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Carol M. Huttar & Karlynn BrintzenhofeSzoc

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Virtual Reality and Computer Simulation in Social Work Education: A Systematic Review

Carol M. Huttar and Karlynn BrintzenhofeSzoc

ABSTRACT

The use of virtual reality and computer simulation are gaining ground in social work as viable teaching methods. Traditionally recognized as ancillary to classroom learning, they are being incorporated strategically into course curricula. A systematic review was undertaken to answer the questions, How are virtual reality and computer simulation technology being used to train social workers, and are they effective? Seven academic data sets and the Council on Social Work Education and the Society for Social Work and Research conference abstract databases were searched. Based on inclusion criteria, seven full articles were included revealing five themes. The technology is primarily used to teach direct practice rather than macro-level skills and is geared toward the education of students rather than practitioners.

ARTICLE HISTORY



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The use of virtual reality and computer simulation are gaining ground in social work education as viable teaching methods. Traditionally recognized as ancillary to classroom learning, they are being incorporated strategically into course curricula, alongside other information and communication technologies such as YouTube, wikis, Twitter, and Facebook (Hitchcock, n.d.; Perron, Taylor, Glass, & Margerum-Leys, 2010). Technology in the classroom is no stranger to social work education, particularly with the rise of course management software such as Blackboard and other distance-learning modalities (Vernon, Vakalahi, Pierce, Pittman-Munke, & Adkins, 2009). Technology was formally incorporated into social work's professional framework with the publication of the *Standards for Technology and Social Work Practice* (National Association of Social Workers & Association of Social Work Boards, 2005). These standards have been updated and expanded from the original 28-page document to 64 pages in collaboration with two additional social work organizations, the Council on Social Work Education (CSWE) and the Clinical Social Work Association (National Association of Social Workers, Association of Social Work Boards, CSWE, & Clinical Social Work Association, 2017). The standards now address the value of virtual communities and identify social media and the use of technology in social work education as two distinct headings that were absent in the first edition. These standards should guide the use of virtual reality and computer simulation in the person-centered social work educational landscape.

Virtual reality (n.d.) is defined as

an artificial environment which is experienced through sensory stimuli (as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment; also, the technology used to create or access a virtual reality.

Virtual reality is a full-body experience in real time involving the use of electronic gear such as headsets and sensory gloves. It has also been used as a catchphrase to describe other immersive experiences such as the online virtual community of Second Life, a multiuser virtual environment

CONTACT Carol M. Huttar  03huttar@cua.edu  The Catholic University of America, National School of Social Service, 620 Michigan Avenue, N.E., Washington, DC 20064.

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where the user autonomously navigates a 3-D world through user-designed avatars. Relatedly, computer simulation is also an online experience requiring participant response; however, the experience is not necessarily three dimensional or sensory, and the outcome of the simulation is preprogrammed and not determined in real time as in virtual reality. Both methods require full engagement of the participants, who draw on their intellectual, social, and emotional knowledge in the learning process. Because of their ability to engage multiple senses and produce personalized real-time results, virtual reality and computer simulation have the potential to stimulate meaningful, deeper conceptual ways of learning in the scholastic setting (De Freitas & Neumann, 2009; Jarmon, Traphagan, Mayrath, & Trivedi, 2009), particularly through the virtual reality educational tools created by the companies Immersive VR Education, zSpace, Google, and Alchemy VR (Reede & Bailiff, 2016). Research reveals that virtual reality and computer simulation provide a more controlled, interactive, and user-driven experience, which students tend to prefer (Salaway, Caruso, Nelson, & Ellison, 2008).

Virtual reality and computer simulation have long been used in the fields of mathematics (Kaufmann, Schmalstieg, & Wagner, 2000; Winn & Bricken, 1992), engineering (Abulrub, Attridge, & Williams, 2011; Pantelidis, 1997), medicine (Chang & Weiner, 2016; Hirumi, Johnson et al., 2016; Hirumi, Kleinsmith et al., 2016; Szekely & Satava, 1999), and psychology (Banakou, Hanumanthu, & Slater, 2016; Stark-Wroblewski et al., 2008). Technological advances have particularly challenged those in social work education and educators to reconsider what constitutes face-to-face interaction, class participation, discussion, and competency. This is significant as there is evidence that technology acts as a social laboratory where interacting online can foster more authentic “true selves” than in face-to-face interactions (Bargh, McKenna, & Fitzsimons, 2002), a finding particularly salient for social work education and the development of competent, reflective practitioners (p. 1). Applications of technology have also expanded traditionally held notions of lecture-based learning, in-class role playing, and conventional assignments such as videotaped sessions between a student practitioner and a fictitious client. Additionally, the requirements and implementation of field instruction, social work’s signature pedagogy (Council on Social Work Education, 2015), have been modified, primarily because of enhanced distance-learning platforms (Vernon, Vakalahi, et al., 2009).

