

Institution: University of Central Lancashire		
Unit of Assessment: UoA 11 Computer Sciences		
Title of case study: <u>Giving children and young people a voice in the creation of mobile apps and games.</u>		
Period when the underpinning research was undertaken:		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g., job title):	Period(s) employed by submitting HEI:
Prof Janet Read	Professor	December 1998 to date
Gavin Sim	Reader	April 2002 to date
Daniel Fitton	Reader	Sept 2009 to date
Peggy Gregory	Senior Lecturer	January 1999 to date
Matt Horton	Lecturer	October 2013 to date
Period when the claimed impact occurred: 2014 - 2020		
Is this case study continued from a case study submitted in 2014? N/A no submission in 2014		
1. Summary of the impact (indicative maximum 100 words)		
<p>The University's Child Computer Interaction (ChiCI) Group engages in pioneering research involving children in software design. It aims to address imbalances in respect to their participation in the creation of new IT products. The IT industry considers the participation of users desirable, however, because of expense it is often avoided and the use of children as participants is a rare occurrence. Our research uses inclusive methods to engage children in the UK and across the globe in innovative, collaborative and participatory design processes. This helps to raise the children's career aspirations, gives them a better understanding and awareness of the software design/computer game industry and gives them a voice in the design of mobile apps and games. As a result of our work, the formal policy for the inclusion of children in participatory design, used by the Interaction Design and Children (IDC) community, has changed. This change has ethically informed and safeguarded children from commercial exploitation, benefitted the industry and enabled children to enjoy better software products.</p>		
2. Underpinning research (indicative maximum 500 words)		
<p>The IT sector is a global market, and it is therefore important to get feedback from all users for the industry to develop and for users to be comprehensively represented. Our aim is to enable children, nationally and internationally, to be inclusively and ethically involved in the design of mobile apps and games. On this basis, our research is all open access so that both industry and users can benefit from our focus.</p> <p>We use Participatory Design (PD) approaches (as these are known to be effective in Computer Science to ensure users' needs are met) to facilitate this inclusive involvement. In 2002 our research employed Participatory Design in a new way when we facilitated and collaborated with a class of thirty school children to design a website for their school. In this project, we investigated, using surveys, retrospectives and observations, the effects of power imbalances alongside the communication and design skills of both the children and the adults. This positioned inclusivity at the heart of the project. This was one of the first uses of Participatory Design with children where an end product was developed [1]. The work raised questions about how to empower children in software development events so that they could be inclusively involved. The desired outcome of such empowerment is that both children, and the industry itself, can gain mutual benefit.</p> <p>Since 2010, with some intervening papers examining design methods, and with funding from the EPSRC, we have been involved in a critical debate about the effectiveness of Participatory Design with children considering both methods and contexts.</p>		

Methodologically we have fully engaged with the ethical application of Participatory Design practices with children. The main challenge here was how best to convey to children the importance and the relevance of the permissions they had granted as part of the consent process. This is more than just obtaining consent from schools or parents it is importantly, about the children being able to comprehend how their data is used and how their participation might result in real-world applications.

Read et al.,’s 2014 paper applied an empirical study to ideas generated by a large number of children, to propose a democratic approach towards the inclusion of design ideas based on two models [2]. In model one teams of children produce design ideas and each team selects one design to go forward for a ‘vote off’ final selection process. In model two all the designs from each team are included in the ‘vote off’ ensuring that no ideas are lost. This was followed by a 2016 research paper that empirically developed an approach that merged ideas from both adults and children [3]. This approach ensured the inclusion of the children, but also gave them accountability in the process. It enabled children to understand how their contributions became included in the product and thus they felt valued, enjoying a sense of responsibility within the design process. These two works have sparked debate within the Interaction Design and Children (IDC) community resulting in an annual ethics panel becoming a statutory feature of the Interaction Design and Children international conference since 2014 [A, B].

A further facet to our work involves investigating methods to include children from outside the UK. Several of our papers have considered cultural concerns in Participatory Design and highlighted the challenges of having children in the UK develop games for children from different countries. This work, which included a field trip to Uganda to test out UK-based ideas, helped to change how the Interaction Design and Children (IDC) community thought about designing for children from Low and Middle-Income Countries (LMICs) [4]. In particular, it highlighted that children could not effectively attend to the design of content as well as the context of a different culture. Thus, the paper provided essential evidence that children in other countries had to be contributors so as to create greater involvement with the product. This paper became part of a movement termed ‘Human Computer Interaction for the Developing World’ (HCI4D) and in 2013 Read helped to launch the theme of ‘HCI for Kids’ at the Computer Human Interaction (CHI) Conference in Paris. In the IDC community HCI4D is now being known as ‘Digital Development.’

