Virtual Reality Training and Library Science Education: Examining the Possibilities

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The use of virtual reality (VR) in social work (SW) and pre-service teacher education has become a promising tool for skills development for students. A review of existing scholarship was conducted to provide an overview of the current landscape of VR in SW and pre-service teacher education. This analysis focused on the use of VR in fields that involved working with people, particularly people in crisis. After an initial review of 115 articles, 60 were identified as relevant to this study. Our analysis of recent trends in the literature emphasizes the potential of VR for library and information science (LIS) education. This literature review provides a basis for a study that examines how VR training approaches may be implemented to support LIS graduate students to build communication and de-escalation skills and confidence in interacting with patrons in crisis. Therefore, this literature review demonstrates the value of using VR and informs our proposed future project examining the viability and usability of VR training for this skill development using the social VR platform Mozilla Hubs.

Keywords: crisis intervention, library science education, social VR platforms, social work education, teacher education, virtual reality

Libraries support people in crisis by providing psychosocial and informational support and a free, safe, and climate-controlled space to spend time (Provence et al., 2021). Library workers interact with individuals in crisis in a variety of ways that are rooted in their attitudes, knowledge, and experience and face barriers to getting and using training that may support their efforts (Williams & Ogden, 2021). Crises, including natural disasters, civil unrest, and, most recently, the COVID-19 pandemic, often impose stressors on library workers' ability to support people in crisis and can challenge the service capacities of library workers in their efforts to support their communities (Wahler et. al, 2021). There is a strong need for additional skills training and professional development for library professionals and, by extension, emerging professionals and current LIS graduate students. Developing social work (SW) skills in de-escalation and communication can help support librarians'

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KEY POINTS:

- Fields such as social work and teacher education have successfully used virtual reality, which provides useful insights for implementing it in LIS education.
- Virtual reality introduces a low-stakes yet realistic environment in which to repeatedly practice skills and learn.
- Immersive learning provided by virtual reality can help build confidence and empathy, both of which are important for crisis communication skill development.

capacity to interact with people in crisis. This training is time intensive, often in person, and a single session or short series of sessions. Additionally, it may be difficult for library workers to implement those skills once they are in a situation that requires them to do so.

These challenges motivated us to examine how training and education can support crisis response skill development for library professionals. Introducing regular and repeated training opportunities sooner for professionals, and in LIS programs, may be beneficial. One potential avenue for addressing this challenge is virtual reality (VR) training. Although VR has gained popularity in higher education over the past decade, VR training for LIS students has not yet been implemented. To better understand the landscape of research in this area, we conducted a literature review. We examine the following question: Is VR a viable approach for training LIS students and emerging professionals in communicating with people in crisis?

Methods

Our review used the checklist from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework for conducting systematic literature reviews. First, we established inclusion/exclusion criteria and categories for the articles. We identified research questions, technologies used, type of study, and major findings for each article to determine inclusion in the review. Articles were included if they were research or review articles with an explicit focus on VR and education for crisis intervention. For example, articles were excluded if they simply mentioned VR or did not include study findings, such as commentaries on the future of VR or letters to the editor. Three reviewers reviewed the articles and discussed the findings from each article to determine whether the article met requirements for inclusion in the literature review.

To conduct the search, we relied on the institution's databases, library discovery service, and Google Scholar to identify literature about using VR for education of social workers and teachers, as well as for use in mental health and crisis intervention practices (see Table 1). Search terms (see below) included "virtual reality," "social work," "training or education," "social work education," "counseling," "role play," "homeless#," "counseling or therapy or treatment," and "crisis intervention." Both the subject terms and article abstracts were searched to identify whether the article addressed VR and any of the included fields. Articles were excluded if they did not meet the criteria outlined above or if they were duplicate records. See the Appendix for the full list of articles included in this review.