Recognizing the emerging use and applicability of virtual reality and computer simulation in social work education, this article describes the collaborative systematic review process that was undertaken to answer the following questions: How are virtual reality and computer simulation technology being used to train social workers, and are they effective? This analysis is one of the first of its kind in social work education exploring this question. For the purpose of this systematic review, virtual reality and computer simulation are defined on a spectrum as any computerized modality that requires interaction from the participant in a programmed environment. This broad definition encompasses virtual reality that involves immersive sensory environments requiring electronic equipment as well as online worlds such as Second Life. Social work education is defined as what occurs in the classroom with students and in continuing education, conferences, and other learning opportunities for professional social workers. The outcome of this systematic review is the identification of key findings, benefits, and limitations in using these technologies and a discussion of implications for social work education and practice.

Systematic review

A systematic review was chosen to explore the topic of virtual reality and computer simulation as training tools for social workers to fully understand the range of application and effectiveness in virtual learning environments. Virtual reality and computer simulation have an evolutionary relationship. Computer simulation can be considered a forerunner to virtual reality platforms, primarily because of participant interaction, with virtual reality adding more complex levels of functionality and a participant interface. For these reasons, both modalities were chosen for this review.

Systematic reviews are critical to social work as they present focused, critically examined summaries of the literature on relevant topics. These comprehensive reviews enable social workers to obtain needed information for best practices without the time-consuming process of reading every published article in their field. Also, systematic reviews interpret findings, which acknowledges the strength of evidence, trustworthiness, and meaning in the research. This process is helpful in determining the quality of published literature (Khan, Kunz, Kleijnen, & Antes, 2011). This systematic review was developed specifically for the social work profession to provide a complete, up-to-date snapshot of current technological training methods using virtual reality and computer simulation. It was also conducted to examine their effectiveness as a guide to determine the profession's future educational directions.

Importance for social work education

Educators are in a prime position to decide how virtual reality and computer simulation as instructive methods will guide and shape the future of social work practice, research, and policy. This systematic review brings the most current, evidence-based information regarding virtual reality and computer simulation in social work to the forefront, revealing the strengths, challenges, and gaps in research important for social work educators to consider in their decision-making processes. This information can be used to critically consider what, how, and why technology is being used to make thoughtful decisions about its implementation in course development. It can also be used to inform educational competencies such as those developed by the CSWE (2015), and technology standards such as those from the National Association of Social Workers, Association of Social Work Boards, CSWE, and Clinical Social Work Association (2017). Additionally, the review's findings on effectiveness may serve as a guide for how institutions of higher education and professional certifications choose computer-based training methods and the effectiveness studies that need to be conducted.

Methodology

The process of conducting this systematic review began in October 2015, and analysis was completed in December 2016. Grounded in an interest in innovative education, this review sought to uncover how social work as a profession has embraced virtual reality and computer simulation as instructive methods and their effectiveness in instruction. Although social work intersects with the complementary applied fields and skill knowledge bases of psychology, mental health, and substance abuse, of particular interest was how social work as an established profession uses these technologies in education.

The project was guided by Khan et al.'s (2011) book because of its clearly defined steps of how to conduct systematic reviews. Before conducting research, we created a checklist of inclusion criteria for an abstract review and a full-text review, making modifications as the research progressed. Inclusion criteria for the abstract review included specificity to the social work profession, use of key words regarding virtual reality and computer simulation as they were defined for this review, and a focus on education and training. The full-text review was more comprehensive and specific than the abstract review, ensuring articles met the inclusion criteria at a more specific level (see Appendix for the checklists). Only publications in English were included. Also, we determined during the review process that only articles published after the year 2000 would be included and considered current.

