Making for Graphicacy and Media and Information Literacy with People Who are Blind and Visually Impaired

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ABSTRACT

In this abstract we provide a rationale for our efforts to investigate the assumptions about how people who are blind and visually impaired gain graphicacy and media and information literacy (MIL). We describe the design of three teaching and learning experiences that we implemented with the intention of exposing blind and sighted participants to graphicacy through tactile and embodied engagement with art and craft and maker tools. The aim of this research is to use tools and associated instruction as probes to identify new approaches to transform MIL instruction practices for this population and library professionals and patrons, as well as dismantle limiting assumptions that impose barriers to accessible information production and consumption resources. We anticipate that the insight gained from designing and implementing these teaching and learning experiences can shed light on the underlying social or attitudinal aspects that impact ones ability to gain MIL, and inform information science educators and researchers about the requirements for refining MIL curriculum for people who are B/VI and developing technical systems that support MIL learning and lifelong practices.

Author Keywords

Media and Information Literacy; Blind and Visually Impaired; Information Production; Information Consumption; Maker Technologies; Accessible Media

INTRODUCTION

In an age where accessing, analyzing, evaluating, and creating media that communicates information is critical to ones' engagement in education, work, and society generally, it is of utmost importance to find meaningful ways for people who are blind or visually impaired (B/VI) to fully engage in these activities. During formative research with people who are B/VI we noted that many have not been consistently exposed to tactile and haptic resources, nor teaching practices that enable them to understand and present information in the form of sketches, photographs, diagrams, maps, plans, charts, graphs and other non-textual, two-dimensional formats [1]. This knowledge and set of skill are referred to as graphicacy. Balchin defines graphicacy as the representation of visuo-spatial abilities and communication of spatial information that cannot be conveyed adequately by verbal or numerical means [3]. Graphicacy is an important extension of literacy and a competence increasingly expected of educated adults in our society [2]. To date, there are few assistive technologies (AT), accessible educational technologies or information systems specifically designed to support B/VI develop their graphicacy skills or more broadly (MIL).

BACKGROUND

Vision serves as a primary means through which people to learn. For many, it is source for verification of [and] interaction with the environment and other persons, and a facilitator for the development of the ability to transfer information across other sensory-input systems [9]. Vision is considered to be the primary integrating sense, and when present, allows for the immediate preview of the gestalt or whole, the positioning of objects, or layout of an environment [12]. When the sense of vision is lost, people rely more heavily on their other senses, and in some cases AT, to learn and make connections between bits of information.

A variety of AT have been developed towards the aim of enabling people who are B/VI access and consume information from computers and the web. For example, screen readers are software applications that work closely with the computers Operating System (OS) or specific web browsers to provide information about icons, menus, dialogue boxes, files and folders through speech-out put or braille display. Yet, in cases where information is presented in non-textual form screen readers become obsolete. Guidelines and standards such as the Web Content Accessibility Guideline (WCAG) [14] have been established to help web designers and developers make web content (text, images, and sounds) accessible through screen readers and braille displays. To make graphics accessible it is recommended that alternative text describing the image be included in the graphics digital meta data.

However, many designers and developers do not adhere to the WCAG guidelines. In turn, many people focus on developing technical solutions to address the fact that images are inherently not accessible. For example, there are projects to develop automatic image recognition and description, e.g. [6], engage digital crowd workers in creating alternative text descriptions e.g [5]). While there is a great need for AT to make

digital information available, many of these technologies do not inherently support a person to the combined key MIL competencies. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) as: 1) the skills and practices to consume the media the applications are intended to provide access to, 2) the skills and practices to produce media that is made available through such AT, and 3) the opportunity to participate in social discourse (MIL) [13].

To date there are not many efforts underway to develop MIL curriculum or tools focused on supporting people who are B/VI gain MIL. In an analysis of disability and accessibility in the library and information science (IS) literature, Hill (2013) reports that often times the IS researchers and scholars neglect the social or attitudinal aspects associated with disabilities within their approaches to making MIL practices more accessible; rather it centers on the technological limitations that are already well understood [8]. In an effort to look more specifically at the skills and practices people who are B/VI need to engage in to have MIL, Weigand et.al. (2013) noted that there are few concrete guidelines for developing MIL curriculum or tools [15]. They also identify in order to acquire MIL, basic literacy skills should be developed through the aid of tactile and haptic resources that immediately responses to their input [15]. Basic forms of tactile and haptic outputs include braille and tactile graphics.

Despite this recommendation, during formative research we observed that many people who are B/VI have not had training on how to find, use, or produce tactile or haptic representations. This may be in part due to the cost of producing and sharing tactile materials the number of people being trained as teachers of the visually impaired, and the lack of curriculum designed to train teachers in tactile information design, AT, and MIL. Furthermore it may be amplified by the fact that MIL curriculum do not focus on accessible information design as part of the competencies, although it is well suited to fit under UNESCO's MIL learning themes. In turn we sought out to investigate how to improve the state to MIL education for and with people who are B/VI.