The following search terms were used:

- (virtual reality) and ("social work") and (training or education)

Table 1: Databases and search results

Database	Results
CINAHL Complete	19
APA PsycArticles	3
Complementary Index	19
SocINDEX with Full Text	15
Academic Search Ultimate	20
Library and Information Science Source	9
APAPsycInfo	6
Points of View Reference Center	2
Gale General OneFile	3
ERIC	9
Gale Academic OneFile	4
APA PsycArticles	3
Communication & Mass Media Complete	1
MEDLINE	2

- (virtual reality) and (“social work education”)
- (“virtual reality”) and (“social work education”)
- (virtual reality) and (“teacher education”)
- (virtual reality) and (counseling) and (“role play”)
- (“virtual reality” or vr) and ("crisis intervention") and (counseling or therapy or treatment)
- (“virtual reality”) and ("homeless#") and (social work)

A total of 115 articles were selected for initial review. Reviewers worked independently to evaluate the articles from the search, and then collectively determined whether they met the inclusion criteria. After a review of the articles was completed, 60 were determined relevant to this study. Articles were organized into categories based on the scope of the topic: literature reviews, articles using Second Life for SW and education, articles promoting the potential for VR in SW and education, and articles about studies conducted using VR in SW and education. Limitations of this study include the small number of search terms and the narrow scope of this literature review.

The analysis focused on the use of VR in fields that involved working with people in crisis. The goal was to understand broad themes and trends in VR for SW and education within the context of crisis intervention. Additionally, the authors were interested in the use of VR for facilitating professional development. Therefore, the focus for this literature review emphasized the fields of SW education and practice and teacher education, as those fields provided relevant literature for considering the potential of VR for education in LIS programs.

Results

Our analysis of the 60 articles yielded several major themes that are relevant for considering whether VR is a viable educational tool for training LIS students and emerging professionals in communicating with people in crisis. Major themes identified included the value of having low-stakes opportunities to engage in a virtual environment; opportunities to build confidence, empathy, and self-efficacy; role-playing; realistic and immersive learning environments; VR as a flexible tool and technology for learning; and a variety of approaches to addressing skill development in crisis communication. Themes are discussed in the following sections below, within the categories of articles identified.

Literature review studies

Recent literature reviews point to the current landscape of VR in SW education, and education more broadly. Although these studies outline current interests, scope, and future potential of VR, overall, these reviews point most to the need for implementing VR in educational contexts. Whether in the classroom or the library, there is opportunity to extend this to LIS students and information professionals.

Some recent work examined the role of VR in education, particularly as it relates to pre-service educators. For example, Gonzalez-Zamar and Abad-Segura (2020) analyzed 20 years of literature between 1980 and 2000 and found an increase in VR over that time period. The literature review by McGarr (2020) explored using VR in pre-service teacher education, highlighting the benefits of virtual simulations, including the following: repeated practice without risk of harm to students, increase in student motivation, ability for instructors to provide feedback, and VR as a "safe space" to make mistakes. This scholarship demonstrates the possibilities for LIS students. Having low-stakes opportunities to engage in a virtual environment can help students learn how to engage meaningfully with people in crisis. Students can make mistakes, learn from them, and reflect on them without causing harm.

Similarly, VR for SW education literature reviews have examined the potential scope, best practices, and future opportunities (Kourgiantakis et al., 2020; Stavreva-Kostadinova, 2019). Some scholarship examined the role of VR in the education of SW students, such as Huttar and BrintzenhofeSzoc (2020), whose analysis revealed five themes relevant for training social workers: orientation to the technology, professional competencies, population and practice level, benefits of the technology, and effectiveness. The authors found that students are receptive to VR instruction and that VR and simulations can be used to strengthen competency in those already providing SW services. Finally, Yıldırım and Şahin (2020) described the impact of SW educators implementing simulation methodology and techniques. Their paper suggested technological developments, considering the contribution of technological knowledge and communication, and advocating for the use of social entrepreneurship, innovation, and simulation techniques. These studies illustrate the value of incorporating similar training for LIS students and professionals.