Seven academic databases and the CSWE and the Society for Social Work and Research conference abstract databases were searched as they encompassed the full range of social work research. The seven databases were PsycINFO, Social Work Abstracts, ProQuest Social Services Abstracts, ProQuest: Social Sciences, Medline, ProQuest Dissertations & Theses Global, and Web of Science. Documents from the CSWE Annual Program Meetings and conference programs of the Society for Social Work and Research were searched for the years 2009–2015. To ensure all published or

presented work regarding virtual reality and computer simulation were captured, and students and practitioners were counted, the broad key word combinations used included the following: *virtual, computer simulation, social welfare, social work, education, training, social services, and practitioner*. For example, the combination of virtual and social work and education was searched. Throughout the research process, collaborative measures strengthened interrater reliability. In the beginning, the keyword searches were conducted in tandem to verify the results. Also, both of us participated in initial abstract reviews and full article reviews, during which we consulted each other and negotiated any differences. For the conference abstracts that were selected for full review, one of us contacted the primary authors by e-mail asking if their presentation matched the inclusion criteria and if it did, they were asked to forward a copy of their presentation or any publications that covered the same content to be included in the systematic review.

Search results

The original search resulted in 649 citations. Both of us participated in the initial review of the abstracts, which were narrowed to 82 abstracts for further review. The 82 abstracts included 19 conference abstracts from the CSWE and the Society for Social Work and Research. We divided the 82 abstracts between us, and after review and negotiation, we approved 63 for full-text review. The full-text review resulted in 15 articles for final consideration and negotiation. Both of us reviewed the final 15 articles, and final negotiations resulted in 7 articles for systematic review inclusion (see [Figure 1](#)). The final articles pertain specifically to virtual reality and computer simulation in social work as teaching tools published after the year 2000. The search process revealed four pertinent articles that were published before the year 2000 and therefore were not included in the analysis as the technology has changed so dramatically (Flynn, 1990; Galambos & Neal, 1999; Lambert, 1989; Seabury, 1994). The process of reviewing all the articles was completed in October 2016, one year after the start of the project.

Article findings

Of the seven final articles included in the review, five were published between 2013 and 2016, and two were published in 2002 and 2009 (see [Table 1](#)). One of the articles was published before the Second Life website was launched in June 2003 (Doel & Cooner, 2002). All the articles centered on either program development or original research and were conducted in higher education settings; however, East Carolina University (2015) worked with local organizations, revealing the potential for future partnerships in developing virtual education. All studies were specific to the social work profession. Two articles focused on the development of programs alone, without the inclusion of a research component (Doel & Cooner, 2002; Vernon, Lewis, & Lynch, 2009). Of the remaining five articles, two included undergraduate social work student participants (Levine & Adams, 2013; Reinsmith-Jones, Kibbe, Crayton, & Campbell, 2015), two with foundation-year MSW students (Tandy, Vernon, & Lynch, 2016; Wilson, Brown, Wood, & Farkas, 2013), and one identified MSW students as a whole group (Lee, 2014).

The articles revealed five distinctive features: orientation to the technology, professional competencies, population and practice level, benefits of the technology, and effectiveness. It should be mentioned that none of the articles addressed the use of virtual reality that requires sensory equipment. All the features in this section are from articles that used virtual reality as defined by other immersive environments, for example, Second Life.

First, there is no standardized method of orientation or training for using virtual worlds such as Second Life. Although each study provided an orientation to the technology, determination of what training would make the students proficient enough to use the virtual program and complete the assignments satisfactorily was arbitrary. For example, social work student participants in a study by Tandy et al. (2016) were already using the Second Life clinic at Valdosta State University in their

