognitive skill of reading and writing, others privilege children's motivation and socially-mediated interactions with texts, and yet others consider literacy as a multimodal construct that is most concerned with knowing when and how to act. Recognising this diversity, the workshop will survey current design and research on DTCL to identify the key outcomes of this work. In acknowledging the epistemological origins of these diverse perspectives, we will consider how the field

conceptualises measurement and impact. Following from calls to unpack the interaction design features in how they mediate learning, a secondary goal will be to identify the design principles embedded within each technology and to interrogate the literature evidencing its impact. Our goal is to foreground the interdisciplinary approaches to this problem, which will allow us to identify under-examined impacts and processes leading to an agenda for future research and commercial development.

Organisers

Laura Benton is a Research Fellow at University College London. Based at the UCL Knowledge lab her research focuses on education technology design for children. Laura has worked on multiple projects in the areas of literacy, computing and mathematics where she has looked at ways to support the involvement of both children and teachers in the technology design process. She is currently working on the EU-funded iRead project[1] (personalised adaptive reading apps for primary school children), where she is leading the interaction design of an e-reader for beginning, dyslexic and EFL readers as well as coordinating the pedagogical design of a connected literacy game.

Asimina Vasalou is a Senior Lecturer at the University College London Institute of Education. She worked in the technology design industry for over ten years before entering academia. Her research sits between the social sciences and interaction design, and examines how digital technologies shape the learning and expression for young people and vulnerable populations. She is also currently a coordinator of the iRead project.

Elisa Rubegni is Senior Lecturer at the School of Computer Science of the University of Lincoln, UK. She investigates the sociotechnical issues created by information systems and her agenda is focused on two main topics: ICT to enhance personal and community growth, and children-computer interaction. She has been involved in many projects (national and European) which contribute to understanding the design space for supporting learning activities such as literacy acquisition (education) as well as for creating compelling in-presence interactions in public spaces (community interaction).

Natalia Kucirkova is a Senior Research Fellow at the University College London Institute of Education. Her research concerns innovative ways of supporting children's book reading, digital literacy and exploring the role of personalisation in early years. She developed an award-winning children's app 'Our Story' and has widely published on early literacy and children's technology. Natalia currently leads an ESRC-funded project focused on children's personalised books at the Department of Learning & Leadership.

Wolmet Barendregt is Associate Professor at the Department of Applied Information Technology at the University of Gothenburg in Sweden. Her research focuses on user-centered and participatory design of (educational) technologies for children, such as games and social robots. Currently, she is part of the iRead project where she works on the user-centered design of the literacy games and the e-reader for dyslexic,

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[1] http://www.iread-project.eu

beginning, and EFL readers, involving both teachers and children.

Daniel Gooch is a Lecturer in Computing and Communication at the Open University in the UK. His research interests are motivated by wanting to understand how we can best design technology to fit within, and where necessary change, people's practices and behaviour. He has previously worked as a researcher on the iLearnRW project, which developed tablet-based educational apps to assist children with dyslexia in reading and writing.

Website
Details of the workshop plans and accepted papers will be published here: http://iread-project.eu/tech-for-child-literacy-2018/

Pre-Workshop Plans
The workshop will be advertised through HCI and CCI mailing lists (e.g. British HCI news, ACM SIGCHI, CCI Facebook Page), as well as through the organisers' and program committee's academic professional networks and institutional social media channels. We will invite existing and new contacts from EdTech and children's publishing to give fair representation to academia-industry. We expect to have between 15-20 participants.

A ResearchGate project space will be set up for the workshop. Participants will be asked to add their research papers and those of others in the project, alongside examples of technologies currently available within this space. This will be formative in allowing participants to learn about each other's work, but it will

also engage the broader community of researchers working in this area.

Participants will be asked to submit a 1-2 page paper. We will have three formats: a position paper (presenting a critical examination around one of our key themes to advocate how things ought to be), a research-based review (drawing on the literature to present current impacts and uses of these technologies), or a mini research proposal (presenting a motivation statement toward a new area of research).