Focusing on VR for specific groups of learners is another facet of current scholarship. Oliveira et al.'s (2021) study outlines how social skills training (SST) using VR may be a useful way of training schizophrenic individuals, finding that SST training has potential,

although considerations of ethics and professional practice must be made when developing and implementing VR. Ticknor's (2017, 2018) work examined how VR may be useful in treatment of juvenile offenders in that VR provides a more engaging, realistic, and non-judgmental space for interaction than an in-person environment. VR has value for clinical SW instruction as well (Washburn & Zhou, 2018). This work highlights a unique opportunity for SW educators to be on the cutting edge of innovation in the social services and mental health fields.

Examining recent literature reviews highlights the possibilities in implementing VR in LIS education. Recent work demonstrates the applicability of VR for both LIS students and professionals and also reminds us of the value of considering how we might develop best practices in the longer term. Understanding the logistical, ethical, and educational value of implementing VR training tools is a vital component of developing them and something that should go hand in hand with LIS curriculum development.

Second Life

Second Life is an application that allows people to create an avatar for themselves and have a "second life" in a 3-D online virtual world or metaverse. It was first released in 2003 by Linden Labs and has recently gained popularity again (Takahashi, 2021). Second Life has been used in a number of different capacities in teaching and learning, such as psychology (Baker et al., 2009; Gorini et al., 2008), health care (Chow et al., 2012), for people with disabilities (Kleban & Kaye, 2015; Stewart et al., 2010), and medical training (Boulos et al., 2007; Wiecha et al., 2010). As an educational tool, Second Life provides an active approach to teaching and learning where skills can be practiced in an environment that lends itself to learning through play and creativity (Hofer, 2014). Activities that are simulated in a virtual environment like Second Life provide students with a safe place to engage in critical reflection and receive feedback (Martin, 2017).

Second Life has been used in SW education for teaching different principles and concepts to students. For example, Levine and Adams (2013) used Second Life to conduct an exploratory study to teach undergraduate students case management using role play. The goal of the study was to see if virtual role play could increase students' self-efficacy (the belief that one can successfully perform the behavior in question) for tasks required for conducting case management intakes (Levine & Adams, 2013). The results showed that the students increased their confidence and developed more empathy about the challenges managers and clients face. Wilson et al. (2013) explored a home-visiting role play that provided students the opportunity to practice engagement and assessment skills in Second Life before using them in the field. Students commented that the simulation helped with comprehension of the types of skills needed for visiting in the home and how they might respond when something unexpected happens. Another study evaluated student perspectives of the educational value of learning experiences in Second Life (Reinsmith-Jones et al., 2015). The authors found that students reported learning in a virtual world was useful in teaching SW values, skills, and knowledge. Similarly, Martin (2017) explored the student experience of undergraduate SW students using Second Life as a tool for learning online with a focus on interpersonal communication skills.

Current research no longer uses Second Life for education and training. VR technologies dating back to the 1960s (introduction of the head-mounted display) have made a comeback to the consumer market in the form of affordable and immersive VR solutions, providing new opportunities to experiment with more advanced means of communication and training (Boas, 2013). However, the approaches developed using Second Life highlight the value of implementing immersive experiences for teaching and learning, which can be applied in LIS contexts. Having a virtual library to engage with difficult concepts, build empathy for patrons, and critically reflect on skill development can create a meaningful and impactful learning experience for students.

Examining the potential of VR

The viability of VR as a teaching tool has been discussed in pre-service teacher education and SW education and practice. Those who propose VR often outline the capacity to allow users to practice skills in a low-stakes environment with room for exploration and failure and its potential for creating a more controlled environment. Researchers have also suggested key pedagogical considerations for the development of VR education programs.

In education, VR has been proposed as a method to help pre-service teachers build classroom management skills without the pressure of being in a physical environment with real students. Attwood et al. (2020) surveyed pre-service teachers, assessing their perceptions of VR and artificial intelligence as potential tools for teaching classroom management skills. The authors suggested that using VR to teach classroom management can benefit students by providing more opportunities to practice techniques, filling a gap identified between classroom education and practical experience. Calandra and Puvirajah (2014) similarly identified VR as an opportunity for students to practice their classroom skills in a low-stakes environment. They proposed using VR to allow pre-service teachers to "learn through being" within a realistic environment where they can repeat tasks, fail, and focus on particular aspects of the experience for more in-depth practice.

