Virtual O&M: A far north queensland innovation

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Abstract

Transition programs for students with vision impairment require the facilitation of more than navigational orientation and mobility (O&M) skills. Facilitating the student with vision impairment to interpret and gather information about the socio-cultural and learning spaces of the new school is a key component of regional O&M specialist programs. Transition from a primary to a secondary school campus separated by approximately 800 km (490 miles) requires a re-imagining of O&M. The authors discuss the development and trial of an innovative transition program for one student with low vision from Far North Queensland.

Transition to high school, though generally a positive experience, can be a tumultuous experience for many teenagers. According to Suldo and Shaunessy-Dedrick (2013, p. 195), high school incorporates "more difficult coursework, different organizational structures, new peers, more students, and different expectations from teachers". In addition, for students with vision impairment (SVI) navigating an unfamiliar environment can present significant difficulties. For some SVI, learning about and exploring the new school social, cultural, organizational and spatial environments can be a long daunting process particularly it they are moving from the safety and security of their familiar environment to attend the new school.

Furthermore, SVI who are transitioning from rural and remote communities to metropolitan school environments can face additional distress and anxiety. This is because the characteristics, values, and conceptual patterns embedded in a rural lifestyle can differ significantly from the accepted socio-cultural mannerisms, language patterns, and environmental concepts in the metropolitan school communities. Exploring the incongruence between school environments for SVI is generally associated with orientation and mobility (O&M) programs. Due to the vast distances between rural and metropolitan schools in Queensland however, firsthand experience of metropolitan environments is not always physically possible. Exploring environments through virtual O&M resources is therefore, a viable alternative.

Virtual reality is the computer-generated simulation of a three-dimensional environment that can be interacted with in a seemingly real or physical way that is near-reality (Virtual Reality Society, 2017). The idea of virtual reality is to use technology to simulate an experience that is almost the same as the real experience. "O&M virtual reality" is defined as specifically designed computer-generated simulation of a three-dimensional environment that can be interacted with in a seemingly real way, where the goal for this interaction is to aid the development of O&M skills.

Virtual reality has long been popular in the game and entertainment industry. Over the last few years, the interest in virtual reality based learning tools for SVI has increased considerably (Lahav et al. 2015). Virtual reality computer applications (Balan et al. 2014), audio based games (Connors et al. 2014b), haptic (Lahav, 2014), tactile (Brayda et al. 2013), and sonic (Bujacz et al. 2012; Seki and Sato, 2011) technologies have all been investigated with the aim of aiding the development of O&M skills for SVI.

Developing independent and efficient O&M travel skills generally necessitates first-hand experience of the environment through a combination of sensory integration and conceptualization. Immersion in virtual environments might assist to facilitate conceptualization of a new environment prior to actual physical

exploration or independent navigation. The person with VI is presented with the opportunity to begin to be able to transfer and integrate the skills attained in the virtual environment across to the actual environment. The virtual environment aids as an advanced organizer which can be used in both comparatively and expository ways (Ausubel, 1978). As Connors et al. (2014a, p. 2) argued the "highly interactive and immersive exploration of the virtual environment greatly engages a blind user to develop skills akin to positive near transfer of learning". This paper explores the use of a simplified two-dimensional virtual environment to assist a student with low vision from a rural community to gain a cognitive representation of an inner city secondary school as part of an overall transition program.

Background

Australia is a geographically isolated and vast country with a comparatively small population. Queensland is the second largest state in the country with an area measuring seven times as large as Great Britain, with more than half of the population living outside the greater metropolitan area (Queensland Government, 2017b). Far North Queensland centred on the city of Cairns, stretches north to the Torres Strait and west to the Gulf Country some 800 to 900 km (490-560 miles) in either direction. The region has Australia's only international border, with the independent nation of Papua New Guinea, and contains 25.6% of the state's Indigenous population (Queensland Government, 2017b). The entire region covers an area of approximately 381 km^2, which is slightly larger than the total area of Japan.

There are approximately 60 SVI from birth to school leaving age in the Far North Queensland region, with most SVI educated at their local school. Many schools though, are several hours drive away from the base location of the O&M specialist with several regional schools accessible only by airplane travel. This often means long travel distances and short infrequent visits to schools by the sole advisory teacher O&M specialist and the three teachers of students with VI (TVI) employed by the Queensland Department of Education (DOE) to support these students.

The majority of O&M specialist services within Queensland DOE are provided by three advisory teachers for O&M. These teachers are dual qualified teachers and O&M specialists. The Queensland Government (Queensland Government, 2017a, para 2) reports that the main role of the advisory teacher "is to support school staff in enabling students with disability to access and participate in the curriculum". The O&M

advisory teachers work closely with the TVI's, schools, parents, and communities to provide an O&M service targeted to the learning needs of the SVI. The role of the advisory teacher O&M is to build the capacity of the school community to program, implement, and align O&M learning with the Australian Curriculum for the SVI.

The focus SVI of this project lives in Weipa, on the western side of Cape York in Northern Queensland. The Weipa township is inaccessible in the wet monsoonal season and is a 2-hr plane flight from the Cairns metropolitan area. Clinically diagnosed with Albinism, the SVI, has a distance vision acuity of 6/36, and academically is an above average student. The SVI does not use a long cane nor any additional low vision aids. The O&M advisory teacher visits Weipa once per year to complete O&M assessments and programming, and to build the capacity of the school community to implement and align the O&M program with the Australian Curriculum.

