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Interdisciplinary perspectives on designing, understanding and evaluating digital technologies for autism

Sarah Parsons, Nicola Yuill, Mark Brosnan and Judith Good

Abstract

Purpose – *Interdisciplinary perspectives and collaboration in technology research are regarded as vital for producing effective and usable solutions that meet real needs. The purpose of this paper is to draw upon the fifth seminar in an Economic and Social Research Council funded series in the UK on “Innovative Technologies for Autism”. This seminar focused on the contributions that different disciplines can make to the field of autism and technology, and offers some interesting avenues for future research.*

Design/methodology/approach – *A synthesis of key messages from the speakers’ talks is presented, interspersed with comments and observations from delegates which were written on post-it notes during the day and shared amongst the group.*

Findings – *Interdisciplinarity can be conceptualised in many different ways and is not simply about academic contributions. Collaborative research involving genuine stakeholder participation can provide fertile grounds for respecting and exploring individual differences and needs. Investigating the uses of existing technologies as well as developing innovative ideas and prototypes through inclusive design are important avenues for future research.*

Originality/value – *This paper offers a rare glimpse into a range of perspectives within a broad field of research and draws out some important connections between these different viewpoints. There are valuable avenues for collaboration and further exploration that would extend research in productive ways.*

Keywords Stakeholders, Technology, Interdisciplinary, Design, Autism, Participatory

Paper type Case study

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Introduction

Interdisciplinarity is often lauded as an important feature of technology development projects because different perspectives and expertise need to be effectively integrated to produce good solutions that are fit for purpose (Beardon *et al.*, 2001; Parsons *et al.*, 2011). Indeed, there is a strong view that many research questions can only be addressed by research teams from a range of disciplines, including, for example, academics, industry, third sector organisations and statutory services. The emphasis on interdisciplinary teams in the research programmes of the European Commission, which are targeted at big societal challenges (Framework 7, Horizon2020), is a good illustration of this. Moreover, commentators have emphasised the value and importance of interdisciplinary research for addressing societal needs in responsible ways in technology development (e.g. Taebi *et al.*, 2014).

However, it is also well established that effective working within interdisciplinary research teams can be difficult to achieve. One of the frequent complaints about interdisciplinary research is that people from different backgrounds (academically, culturally, socially, geographically) can find it difficult to communicate effectively because of a lack of a shared understanding about key concepts and ideas, as well as the often subconscious assumptions and biases that we all have (Thurow *et al.*, 1999). Zancanaro (2012) refers to such difficulties as “constructive misunderstandings” within interdisciplinary research teams, suggesting that such misunderstandings can be helpful if team

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members are willing to reflect on differing views and respond accordingly. Of course, part of the challenge is understanding what those views may be in the first place.

A further question regarding interdisciplinarity is about who should be included as part of the team, i.e. what disciplines should be involved? Traditionally, such questions have focused on academic disciplines but there has been growing awareness about the need to include key community-based stakeholders within research teams in order to ensure a better fit between research and development, and the real needs of everyday users. As we have noted previously (Brosnan *et al.*, 2016), this aim of strengthened participatory research is rooted in important social justice objectives in terms of ensuring that technologies genuinely meet real needs. However, it raises further challenges for technology research such as: who makes the decisions about the research; the extent to which stakeholders are, or wish to be, involved in the research; how the different views from different stakeholders can be integrated; and the ways in which we evaluate the methods, processes and outcomes of engagement in the research.

Our purpose here is not to problematise these questions more than is already the case, but rather to highlight some of the distinctive viewpoints and approaches that different disciplines bring to the field. One of the ways in which we might learn to communicate more effectively is to engage with the different views and perspectives of people from very different disciplines. We draw upon discussions from the fifth seminar in an ESRC-funded series focusing on “innovative technologies for autism” in the UK to highlight and discuss some of these different perspectives (see also Parsons, Yuill, Brosnan and Good, 2015; Yuill *et al.*, 2015; Brosnan *et al.*, 2016; Good *et al.*, 2016), with the aim of identifying some fruitful avenues for future research.

Stop thinking about what you are and more about what you can do!