In our work on designing with children we have also sought to examine the contexts that are appropriate to them. The project Research on Designing Cool Technologies for Young Teens [5] was funded by the EPSRC and was pioneering in considering specific design requirements for teenagers. This age group had been considered difficult to work with because of challenges of access, and the notion that their personal world can be secretive. The research provided designers with dimensions and keywords for ‘cool’ from a design requirement perspective rather than a marketing standpoint. For instance, ‘cool’ products could allow users to ‘rebel’ in the sense of being able to exclude adults. Alternatively, a ‘cool’ item might also be desirable because it represents authenticity owing to its high quality. It may also be ‘cool’ because it has ‘retro’ appeal through evoking some sense of personal or collective nostalgia. ‘Cool’ could also be innovative by appropriating technologies in novel ways and contexts. ‘Cool’ also means that the product is aesthetically attractive [5].

Other work on contexts has focussed on the places where children may use technology. Our work is based on creating effective designs for wellbeing and outdoor activity. Research by Cheverst and Fitton in 2017 developed a framework for building engaging outdoor mobile systems following field testing and using an iterative approach [6].

3. References to the research (indicative maximum of six references)

1. Read, J., Gregory, P., MacFarlane, S., McManus, B., Gray, P. & Patel, R. (2002). ‘An investigation of participatory design with children-informant, balanced and facilitated design.’ *Interaction Design and Children*.

https://www.academia.edu/download/3433840/An_Investigation_of_Participatory_Design_With_Children-Informant_Balanced_and_Facilitated_Design.pdf

2. Read, J., Fitton, D. and Horton, M. (2014) 'Giving Ideas an Equal Chance: Inclusion and Representation,' in *Participatory Design with Children*. In: IDC2014, 105-114.

<https://doi.org/10.1145/2593968.2593986>

3. Read, J., Fitton, D., Sim, G. and Horton, M. (2016) 'How Ideas make it through to Designs: Process and Practice In: *NordiCHI 2016*, October 23 - 27, 2016, Gothenburg, Sweden.

<https://doi.org/10.1145/2971485.2971560>

4. Sim, G., Read, J., Gregory, P. and Xu, D. (2014) 'From England to Uganda: Children Designing and Evaluating Serious Games.' *Human-Computer Interaction*, 30 (3-4). pp. 263-293. ISSN 0737-0024. <https://doi.org/10.1080/07370024.2014.984034>

5. Read, J., Fitton, D., Cowan, B., Beale, R., Guo, Y. and Horton, M. (2011) 'Understanding and designing cool technologies for teenagers.' In: CHI EA '11 CHI '11 Extended Abstracts on Human Factors in Computing Systems. Association for Computing Machinery, New York, NY, USA, pp. 1567-1572. <https://doi.org/10.1145/1979742.1979809>

6. Cheverst, K., Turner, H., Do, T. and Fitton, D. (2017) 'Supporting the consumption and co-authoring of locative media experiences for a rural village community: design and field trial evaluation of the SHARC2.0 framework.' *Multimedia Tools and Applications*, 76 (4). pp. 5243-5274. <https://doi.org/10.1007/s11042-016-3515-y>

All outputs are peer reviewed.

