Making Science Accessible: A Co-design of Non-visual Representations for Visually Impaired Students

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Summary

Students with visual impairments typically lack access to images in standard science textbooks and are under-represented in STEM subjects. The perception of tactile images is an important skill for individuals who are blind (Thompson et al., 2006). Typically images are translated to text descriptions for "equal" access; however this is a sub-optimal solution because translation of images to text results in the loss of the spatial properties of the depicted objects or events (Coppin, 2015). Given that a traditional scientific textbook contains over 500 images (Ladner et al., 2005); this can hamper the learning outcomes of students without access to visual images. In effect, the recognition of such representations may be less accurate and slower for blind students than the original representations are for the sighted. It has long been said that true experience and knowledge comes from first-hand accounts. From a scientific point of view, self-reports are limited in that they are dependent on an individual's honesty and awareness of what affects their experience. On the other hand first-hand accounts can provide insights into the lived experiences of participants that may not be captured by an objective study. First-hand accounts can be a good starting point for research which will complement the more objective viewpoints. In the proposed tutorial we will use insights from cognitive science and the lived experiences of students with visual impairment to co-design accessible representations. Co-design is a well-established method in which participants with lived experiences are actively engaged in the design process. The tutorial will address accessibility challenges related to educational materials used in the field of psychology, neuroscience and statistics through the following learning objectives (1) to promote a deeper understanding of the challenges faced by blind learners; (2) to co-design accessible cross-sensory models with blind students; and (3) to develop strategies for improving access to scientific content and inclusion in classrooms.

The tutorial will begin with a 30 minute introduction of current research being conducted around inclusive strategies and the accessibility challenges of blind learners in the field of psychology and STEM education. This will be followed by a 20 minute introduction of inclusive design and the Seven Principles of Universal Design (Story, 1998). These approaches to design will inform the strategies that will be implemented during the co-design. There will then be a 30 minute demonstration of accessible learning tools that can be implemented in classrooms. Participants will then be divided into small groups and engage in a 60 minute co-design of non-visual representations with sighted and blind facilitators. During the co-design, participants will build simple and accessible cross-sensory prototypes using simple materials around in their homes. Participants will learn

strategies for making simple models perceptible to blind users. These strategies can be used to make scientific images and diagrams from psychology textbooks more accessible. Following the co-design, there will be a 40 minute discussion around each group's prototype and experience. The tutorial will conclude with a discussion on how inclusive design can be applied to the respective practices of the participants. The tutorial will include feedback from a multi-disciplinary team of psychology and inclusive design students and faculty from the University of Guelph-Humber and OCAD University.

References

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