Young HCI: Promoting Disability and Accessibility Awareness Among Young People

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1 Introduction

Accessibility and inclusion are salient topics in Human-Computer Interaction (HCI) research. Over the last decade, there has been a steady growth of research on accessibility and assistive technology (AT) design [5]. Similarly, application of participatory and co-design methods have seen a similar trajectory. Several publications have involved participation of people with disabilities, including adults and children to understand lived experiences and inform AT design. Research has involved co-designing technology and experiences with participants with and without disabilities. For example, research in inclusive schools [6, 8] has shown that disability exposure and learning, inclusive play and collaboration among disabled and non-disabled peers promotes knowledge sharing and understanding of disability.

Inclusive co-design, play and participatory approaches are effective tools to increase social interaction among children with mixed abilities and empower disabled children in schools [7]. However, these opportunities are still rare. Additionally, the perceptions of non-disabled children and young people about disability remain under-explored in HCI. A recent report by the Royal National Institute of Blind People (RNIB) [3] found that young adults, aged 16 to 24, avoid interaction with disabled people and generally hold an overall negative perception of disabled people in terms of social interaction, education, and financial independence. The report also highlighted that opportunities for interaction help build understanding and empathy; leading to positive attitudes towards disabled people.

In this paper, we present three case studies showcasing activities designed to engage children and young people of ages from 11 year and above in HCI and to learn about disability and AT.

2 Case Studies

2.1 Case Study 1: ICT and Accessibility Bootcamp for 12 - 16 year olds

We designed an ICT and Accessibility Bootcamp training for children and young people to learn about emerging ICT topics and engage in discussions about applications of ICT for disabled people. Twelve students (10 girls and 2 boys)

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Fig. 1. Snapshots from the bootcamp showing students interacting with AI and Mixed-Reality technology

aged 12 - 17 years participated in the week-long bootcamp, which comprised a diverse range of topics, including 3D Making, Physical Computing, Artificial Intelligence, and Mixed-Reality.

We conducted a screening survey with the participants before the bootcamp to assess their understanding of ICT topics and level of confidence. The participants rated having the highest level of confidence in programming (3.42 out of 5) and least in physical computing (1.75). AI and 3D Making and Printing was rated at 2.67 and AR/VR was rated at 2.33.

Based on this knowledge, we designed the curriculum to focus more on the topics in which the participants were least confident and integrated programming and coding into physical computing to scaffold the learning of the new physical computing concepts and skills.

The bootcamp ran for four-days and consisted of three main elements; (1) tutorial, (2) instructor-led hands-on activity, and (3) Do-it-yourself activity. These elements were designed to onboard the participants to new topics, apply the new knowledge through instructor-led practical activities, and inspire them to extend this knowledge and apply their skills in diverse and personalised contexts. The bootcamp schedule was as follows:

- Day 1 - Introduction to 3D Fabrication and its applications
- Day 2 - Introduction Prototyping with Raspberry Pi
- Day 3 - AI in everyday life: AI ethics, fairness, and bias
- Day 4 - Introduction to augmented and virtual reality and Designing with Mobile AR
- Day 5 - Visit to Google Accessibility Discovery Centre

A core component of the bootcamp was collaborative projects, which encouraged students to work in teams to solve problems and create projects. This setting was instrumental in teaching valuable soft skills such as communication, teamwork, and leadership. Observing the students, it was evident how collaborative learning fostered a sense of community and mutual respect. Moreover, it was interesting to see how problem-solving dynamics evolved; students often took different roles within teams, showcasing diverse thinking and approaches to challenges.

The bootcamp concluded with students presenting their projects, reflecting on their learning journey, and discussing the potential impact of ICT on their futures. This session was particularly impactful, providing insights into the students' perceptions and aspirations. Many expressed a newfound interest in pursuing careers in technology, while others discussed the societal impacts of digital advancements.

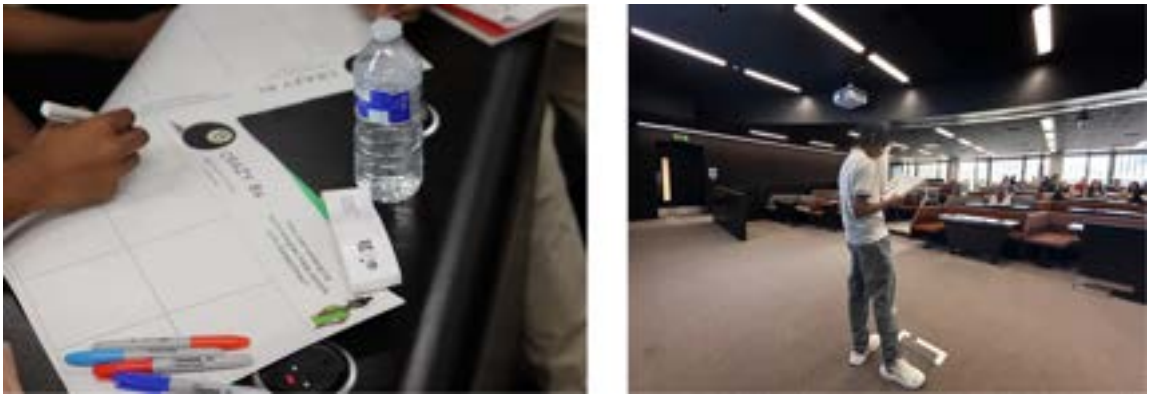

Fig. 2. Snapshots from the STEM workshop showing students brainstorming using the Crazy 8 toolkit and presenting their ideas

2.2 Case Study 2: Disability Innovation workshop for 17 - 19 year olds

The second case study was the design and delivery of an ideation workshop with 26 A-level students from minority ethnic backgrounds in east London as part of the UCL STEM Summer School [ref]. The workshop began with an overview of the medical and social models of disability, engaging in thoughtful discussions on the challenges that face disabled people globally and the need for disability-inclusive policy-making and implementation of the UN Conventions of the Rights of Persons with Disabilities. The workshop encouraged students to consider the intersection of technology and disability, stressing the importance of meeting the diverse needs of disabled communities.