4. Details of the impact (indicative maximum 750 words)

Impact on Policy

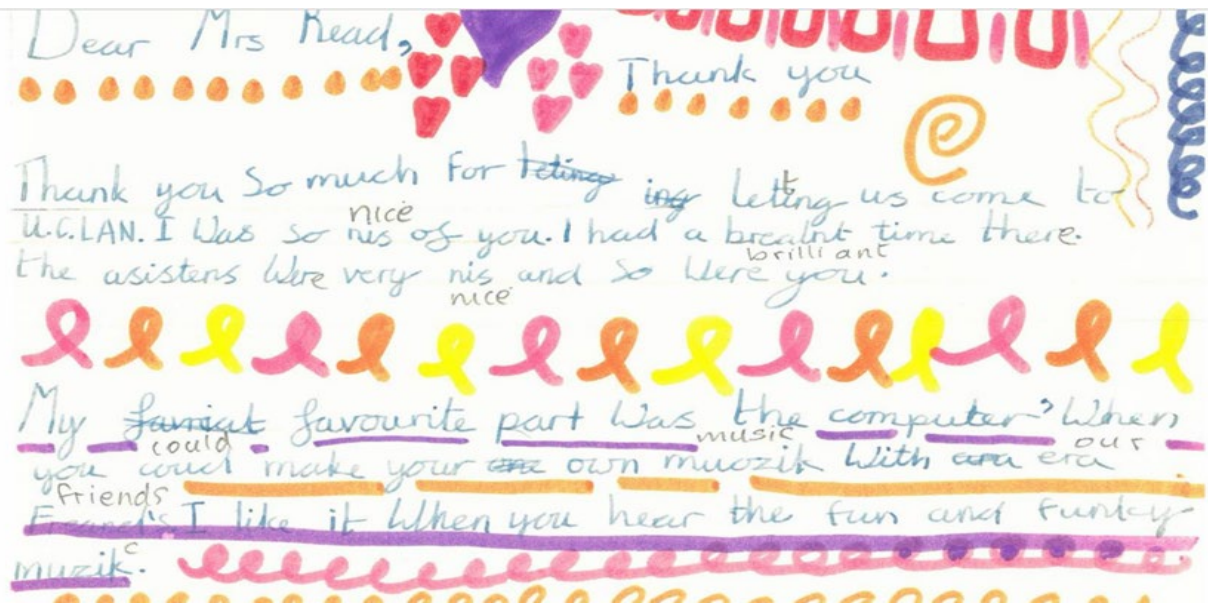
The Association for Computing Machinery (ACM) conference for Interaction Design and Children (IDC) changed its publication policy as a result of our research and guidance. Prior to this there was no formal requirement to state the ethical practices within research papers involving Interaction Design with children. As a result, new guidelines have been incorporated into the conference from 2016. All researchers must now describe how ethical permission was obtained and papers can be rejected based on missing data around the participation of children in research [B]. Submitted papers must have a section entitled 'Selection and Participation of Children' and will be rejected if this is omitted. This has influenced the behaviour of researchers around the globe working within the area of Child Computer Interaction. The former Chair of the ACM IDC conference series (2016 – 2018) Prof Ole Sejer Iversen said: **“As introducing ethics as a concern in Child-Computer Interaction, the ChiCI group pioneered our understanding of the fundamental ethics of doing research with children. This included ... an ethics section in all international research papers submitted to the ACM IDC conference from 2016 and onward.”** [A, B]

Giving Children a Voice in the UK and Worldwide

Article 12 of the UN Convention on the Rights of the Child (UNCRC) states that '[e]very child has the right to express their views, feelings and wishes in all matters affecting them, and to have their views considered and taken seriously.' Our research has enabled both industry and young people to become engaged with each other in the design of computer games and apps created for their use. Our impact emerged from giving a voice to children and young people allowing them to contribute to the creative sector through participation in the design of computer games and apps. Such engagement provided them with a greater understanding of usability issues and stimulated their career aspirations. The ChiCI group have been working with National Curriculum KS2 children in local schools. Alan Brindle, Headteacher of Heskin Pemberton's C of E VA Primary School, Chorley states: **“The children can take a pride in the fact that their opinions and input have had an impact on important studies and research in such an important field.”** The children **“had benefitted in a number of ways,”** and Brindle goes on to say **“Working with the latest technology enables our children to make clear links between their computing curriculum ... and 'real life' applications.”** [C]

Young children are also invited into the university for 'MESS days' (Mad Evaluation Sessions with Schoolchildren). Children take part in activities that typically include evaluations of products,

design sessions, small research studies, and purely fun activities. The MESS day epitomizes our approach to research and interaction design with children. It should be messy, inclusive, fun, fast paced and constantly refreshing. One child from All Saints year 4/5 produced a highly decorative letter of thanks [D]:



As a result of our visits and MESS days, schools have described a subsequent effect on children's aspirations as David Bradshaw Computing Coordinator for St Anne's Catholic Primary School comments: **"It is easy for the children to make clear links between their interests in computing and future educational and vocational pathways."** [E] Joe Dryland, Head Teacher for Kirkham St Michael's Primary School said that, **"Working with well-respected academics had heightened our profile, despite being a primary school, as a seat of learning and education. Our school is seen as a proactive establishment in adopting technology and immersing young children in the possibilities that it provides."** [F]

Raising aspirations and worldwide collaboration with children

Complying with Article 12 of the UNCRC is an ethical and moral imperative for the IT industry across the world. Ole Sejer Iversen notes the international aspect of the ChiCI team's impact: **"Janet Read and her team ... have had a remarkable impact on the international child-computer interaction research since 2003. They were some of the first researchers to study and report on how children were actively engaged in the design of digital technology, and to state that children should have a voice in the design of children's' technology. Their research has provided novel prototypes, methods and techniques that has been recognized world-wide."** [A]