There was general agreement at the seminar that interdisciplinary work is difficult to do but that there are also many benefits to trying. Yvonne Rogers, Director of the Interaction Centre at University College London, reminded us to try to focus on the aims and planned outcomes of the research rather than allowing individual disciplinary allegiances to dominate discussion and planning. That is not to say that expertise from different perspectives is not valuable and important, but that researchers need to learn to share expertise in ways that enable the processes and outcomes of research to be achieved. This was an important message that resonated throughout the day as we started to think about the range of perspectives that need to be considered within interdisciplinary teams and how people can contribute different skills and expertise.

Rogers provided examples from some of her work that encourages children to explore and experiment with different technologies. For example, the Ambient Wood project provided technological tools to inspire children on a field trip to measure, record and answer questions about their environment, and indeed themselves. The technology guided children’s attention, prompted sharing of tools, led to playful interactions, hypothesis generation and wonderment, in ways that children remembered long after the event (Price and Rogers, 2004). Although not focused on children with autism, there were some important take-home messages from this presentation, specifically, the potential for encouraging children to “look up and outwards” by using technologies as tools that promote communication, collaboration and sharing. Rogers suggested that reframing interdisciplinarity as collaborative research is helpful, because it enables us to think about things in different ways and discover new ideas.

Empathic design and authentic problems

As well as considering differences between disciplines in research we also need to consider differences between individuals. The very individual nature of experiences, and the tremendous diversity of needs in the population generally, was emphasised by Ian Hosking from the University of Cambridge, who discussed inclusive design approaches from an Engineering perspective. Hosking talked about the need for “empathic engineering”, which places user experiences and needs at the heart of the design. He presented an inclusive design

toolkit (University of Cambridge, 2015) which encourages designers to consider three main questions:

1. What is the need (that needs to be met)?
2. How can the needs be met?
3. How well are the needs met?

Hosking suggested that starting with the needs of the users is a way to make sure that designers are tackling authentic problems. Comments from audience members provided a good reminder about the complexity of trying to specify “the problems” and who needs to be involved in solving them:

[...]we need to avoid simplistic interpretations of what the “difficulties” or “problems” are – this is where interdisciplinarity is so important[...].

[...]we should include insights from the autistic community when designing in order to make design more inclusive[...].

Hosking asked the question whether it was possible to design an autism simulation so that people without autism could understand more about what it was like to be autistic. This created a great deal of discussion and questioning from the delegates, for example:

[...]how to design for a different mind?

[...]is it possible to simulate the autistic experience? Would we be better asking autistic people about their experiences?

[...]we need a] strengths based approach to (dis)ability to change outlook to design and simulation[...].

[...]individual nature of autism – how can we use technology to meet the individual needs of every child with autism in practice?

Interestingly, the National Autistic Society in the UK has begun to tackle such questions through their “Too Much Information” project (National Autistic Society (NAS), 2016) which includes a virtual reality film that provides experiential insights into the nature of sensory overload in everyday life for some people on the autism spectrum. The project also includes a film that illustrates what it might be like for someone with autism to experience a job interview. The project has been incredibly successful in terms of attracting media attention and millions of views and downloads (NAS, 2016), thereby helping to raise awareness of precisely the kinds of things debated by the speakers and audience at the seminar. Another fruitful direction for future research, therefore, could be to focus on the development and application of technologies for people without autism to understand more about the experiences and perspectives of people with autism. Of course, as one of the delegates emphasised:

[...]what is autism like? Avoiding the stereotypical things. Avoiding tokenism. Variety of autistic opinion [is important].

In other words, while it may be possible to provide some insights into autistic experiences by projects like “Too Much Information” (NAS, 2016) we must always be mindful not to over-interpret or generalise from these insights to assume that this is how most people with autism may experience the world.

Technology-enhanced pedagogies

One way of helping us to understand more about the use of technology in practice and how it can be tailored to meet individual needs, is to involve more children and teachers in research. Karen Guldborg, from the Autism Centre for Education and Research at the University of Birmingham, emphasised the tendency for autism research to focus on “knowledge transfer”, without necessarily involving schools or teachers in the development of technology-enhanced learning. The knowledge transfer model makes assumptions about where expertise lies, i.e. with the researchers, rather than with practitioners and others within the autism community (ESRC, n.d.), and so juxtaposes strongly with questions from the audience regarding who sets the agenda, defines the research problem, and is part of the decision-making about the potential solutions of technology-enhanced learning in autism. Indeed, one of Guldborg’s main concluding messages was that “[...] teachers need to be designing new technology-enhanced pedagogies”, reflecting the lack of teacher involvement in the field more widely.