Due to the physical distance between Weipa and Cairns, and the irregularity of advisory teacher services to the western cape area of northern Queensland, the student's O&M transition program necessitated a multi-faceted team approach involving many staff across both school campuses with the implementation of virtual orientation to the new school environment. Without access to the audio-haptic three-dimensional and gaming applications aforementioned, the student's DOE support team decided to trial a simplified two-dimensional virtual O&M transition program. Aware of Irving's (2015) concerns regarding the lack of proprioceptive and tactile input in virtual environments, this innovative program was considered as a supplement to the regular O&M program provided to the student.

A primary and traditional outcome of many O&M transition programs is that the SVI is able to "mentally map spaces and possible paths for navigating spaces (Lahav, 2006, p. 174). A transition program, however, also includes the explicit teaching of many strategies that the SVI requires to interpret the numerous socio-cultural, learning, and spatial environments of the new school. Effectively achieving these O&M transition program goals for a rural student 800 km away from the metropolitan high school, necessitated a unique approach to orientation, namely a virtual O&M program.

Virtual O&M program

The online space for the virtual program was the DET Learning Place. The DET Learning Place provided a secure eLearning environment. The Learning place

contains two online platforms colloquially known as "edStudio" and "edTube". EdStudio is a drag and drop creative authoring and collaborative space for DET staff and students. An edstudio can easily be created without having to know HTML coding, usually necessary for designing websites. A "closed" edStudio ensured videos and photos could not be accessed by the public or other DET staff and students without granted permissions. The edTube album is a multimedia sharing gallery which enables storage for edStudio audio, video, and images. The edStudio enabled incorporation of media files (e.g., audio, video, and images), interactive tools (e.g., blogs, discussion boards, chats, and drop boxes), text and HTML (hyperlinks) as well as clipart and various resources from the Learning Place.

Initial investigations of other online transition spaces using the same platform assisted in the planning and design of the studio pages, types of induction information needed and most effective media types. Collection of resources from the transition school consisted of school yearbooks, student diary with current school information and supporting documents and anecdotal notes written by the Learning Support Teacher. Video footage and photos were taken of classrooms and surrounding school areas. High resolution photos concentrated on outside room information such as numbering systems, visual cues, landmarks and information surrounding doorways, and inside the rooms. In addition, photos and video footage of support staff introducing themselves and detailing their role within the school were included. Photos were imported into Windows Moviemaker, with cognitive modelling statements such as "I can see …" included as narration for the movie file. The movie file was saved as a VLC media file (.mp4) format, used for its compatibility with the DET Learning Place platform.

Using design mode, pages within the "edStudio" were built to group the information (text, images, and videos) into relevant sections. These sections were labelled; "Welcome" (which included specifically chosen high student interest images), "About us" (containing core information about the school such as college values, motto, code of behaviour and uniform standards), and "Getting around the College" (encompassing videos of aerial views of Cairns and surrounding areas, the College and an interactive map of the school). Also included were sections containing text, videos, and images, blog and links to school websites and Facebook. These supplementary sections provided information on; college staff, timetables, core subjects, electives, social events, boarding,

and expectations for the first day. Bonus sections included SVI specific information such as "What to do if …", "Things to look out for …", and "VI support". Furthermore, a "Task" page and "About Me" sections were included to facilitate a more active role for the SVI within the site. The About me section enabling the SVI to author her own page.

The next step in the process was to gather feedback from the student and staff. A telephone conference was set up with the student, support staff and the TVI. The TVI guided the SVI and support staff through the studio, providing information on site navigation as the "tour guide". During this initial session, the student had control of the journey and experience, and was encouraged to provide feedback on preferred text colours, size, and position. Future weekly phone conferences will continue exploration and completion of specific tasks within the site.

Limitations

There were two main limitations encountered when implementing the virtual O&M transition program. These were the student's initial confidence with technology, and consistent access to the internet and search engines. At the commencement of the program, the SVI had limited skills with computer technology especially navigating keyboards and screens, and little experience with interactive search engines such as Google maps. The TVI provided scaffolded instruction to the student and on-site school staff prior to the commencement and throughout the program to ensure success of the program. Consistent access to the internet with reliable download speed at the school site was an ongoing difficulty, as was connection to shared conversational media such as Skype. To overcome this the student and TVI designated a mutual time during low internet traffic to investigate the virtual O&M program.

Conclusion

O&M in Queensland provides many unique challenges such as the extreme physical distances between the low incidence and widespread population of SVI, and the limited number of Queensland DOE advisory teachers O&M employed to support O&M in schools. In Queensland, the SVI might be the only SVI within the school community and within a vast geographical area further exemplifying the low incidence and heterogeneous nature of being a student with VI. In addition, there are only three Queensland DOE advisory teachers for

O&M, with only one of these located within the remote geographical space encompassing the North and Far North Queensland regions. Traditional models of face to face O&M specialist lessons are neither equitable nor sustainable in remote Australian areas. The virtual O&M trial, a first for Queensland and possibly Australia, assisted to reduce the barriers of distance and enabled the SVI to experience aspects of the new school through various media.

Initial feedback from the student regarding the program suggested high interest, engagement and discussion surrounding the new secondary school. Comments from the secondary school staff following the first day of the school year were specific to the student's confidence, self-determination, and independence in navigating the metropolitan school environment.

Future virtual O&M programs

Providing a secure multi-media interactive virtual O&M space has multiple applications for many rural and remote students. Further exploration of the provision of O&M learning for rural and remote SVI through alternative and innovative virtual practices is imperative to maintain equitable and sustainable O&M services throughout Australia's remote regions. Re-imagining O&M learning and teaching through augmented and virtual reality is applicable to many Australian and rural communities.

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