By involving children in participatory design, we can raise quite young children's aspirations and increase their cultural engagement and understanding. St Anne's Catholic Primary School, Leyland commented that the visit by the ChiCI group provided **'clear information about career options in computing,'** and furthermore they were: **"Giving the children the opportunity to experience using new equipment and technology and the chance to discuss the real-life application of developing technologies. Often the children in our school are end-users of technology and the ... visits help to get them to think about how technology can be developed to serve a purpose rather than just to be consumed"** [E].

A series of STEM enrichment activities in Clitheroe, Kirkham, Kuala Lumpur, Dubai, Hanoi and Mumbai, working with children aged 5-14, have led to the design of the Stones app. Stones is a project funded by the University of Central Lancashire to develop a mobile game suitable for children from all corners of the world to play. What is novel about the Stones project is that the ChiCI research team gathered design ideas for this game from children across the globe. The

aim was to encourage outdoor activity, creative play and to facilitate an imaginative adoption of the app. The game also needed to be sustainable from an environmental point of view, and accessible to children regardless of their location and technology. Joe Dryland commented that, **“From the perspective of the children, the benefits to their learning has been huge. Very few children would ever get the opportunity to develop APPs for children in other countries or support the development of future technology.”** [F]

Our research on ‘Cool’ and mobile design influenced the design of the Stones app to be effective and attractive to young people. The app provided a pathway for children to move from solitary indoor activities on mobile devices to outdoor face-to-face play with other children. Surveys carried out before and after the design sessions have shown that children are empowered by participation and their aspirations were raised. Collectively, we engaged with many children in participatory design. We met with children in the UK, Iceland, United Arab Emirates, USA, Malaysia and India, all of whom helped collaboratively contribute to the design of Stones. All the children who participated in the design sessions were invited to visit the Stones website where they could comment on the work to date. A boy aged 8 said: **“I really enjoyed the day and it is great that my ideas have been included in a game. I did not think i could help make a game for children like me.”** A girl aged 9 said, **“It is good that my idea is looked at and included in a game. I did not think children help make games.”** [G]

Assisted by our research publications in this area [4], professionals and organisations have adapted to changing cultural values within the HCI (Human Computer Interaction) environment. One example of this is the development of the Human Computer Interaction for Development (HCI4D) community. Within the HCI4D agenda, Sim and Read have continued to work and contribute to capacity building across Asia. For example, Sim in 2020 was part of the student design consortium for India HCI, setting the theme for the competition and judging students work. Whilst Read has also promoted CCI methods in Indonesia to academics and industry practitioners at several ACM UX Indonesia events. [H]. Dr Eunice Sari, CEO and Co-Founder of UX Indonesia comments: **“Prof. Read has been an instrumental part of the HCI and UX community in Indonesia. Her method of design for the minor, i.e., children and aging people, is inspirational. Her down-to-earth and creative design thinking approach to work with the end-users has bridged a lot of gaps in getting the best insights from the minor users to design new solutions to improve quality of life. Her research is very unique and pivotal especially during the Covid-19 pandemic as she brilliantly mixes the fields of HCI, education, and design to solve problems.”** [I]

The Covid-19 pandemic has disrupted the international work that we planned in 2020 preventing us from completing our work in the ways we had intended. We have engaged with over 500 children and young people in both developed and developing countries but, because of the ban on travel, it has been difficult to complete the circle with the children in the ways we would have liked to. Robust evaluations of the impact of our engagement have not been possible with schools and communications being so disrupted.

5. Sources to corroborate the impact (indicative maximum of 10 references)

- A. Email testimony from former Chair of ACM IDC conference series (2016 – 2018) Professor Ole Sejer Iversen, Aarhus University, Denmark
- B. IDC call for full and short papers with ethical guidelines instructions
- C. Letter from Heskin Pemberton’s C of E VA Primary School Chorley
- D. letter from child attending University of Central Lancashire MESS day 19/3/20
- E. Testimonial letter from David Bradshaw, Computing Coordinator, St Anne’s Catholic Primary School, Leyland
- F. Testimonial from Kirkham St Michael’s School
- G. Feedback from participants in Stones project
- H. Gavin Sim conference facilitation Indonesia – poster
- I. Testimonial from Eunice Sari CEO and Co-Founder of UX Indonesia