VR has also been proposed as a means for building pre-service teachers' cultural competence and empathy for others. Haghanikar and Hooper (2021) examined using VR to show pre-service teachers a day in the life of a person experiencing homelessness to educate them about homelessness and its impact on their students and suggest pairing VR with other classroom activities to build teachers' cultural competency. VR can introduce students to a new perspective that encourages them to build empathy for others.

Developing clinical skills and preparing for work in human services are two additional areas in which VR has been explored. Beal (2017) reported a VR program in development to teach BSW students about group dynamics. Davis et al. (2021) reviewed two VR programs used to train human service workers to perform home visits and health assessments. Pedagogical considerations are important to the development of VR for SW education. Davis et al., McDonald et al. (2021), and Sturman et al. (2021) identified learning theories relevant for developing VR programs for education, illustrating the importance of incorporating VR into existing curricula and learning goals. Davis et al. proposed a framework applying evidence-based learning theories to VR development and suggested working closely with technology development teams when building programs, incorporating game-like features

that engage learners, and proactively addressing ethical issues related to technology use. McDonald et al. proposed informing VR design with concepts such as including expert feedback, skills scaffolding, and incorporating direct feedback on the user's performance into the VR program, along with limiting the amount of material covered so each VR experience is designed to teach a single skill and starting with basic skills to build to more complex skills. Sturman et al. described the planning and development process for a VR learning environment that implemented constructivist learning principles involving collaboration between the technology development team and SW faculty.

Lastly, VR has potential for SW practice. Bloch (2021) proposed the use of VR for restorative justice practices, citing its potential for enabling perspective taking as a valuable asset. Bloch suggested that using VR for restorative justice would provide a low-stakes environment that lessens the emotional burden for survivors of crime, as well as help offenders build empathy. Boeldt et al. (2019) proposed the use of VR for exposure therapy to treat anxiety disorders and suggested that VR allows therapists more control over exposure to anxiety triggers, which can lower patient distress and improve outcomes. In addition to using VR to treat patients, therapists can use VR to practice exposure therapy scenarios with virtual patients, allowing them to increase their skills through repeated practice.

In addition to SW, VR has been proposed in other mental health fields. Üstel et al. (2021) conducted focus groups and interviews with peer specialists to assess their perception of using a VR job interview training program for people with serious mental illness. Peer specialists reported that the program was exciting and helped them build skills but were unsure if it was appropriate for peers to facilitate the program or if clients would be open to a virtual training over face-to-face learning. Lyk et al. (2020) conducted usability studies using VR to teach adolescents about alcohol abuse in a virtual party environment, modifying the program based on user feedback.

VR studies

Programs being pilot tested or used to train social workers, counselors, and teachers are emphasized in current VR usability scholarship. These show a positive trend toward more use of VR for training and using VR to provide mental health services that are often facilitated by professional counselors or social workers.

Training for pre-service teachers in classroom skills such as student engagement has been bolstered by the recent use of VR. Applications of VR in pre-service teacher education include training in bullying prevention (Kim et al., 2017), creating learning objects (Nissim & Weissblueth, 2017), and interaction in VR using avatars and virtual school spaces such as gyms (O'Connor & Worman, 2019; Wahl-Alexander & Brezwyn, 2021). These studies foreground how different aspects of VR may impact levels of stimulation and effectiveness of training and may help with assessing pre-service teachers' self-efficacy, interests, and creativity. Examining VR can also help with understanding students' progression of attitudes, from feeling frustrated and disconnected with a VR experience to feeling positive, challenged, and satisfied with the skills they gained. The extent to which students are engaged (everything from creating avatars to creating and manipulating objects within the environment) is also relevant for understanding attitudes and confidence while engaging with classmates. Finally,

having detailed VR environments, such as the gymnasium discussed in Wahl-Alexander and Brezwyn (2021), is helpful for learning how to navigate spaces and prepare lesson plans in ways that help calm nerves and encourage students to think concretely about the details and execution of lesson plans.