Workshop Topics
We will invite academic and practitioner submissions concerned with theories, design and practice. The submission topics should cover DTCL and its relevance to the HCI community, considering one or more questions that address our overarching themes:

- Who are the current beneficiaries of DTCL, and which learners should we be reaching?
- How do we design DTCL for literacy learning that is adult-mediated as well as for users facing socially shaped barriers?
- What are the obstacles within current children's publishing models to new technology development? How can interaction design shape innovation within the children's publishing industry?
- What are the outcomes of current DTCL and are there evidence-based interaction design principles? How do we define and measure 'effectiveness'?

Provisional Program Committee
Below is a provisional list of relevant people that the co-organisers have personal connections with, whom if successful we would aim to involve as participants in the workshop and/or in reviewing the workshop proposals:

- Sole Pera (Boise University)
- Marlene Scardamalia (University of Toronto)
- Maria Kambouri (UCL)
- Kate Howland (University of Sussex)
- Yvonne Griffiths (University of Leeds)
- Kate Cowan (UCL)
- Robert Hendley (University of Birmingham)
- Robert Savage (UCL)
- Yvonne Vezzoli (Università Ca' Foscari Venezia, Venice)
- Monica Landoni (University of Lugano, Switzerland)

Workshop Structure

The workshop will consider the themes we have identified, and emergent themes that will be derived from the submissions. It will be structured around three main questions moving us from an understanding of the field to a future oriented agenda: *Where are we now? Where do we want to go? How will we get there*? Each of the organisers act as the 'faciliator' of a theme with participants rotating tables to make their contributions. The outcome of this will be a working document that is shared within ResearchGate and forms the basis for a journal special issue CfP.

Here is the proposed workshop schedule:

Time	Activities
9:30 – 11:00am	- Introduction to workshop - Short madness-style intros (2-3 mins) from participants - Rotation 1: Small group (4-5 participants) theme discussion activities
Coffee	
11:15 - 12:30pm	- Rotation 2: Small group (4-5 participants) theme discussion activities
Lunch	
1:30pm – 2:30pm	- Rotation 3: Small group (4-5 participants) theme discussion activities
Coffee	
2:45pm – 4:00pm	- Feedback from discussions - Map out future direction - Closing
Post-workshop dinner	

In terms of resources we would require a projector, four flip charts and a classroom style space (with moveable tables).

Post-Workshop Plans

Following the workshop we will organise a special issue in a high-impact journal. One of the workshop organisers (Asimina Vasalou) is associate editor at International Journal of Human-Computer Studies and will approach the journal as a first step. Alternatively, the organisers have previously worked with the

International Journal of Child-Computer Interaction, which would be an alternative venue. Three of the organisers are members of a large EU project on DTCL and will write a blog post about the workshop outcomes to be published on the project website and shared via academic blog sites such as The Conversation. We will also share the position papers and outcomes generated during the workshop on the workshop website, which will continue to remain accessible after the workshop.

Call for Participation

Literacy is a necessary skill for both learning and participation in social life. Acquired in early years and primary school, skilled readers continue to have a lifelong engagement with literacy. Yet, many children leave school without the necessary knowledge and practice in reading and writing. Recognising the importance of securing these foundational skills, in recent years there has been a proliferation of *digital technologies for supporting children's literacy* (DTCL) and accordingly there is an emerging body of evidence to show how these tools shape children's learning or motivation.

We invite academic and practitioner submissions concerned with theories, design and practice within digital technologies for supporting children's literacy in primary school (ages 5-11). Submissions should cover a DTCL and its relevance to the HCI community, considering questions that address our overarching themes:

- Who currently benefits from DTCL, and should we change this?
- How do we design social uses of DTCL?

- How can interaction design collaborate with the children's publishing industry?
- What are the outcomes of current DTCL and are there evidence-based interaction design principles? How do we define and measure 'effectiveness'?

Participants should submit a 1-2 page paper in one of the following formats: a position paper (presenting a critical examination around one of our key themes to advocate how things ought to be), a research-based review (drawing on literature to present current impacts and uses of these technologies), or a mini research proposal (a motivation statement for a new area of research). For further information see our workshop website: http://iread-project.eu/tech-for-child-literacy-2018/

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