RESEARCH DESIGN

Research Questions

We developed three central questions, framed by Forte's (2014) provocation These include: *1) What assumptions do we as researchers/curriculum designers and the participants have about how people who are B/VI gain graphicacy and MIL more generally?; 2) What approaches can be used to transform this populations' MIL knowledge, skills, practices and attitudes such that they are accomplished and feel empowered in their sense of MIL?; and 3) What approaches can be used to transform library professionals and patrons' media and information literacy practices and instruction to dismantle limiting assumptions and barriers to access to information production and consumption resources?*

Settings and Participants

In order to answer the aforementioned questions, we designed and conducted three TLEs.

TLE 1: This TLE took place over the course of nine weeks in May 2016 at an independence training center. Participants and facilitators met once a week for four hours over the course of the nine weeks. Five B/VI adult participants (female:3, male:2/ Blind:4, Low vision:1) ages 19 to 56 and three facilitators participated in the TLE. One of the facilitators is a regular art instructor at the training center, one facilitator is media design and education researcher (and one of the co-authors), and the other facilitator was a literacy educator and research assistant. The group worked together to create a tactile composition for other blind individuals.

TLE 2: This TLE took place over the course of one week in July 2017 as part of a summer camp for blind and VI students. Participants and facilitators met once a day for four hours over the course of one week. Five blind and VI high school participants (female:3, male:2/ Blind:3, Low vision:2) ages 16 to 19 and five facilitators participated in the TLE. One of the facilitators is the same art instructor as in TLE 1, one is the same media design and education researcher in TLE 1, one facilitator is a biologist and education researcher, the fourth facilitator is an artist who is blind, and the fifth facilitator is university student/ camp mentor who is low vision.

TLE 3: This TLE took place over the course of one week in August 2017 in a library maker space. Participants and facilitators met once a day for a four hours over the course of one week. Twelve sighted high school participants (female:3, male:9) ages 14 to 17 and three facilitators participated in the TLE. One of the facilitators is the same media design and education researcher in TLE 1 and 2, one facilitator is a librarian who runs the makerspace at the library, and the third facilitator is an artist who is blind (not the same as in TLE 2).

Curriculum Design

At the onset of each TLE we took into consideration the affordances of each of the learning environments and designed activities to best match the participants interests and needs. However, the principles underpinning the curriculum design remained the same across sites.

MIL Strategies: In our work we choose to look to the UNESCO MIL Curriculum and Competency Framework [13] to guide our understanding of MIL instruction as it is the most current and comprehensive curriculum. UNESCO identifies three dimensions of MIL, including: 1) the skills and practices to consume the media, 2) the skills and practices to produce media, and 3) the opportunity to use media and information to participate in social discourse. The curriculum identifies a variety of educational strategies to address these three dimensions, including:

Issue-inquiry:We engaged students in discussion and design reflections to identify how and why accessible information (products and instruction) is important yet not widely available, consider their and others exposure, use and creation of tactile and haptic information, investigate sources of instruction and products, and become active consumers and producers of tactile, haptic, and auditory information using a variety of tools. PBL: We framed the making task for participants by challenging them to consider and address the ques-

tion:*How do you create accessible representations of information for people who are B/VI, and what media and tools support your design?* Scientific inquiry/design thinking: We provided activities for participants to make direct observations and gather materials from the environments as inspiration for their issue-inquiry, to analyze previous examples of tactile and haptic representations, to identify and plan/prototype possible solutions, and develop a range of material artifacts that communicated something about their observations. Cooperative learning: We positioned participants to choose how they wanted to work with one another to address the problem statement. Textual analysis: We provided examples and activities to engage participants in understanding the semiotic affordances of images, text, sound, and how each of these modes and associated media types support communication. Contextual analysis: We led the groups in conversations to engage them in identifying how and when they have or have not been exposed to tactile and haptic information. Translations: Core to the PBL question at hand, participants worked to translate graphical information and tactile and haptic experiences into accessible representations. Simulations: Throughout the learning experiences, we asked participants to positioning themselves as the end users of the products they were producing. Production: Production was a critical component of each of the aforementioned strategies, as discussed in more detail below.

Making as Means of Production: Hands-on making of tactile and haptic representations of ones observations and concepts, using a variety of craft and maker technologies, was the core activity involved in each TLE design. We related to the term Making as the acts of artistic/personal expression AND/OR communicating information through the design and creation process and use of craft and technologically enhanced materials. Making as an educational construct has roots in democratic education [7], constructionism [10], and universal design for learning [11]. During each TLE we introduced participants to arts and craft materials, construction tools e.g. drills and saws, and to several maker tools that are at least partially accessible to people who are B/VI through using tangible and embodied actions as part of their inputs and/or outputs, e.g. servo motors and control boxes and Bare Conductive touch boards [4]. Examples of embodied actions that support consumption of information include reading braille and tactile graphics, using one's body to navigate space or objects, and using one's body to activating buttons and triggers (with direct outputs).

FUTURE WORK

In the near future we plan to analyze data that we collected from these three TLEs, and provide in depth findings related to our research questions. Our goal is to provide evidence of how our curriculum and maker tools supported students develop the knowledge, skills, practices that result in graphicacy and MIL. We intend to provide more detail about our TLE designs, and definitive suggestions for how they can be used by IS educators, researchers, and designers/developers. Based on our preliminary review of our data, we can note the B/VI participants involved in the TLEs did not assume their own fluency with the tools and materials; in fact, many of the participants reported that in the past they had not been widely exposed to instruction and diverse tools and resources that could be used to support their graphicacy and MIL development.

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