The students participated in interactive group activities to brainstorm and present ideas using the Crazy 8s and Elevator Pitch techniques, often used in design-thinking and user-centred design approaches. The workshop aimed to encourage students to consider the intersection of technology and disability, stressing the importance of meeting the diverse needs of disabled communities. Through idea generation, the students gained a deeper understanding of technology's impact on the lives of disabled people and the need for leveraging technology to bridge the gap between ability and disability to promote a more inclusive society. The participants worked in groups and individually to generate eight ideas in 16 minutes, each addressing the question "how can emerging technologies help people with disabilities?"

The ideas generated by the students built on the earlier discussions and combined their STEM knowledge and personal experiences of having friends and family members with a disability or long-term health conditions. The ideas generated by the students centred around the use of internet of things (IoT) and ubiquitous technologies with the principles of universal design to create accessible and assistive systems that can aid people with and without disabilities alike. For example, improving accessibility of the home environment through connected IoT home equipment and devices and improving access to information and built environment accessibility to remove barriers to transport for people with disabilities.

At the end of the workshops, the students demonstrated a greater understanding of disability rights and the role of governments and regulatory bodies in promoting accessibility, the barriers experienced by people with disabilities and the need for universal and accessible design.

Fig. 3. Snapshots from the exhibition showing students interacting with the accessible gaming station using Microsoft Adaptive Controller and Tobii eye tracker

2.3 Case Study 3: Co-designing the 'Evolution of AT Exhibition'

We worked with four secondary school students aged 16-18 years to design an exhibition on the history and evolution of assistive technology. The students (1 female and 3 male) were from minority ethnic backgrounds and had lived experiences of long-term health conditions and disability. The students worked on the team for 2 weeks during which they researched, conceptualised and designed the materials and outputs. As part of the research, the students also interviewed older adults with visual impairments about their lived experiences and use of technology in their daily lives.

The exhibition was attended by over 100 people from diverse age groups and backgrounds, including staff and students from east London schools, staff and students from across UCL, local council members and residents. Displays included the invention of hearing and visual aids, visual impairment simulation glasses, 3D printed EdTech, Mobile phones as assistive technology, Upper and lower-limb prosthetics, AR for neurosurgery and dementia care, Brain-computer interfaces for mental health and well-being, Accessible and assistive technologies for gaming, and DIY 3D printing AT.

We asked the attendees for their feedback on the exhibition. The average overall satisfaction rating was 4.71 and enjoyed the "interactive aspect", "knowledge-sharing", "topic relevance", and "fun experience". When asked how the experience could be improved, the attendees suggested adding a "more engaging introduction", and "showcasing more technologies". The majority of the participants (88%) agreed that the topic was relevant and they would be interested in participating in a similar activity again. The responses also achieved a net promoter score (NPS) of 71%, recognising that the attendees found the exhibition interesting and would recommend it to others.

3 Lessons Learned

3.1 Opportunities for Disability and Accessibility Awareness

One of the key findings from the above activities was the absence of discussions around disability and accessibility in schools. Many participants had very little knowledge of disability and assistive technology due to the lack of exposure in schools and personal experiences with people with disabilities.

Schools in the UK have made efforts to improve communication among hearing and deaf pupils [1], including offering British Sign Language (BSL) in primary schools as an additional language alongside Spanish and French [1, 4]. However, the implementation of such initiatives is rare and inconsistent across the country; therefore, many children and young people don't have access to these skills. Particularly, children from minority and ethnic backgrounds and from less

affluent areas suffer the most due to the risk of funding cuts [2] and restricted special education needs and disabilities (SEND).

Therefore, we conclude that children of all ages need opportunities to learn about disability and to have open and meaningful discussions to help create awareness about accessibility and understanding of the lived experiences.

3.2 Building Inter-generational Interaction

Young people who had opportunities to interact with blind and partially sighted older adults achieved a deeper understanding of BPS people's lived experiences and had much stronger positive perceptions of people with disabilities. Additionally, these engagements often led to an increased sense of social responsibility and a sense of purpose to create awareness about visual impairment and sharing the lived experiences of BPS people among their peers. They also felt inspired by the independence of BPS individuals and expressed a commitment to advocating for greater accessibility and support for people with disabilities. Similarly, the BPS older adults they interviewed also appreciated the young people's interest in disability and openly shared their experiences. This positive feedback loop nurtured the young people's motivation to pursue more initiatives that enhance the quality of life for people with disabilities.

3.3 Bridging the Gap Between Research and Education

Through these community engagement activities, we were able to bring together children and young people, researchers, educators, disabled lived experience experts, and the general public to address the lack of awareness about disability and assistive technology. Seeing the impact of these activities, participants reported a significant shift in their understanding and perceptions of disability. Children and young people expressed increased empathy and a desire to advocate for inclusion in their schools and communities. Researchers and educators discovered new perspectives and practical insights by collaborating people with disabilities and young people, enriching their future work and teaching approaches.

Many participants noted that these interactions fostered a greater appreciation for the role of assistive technology in empowering people with disabilities to live more independent and fulfilling lives. They also recognised the potential for AT to bridge accessibility gaps in society. As a result, there was a shared sense of commitment to continue these dialogues, deepen community collaborations, and explore new avenues to promote inclusion and innovation in assistive technology.

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