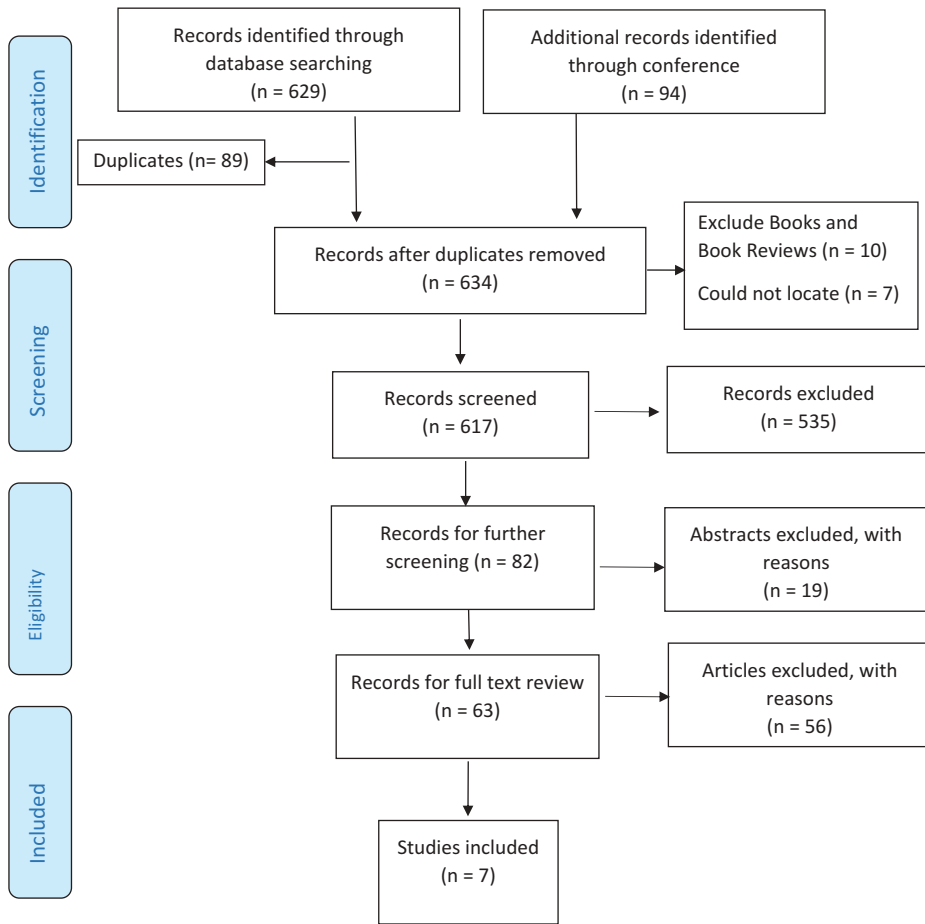


Figure 1. PRISMA flowchart of systematic reviews (Moher et al., 2009).

social work courses and therefore required only minimal orientation. Similarly, participants in a study by Reinsmith-Jones et al. (2015) were already familiar with using Second Life through the university’s established Social Work Island, a location within Second Life which is supported by a department that provides specific training on how to navigate the island. In contrast, Lee (2014) used the virtual platform Voki instead of Second Life in collaboration with Centra, another online meeting environment. In this study, the only mention of technology orientation for students was 20 minutes that was provided for them to learn how to create their avatar in Voki; however, there was no mention of training students to use Voki or Centra.

Second, the professional core competencies used for social work education reaccreditation during the time of these studies were from the CSWE (2008). Of the six articles published after 2008, one article specifically applied the competencies to the use of technology (Vernon et al., 2009). Third, all articles centered on training students. Articles on how to use virtual reality in training professionals in the field were absent, either for continuing education credits or on-site professional development. Additionally, the studies addressed how to provide direct services through virtual reality or simulation technology (i.e., client interviews, case management skills, identification of discrimination and oppression) but did not address how they could be used in macro-level social work practice such as advocacy or community engagement. It is worth noting, however, that two articles published before



Table 1. Articles included in analysis.