Some studies explored training pre-service teachers to incorporate VR into teaching. Implementing VR was used to identify its potential use in education (Eutsler & Long, 2021), develop student field trips (Huh, 2020), and understand how K−8 students engaged with VR activities (Peterson & Stone, 2019). This scholarship underscores the usability of VR and its relevance for many educational contexts and illustrates teachers' openness to the idea of using VR in many ways in education.

In SW education, VR has been leveraged to promote cultural competency, prepare students for field experience, and practice clinical skills. Lanzieri et al. (2021) conducted a pilot study of a 360° VR simulation used to build SW students' skills in understanding social contexts and communities and connecting these concepts with SW practice by immersing them in a virtual New York City neighborhood. Students reported that the experience was beneficial to learning, calling attention to the value of the reflective questions used in the simulation and the immersive nature of the simulation. Lee (2014) studied the use of a virtual environment where SW students controlled and interacted with avatars from diverse populations in a cocktail party setting to build their cultural competency. Compared with students who engaged in a similar activity in person, students in the virtual world reported greater learning about diversity issues and improved self-awareness about their knowledge of diversity.

Two studies explored the use of VR to prepare SW students and future child welfare workers for conducting home visits and assessments. Roberson and Baker (2021) reported on a 360° VR simulation included in a Master of Social Work class where students observed a home visit in VR. Students gave feedback on challenges with the head-mounted display (HMD) and commented that the VR simulation enhanced their learning by providing a more realistic and enjoyable scenario. Furthermore, Tierney (2020) found that VR software to practice home visits was beneficial for students before going into the field and helpful for assessing training modules, screening applicants, identifying unconscious bias, and educating stakeholders about the day-to-day work of child welfare.

Perhaps the most common use for VR in SW education is for practicing clinical skills that are typically practiced through face-to-face role-play exercises. Many studies explored the use of VR in place of or as a supplement to traditional role plays. Atuel and Kintzle (2021) compared using peer-to-peer role-play and a virtual client trainer to teach graduate students interviewing and clinical skills for working with military populations, finding both methods equally effective and that VR could standardize education across student populations. Lowell and Alshammari (2019) compared learning in a virtual counselor training environment with two non-VR methods. They found that counseling students gave higher ratings for their perceived learning when conducting interviews in the virtual environment and reported that it helped them better understand the interview process. Rogers et al. (2020) tested a VR role-play where students interacted with a virtual client as their counselor and compared it with a desktop simulation. Most students preferred the

VR exercise and found the virtual client to be believable. Finally, Washburn et al. (2016, 2020) found that training on conducting behavioral health assessments was easy to use and improved diagnostic accuracy.

VR has been studied as a method for providing mental health services, including social-emotional education, life-skills training, and therapy. In these studies, VR is a tool for clinicians and other professionals to provide education and services to varied populations.

Some studies have explored using VR to provide social-emotional education. Hadley et al. (2019) compared the impact and acceptability of an emotion-regulation and risk-reduction intervention paired with an immersive VR environment and the same intervention paired with role plays for adolescents. They found that adolescents who were exposed to the immersive VR environment attended more sessions of the intervention, reported higher self-efficacy, and reported less difficulty using emotional regulation compared to those who participated in role plays. Ke and Moon (2018) studied the impact of a virtual playground on participation patterns and social interaction of children with autism and found that the VR game had a positive impact.

Life-skills training is another area where VR has potential, particularly in job interview training for vulnerable populations. Burke et al. (2018, 2021) studied using virtual interactive training agents (ViTA) for adults with intellectual disabilities to practice job interview skills and saw improvements in participants' scores on an interview assessment scale over the course of the sessions. Smith et al. (2016) studied a computer-based VR job interview training for people with substance abuse disorders and found that those who used the VR training had higher scores on interview assessments and were more likely to start a competitive position after six months compared to the control group.