Guldberg provided an example of her research from the Shape project (University of Birmingham, 2016) which involved working with teachers, and children with autism, to co-construct a much more contextualised understanding of using technologies in the classroom through the creation of digital stories. This methodology enabled teachers to reflect on their own and others' practices, as well as children's perspectives and responses when using the technologies. Being able to construct and examine the digital stories provided practitioners with insights into practices and behaviours, as well as opportunities to reflect on some of their own assumptions, in ways that would have been difficult to achieve otherwise (Guldberg *et al.*, in press). Methodologically, it was the joint construction of the digital stories between researchers and practitioners (albeit in different ways) that provided a creative and reflective space for identifying the practices and pedagogies that enabled children's engagement and learning (Parsons, Guldberg, Porayska-Pomsta and Lee, 2015). As Guldberg stated, this project showed that technology-enhanced learning (for children with autism) is:

[...]as much about how we can use technology to help us evidence and support practice as it is about looking at what children actually do with the technologies.

This reflects the importance of examining and supporting the processes of participation and engagement in the design and use of technologies as much as the eventual learning outcomes that may be demonstrated by students (Brosnan *et al.*, 2016). The methodology used in the Shape project could be a very valuable approach for examining technology-related practices in schools and in other contexts in order to strengthen practitioner involvement in the creation and critique of evidence-based practices.

Stealth show and tell

In addition to considering stakeholders in terms of different academic disciplines, and individual differences, we learned that it is also important to remember that children and young people – as primary users of technology – are also doing their own research on topics of interest to them. Rachel Thomson from the University of Sussex showcased children's everyday experiences of, and perspectives about, digital technology use from a sociological point of view. She drew upon the Curating Childhoods project (University of Sussex, 2016) which uses a range of interesting and creative methodologies to provide rich insights into (non-autistic) children's everyday lives (Berriman and Thomson, 2014). Thomson emphasised that children are doing their own research, via digital technologies and social media, a lot of the time and pursue their own interests and obsessions in this way. She commented that there is an "incitement to research built into digital tools" which could be harnessed much more effectively to reveal how children are using technology, and for what purposes.

This can be very motivating for children and young people as a way of finding out about topics of interest but also in terms of building valued identities and social networks. Thomson's work encouraged young people to collate information relating to their topics of interest, which she likened to a "stealth show and tell, providing insights into identity and interests via personal (online) research". What was clear from Thomson's work was the power of this kind of approach for gaining insights into children's relationships with digital technologies and with each other. It was also very clear that there is a lack of research that seeks to understand the lived experiences of autistic children and young people through their own, personal, digital lenses. Importantly, this framing of the place of digital technologies in research focused on everyday technologies already in use as tools for exploring interests, identities, friendships, participation and voice. Such a grounded framing contrasts markedly with the more top-down approaches to designing, delivering and evaluating novel technologies that tend to dominate the field of autism and technology. Therefore, these more longitudinal and ethnographic approaches to understanding the role of digital technologies in (autistic) children's lives offer valuable ways for researching "authentic problems" in everyday contexts.

Conclusions

Interdisciplinary perspectives on the autism and technology field can inform our research approaches and outcomes in many meaningful ways. Of note through the research presented by our speakers

were the aspects that connected their diverse disciplines. In particular, processes, pedagogies and practices featured across the talks and were discussed in different ways. At the heart of the dilemma of how to do authentic research that addresses authentic problems in the autism and technology field lies the interconnected influences of power and the personal. For example, an important point was raised by one of the teachers in the audience who noted that as well as recognising the different academic disciplines and stakeholders who may be involved, we also need to:

[...]value the interdisciplinary nature of the class – each child has their own strengths and skills[...].

This is a helpful reminder that interdisciplinary considerations in research are usually couched in terms of the expertise and backgrounds of the academic partners involved, and rarely in terms of the backgrounds and experience of the potential end-users. Moreover, when we consider the “users” or “stakeholders” within projects we must avoid assumptions about homogeneity and the temptation to draw more general conclusions from their involvement. Instead, it is worth reflecting on the extent to which participatory design approaches are doing enough to recognise and include the varied expertise and interests of stakeholders. We must find ways to create and share power in research in more equitable ways, and to value the very personal and individual perspectives that all stakeholders bring to the table.

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