Implementation of VR for therapy and counseling has also been explored. McNamara et al. (2018) conducted a pilot study examining the use of a VR program to treat the distress caused by nightmares and found that participants reported a significant reduction in anxiety levels, nightmare distress, negative daytime nightmare effects, and nightmare frequency. Herrera et al. (2018) studied the effectiveness of VR in promoting empathy for people experiencing homelessness by immersing people in a virtual environment from the perspective of a homeless person. The study found that the VR experience led to higher empathy and connection with the homeless population compared to those who did not engage in VR or perspective taking. This has implications for future use of VR to train professionals in responding to people in other crisis contexts.

Few studies relied on using the fully immersive online social VR platform Mozilla Hubs, and none focused primarily on training/education. Mozilla Hubs is an open-source platform on the web which supports many different HMD devices (hubs.mozilla.com). One study by Le et al. (2020) looked at the potential for creating a "social environment" for participants to attend a conference remotely where the presentations were live-streamed on Mozilla Hubs. Additionally, Le et al. conducted a virtual poster session and found that it improved the "social connectivity" between the participants. The attendees reported that the "overall experience" was "very satisfying."

Additionally, there have been a few studies involving student experiences of social VR using Mozilla Hubs as a result of COVID-19 and as an alternative to Zoom or other online

communication tools. Holt et al. (2020) conducted virtual poster sessions with students in Mozilla Hubs, Gomes de Siqueira et al. (2021) used Mozilla Hubs to promote interaction and communication with students in a virtual reality course at the University of Florida to help team formation, and Yoshimura and Borst (2021) studied students participating in remote lectures and giving presentations using Mozilla Hubs.

Discussion

Our review examined the extent to which VR is a viable approach for training, education, and professional development for LIS students and professionals and focused on VR in fields that involve working with people in crisis. The use of VR in pre-service teacher and SW education has increased and is informative for LIS contexts. However, commonalities between the studies in this review aside from using VR technology and simulations are limited. Earlier research used the 3-D online virtual world Second Life to conduct studies (Levine & Adams, 2013; Reinsmith-Jones et al., 2015; Wilson et al., 2013). Most used immersive VR environments and simulations. There is a lack of standards or protocols in place for training using VR. Although researchers are conducting a variety of studies in this area, there is no consensus or consistency in research design, which highlights the virtual environment as a flexible tool that provides an innovative technology for training/education. There are many different approaches to effectively teach and learn using VR: the possibilities are endless.

One present trend shows that the use of role play in the virtual environment is effective in students achieving the desired learning outcomes (Hadley et al., 2019; Levine & Adams, 2013; Rogers et al., 2020; Wilson et al., 2013). Another salient finding includes promoting the development of skills like empathy (Haghanikar & Hooper, 2021; Herrera et al., 2018; Levine & Adams, 2013) confidence (Levine & Adams, 2013; Wahl-Alexander & Brezwyn, 2021), and self-efficacy (Hadley et al., 2019; Levine & Adams, 2013; Nissim & Weissblueth, 2017). Students also view virtual spaces as realistic ones for interactions and scenarios (Calandra & Puvirajah, 2014; Roberson & Baker, 2021; Ticknor 2017, 2018), and as safe environments in which to learn and practice (Martin, 2017; McGarr, 2020). The realism of VR and the feeling of being in a safe place contributes to the effectiveness of using VR for training/education. The trends in VR have valuable implications for training LIS students and professionals. Creating learning opportunities that are low stakes, allow for immersive learning and interaction, and build skills like confidence and empathy are vital. Current scholarship demonstrates that VR can address these areas.

There is an opportunity for information scholars to imagine the possibilities of implementing VR in educating LIS students. To begin to address this understudied area, our future research proposes assessing the potential of VR in LIS education. Our research invites students to participate in a usability study involving VR scenarios that feature a variety of training exercises around active listening and de-escalation. This study will introduce VR training using the Mozilla Hubs platform to students in an LIS graduate program. The study will allow students to explore scenarios and training, in the Mozilla Hubs platform, that have previously been conducted with library professionals in person. Additionally, since Mozilla Hubs is open source, Porwol and Dumas (2021) have created an instance that will allow them to collect user behavior data from the participants (gazing, position, whether people

are talking and how loudly, and hand gestures). The authors will use artificial intelligence (AI) to train the models for data analysis. Communication and de-escalation skills involve many physical behavioral cues, which may correlate to specific user behavior data that will be collected during sessions.

Based on the major themes identified in this literature review, we will similarly implement VR training that includes role playing, a focus on developing confidence and empathy, and understanding how low-stakes, immersive environments can be valuable learning contexts for LIS graduate students. For example, role playing is one of the methods we will use in our training sessions in VR for library students. Students will act as librarians and interact with actors who perform as patrons in crisis in a virtual library setting. Similar to studies outlined here, we will also be measuring our library students' empathy, confidence, and self-efficacy in their communication and de-escalation skills both before and after the training sessions.

Conclusion

Our analysis of recent trends in the literature emphasizes the potential of VR for LIS education and highlights the potential value of VR training approaches in enabling LIS students to build communication and de-escalation skills and confidence in interacting with patrons in crisis. Our future work will address this understudied area by considering the viability and usability of VR training using the social VR platform Mozilla Hubs. Although the use of VR in training social workers and educators has become increasingly adopted, there remains an opportunity for librarians to implement similar approaches to more effectively train library staff in interacting with patrons in crisis. Our future work will examine the following:

- How VR training approaches using head mounted displays (HMDs) and the social VR platform Mozilla Hubs can be implemented to support training librarians and library school students to build communication and de-escalation skills and confidence in interacting with patrons in crisis
- The viability of VR training approaches using HMDs and Mozilla Hubs for training librarians and library school students.

Library staff continue to support individuals in their communities, and those efforts have been particularly challenging in recent years, and since the onslaught of the COVID-19 pandemic. This review demonstrates that recent trends in higher education emphasize the value of VR for training pre-service professionals (Kourgiantakis et al., 2020; McGarr, 2020), and the potential of VR for educating library and information science students is clear. Studies in education and SW highlight the benefits of virtual simulations, including repeated practice without risk of harm to students, increase in student motivation, ability for instructors to provide feedback, and virtual environments as a "safe space" in which to make mistakes (McGarr, 2020). All of those facets of VR training are also relevant for training LIS professionals. This literature review, and the resulting proposed study, have

implications for VR training for both LIS students and professionals as well as for LIS education overall.

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Appendix: Articles included in literature review

Citation
Attwood et al. (2020)
Atuel & Kintzle (2021)
Baker et al. (2009)
Beal (2017)
Bloch (2021)
Boas (2013)
Boeldt et al. (2019)
Boulos et al. (2007)
Burke et al. (2018)
Burke et al. (2021)
Calandra & Puvirajah (2014)
Chow et al. (2012)
Davis et al. (2021)
Eutsler & Long (2021)
Gomes de Siqueira et al. (2021)
Gonzalez-Zamar & Abad-Segura (2020)
Gorini et al. (2008)
Hadley et al. (2019)
Haghanikar & Hooper (2021)
Herrera et al. (2018)
Hofer (2014)
Holt et al. (2020)
Huh (2020)
Huttar & BrintzenhofeSzoc (2020)
Ke & Moon (2018)
Kim et al. (2017)
Kleban & Kaye (2015)
Kourgiantakis et al. (2020)
Lanzieri et al. (2021)
Le et al. (2020)
Lee (2014)
Levine & Adams (2013)
Lowell & Alshammari (2019)
Lyk et al. (2020)

Appendix: Continued

Citation
Martin (2017)
McDonald et al. (2021)
McGarr (2020)
McNamara et al. (2018)
Nissim & Weissblueth (2017)
O'Connor & Worman (2019)
Peterson & Stone (2019)
Reinsmith-Jones et al. (2015)
Roberson & Baker (2021)
Rogers et al. (2020)
Smith et al. (2016)
Stewart et al. (2010)
Sturman et al. (2021)
Takahashi (2021)
Ticknor (2017)
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