Citation	Purpose	Population	Methods	Main Findings
Tandy et al. (2016).	The article presents a pilot study to assess aspects of student interviewing competencies.	N=20 foundation-level MSW practice course students already familiar with using Second Life participated.	Qualitative research. Creation of chatbot "Jenny". Students interviewed "Jenny" through their avatars in Second Life. They completed a 2-page reflective report and participated in a focus group about the assignment.	The intervention was found to be effective for the students in understanding how their interviewing errors affected Jenny and what responses were most effective and successful. It gave students a feeling of control over the interview process and provided repeated practice to take risks and make mistakes
Reinsmith-Jones et al. (2015).	The study evaluates student perspectives of the educational value of learning social work skills, values, and knowledge in Second Life.	N=70 undergraduate social work students participated from spring 2010 and fall 2011. They were enrolled in the course Introduction to Social Welfare and Social Work.	Mixed Methods research. Student responses to a consumer discrimination exercise and the US Holocaust museum located in Second Life were evaluated using opinion surveys and journal entries.	Second Life experiences were found to have varying levels of effectiveness, with the store scenario rated as the highest for teaching feelings of discrimination.
Lee (2014)	The article describes a pilot study to examine labeling and stigmatization.	N=41 Foundation MSW students participated in the Second Life home visit simulation. N=10 provided participated in the traditional course.	The implementation phase consisted of students using the program as part of the course lab. Feedback was provided through MSW hybrid/online social work courses through MSW student use of avatars and virtual communities to those in a traditional course. It also used "cocktail party" experiential learning exercises.	Varying levels of effectiveness were achieved. Greater effectiveness was found for participants in the hybrid course regarding diversity, self-awareness, and conflict-resolution than in-class participants. In-class participants reported greater effectiveness in working with people of color than those in the hybrid class.
Levine and Adams (2013)	The article presents an exploratory study introducing students to case management using role-plays conducted in Second Life. It sought to assess self-efficacy in basic case management skills, active listening, and foundational helping skill.	N=9 undergraduate social work students enrolled in an online case management course participated.	Pre-and posttest design. A self-efficacy scale and selfreport measure were used to assess self-efficacy regarding a range of case management tasks. A demographic and technology skill questionnaire was also completed by each student.	Students reported increased confidence in most items of the 25-item self-efficacy scale except for items such as providing or requesting feedback from a client, disclosing opinions and feelings to clients, or providing appropriate self-disclosure.
Wilson et al. (2013).	The article explains the development of a virtual simulation home visit in Second Life for a direct practice course.	N=41 Foundation MSW students participated in the Second Life home visit simulation. N=10 provided feedback on their experience.	The implementation phase consisted of students using the program as part of the course lab. Feedback was provided through voluntary debriefing sessions.	Overall, the home visit exercise was effective in providing a safe opportunity to practice assessment skills "without risk" (p. 433), and in sensitizing students to challenges of conducting home visits and the unanticipated situations that may arise.
Vernon et al. (2009)	The article provides a systematic overview of Second Life and social work education, including the CSWE competencies.	N/A	N/A	N/A
Doel and Cooner (2002).	The article explains the development of a web-based internship program to prepare students for an actual placement. It also outlines the creation of program for CD-Rom delivery.	N/A	N/A	N/A

2000 were found to have a macro-focused orientation, but they were not included in the review results (Flynn, 1990; Galambos & Neal, 1999).

The fourth feature was the identification of several benefits of using virtual reality and simulation technology as teaching methods. All articles identified how the technology provided an opportunity to practice and make mistakes in a safe environment. It also enabled students to consider unanticipated situations that can occur and how they may respond (Wilson et al., 2013). There was consensus that the technology allowed students to expand their understanding of others' experiences and life circumstances, as shown through the study by Lee (2014) in which student's confirmed an increased knowledge of how discrimination and oppression affect their clients on multiple levels. In their study of developing a virtual field placement, Doel and Cooner (2002) note how technology can save scarce resources, act as a screening tool, encourage greater risk taking with minimal harm, create unusual or challenging situations for learning purposes that may not occur naturally, be manipulated to address each student's unique learning style and learning pace, and standardize practice learning experiences.

Finally, four articles mentioned varying levels of effectiveness, all identifying positive results and overall high levels of high achievement. For example, the exploratory study by Levine and Adams (2013) used pre- and posttest questionnaires to assess self-efficacy regarding case management skills, reporting increased confidence in such skills as developing case management plans, identifying client dynamics, assessing client social functioning, conducting evaluation activities during the case management process, and providing appropriate self-disclosure. The study by Tandy et al. (2016) identified increased effectiveness through reflective papers including greater awareness of how student interviewing errors affected the clients and how their responses could "create a successful interview, or cause a failure" (p. 4). Reinsmith-Jones et al. (2015) used surveys and journal content to evaluate effectiveness, which revealed that students found virtual reality an effective method for teaching social work values and skills. Wilson et al. (2013) captured student feedback indicating that effectiveness would have been increased if students had more time to practice using the technology before beginning the assignment as "this would have helped them to focus more on the assignment and less on the mechanics of operating their avatar" (p. 432). This highlights a connection between sufficient orientation to and training of the technology first as an indicator of effectiveness.

Discussion

The use of virtual reality and computer simulation has entered the social work educational arena but has room for growth. These seven articles demonstrate that students are receptive to this type of instruction, as shown through the articles with an evaluation component. None of the articles presented the use of virtual reality and simulation in the distance-learning programs that are growing in the field of social work, and only one tested the effectiveness of virtual training compared to traditional in-class instruction (Lee, 2014).

Another gap identified in the literature is the use of virtual reality and simulation to train postgraduate social workers. As it is expected that social workers will be lifelong learners, using virtual reality and simulation may be an efficient way to provide training for postgraduate social workers. This indicates a need to discover how virtual reality and simulations can be used to strengthen competency in those already providing social work services. Also, a gap exists in understanding how the technology can be used to strengthen macro-level skills such as those used in advocacy, community building, or legislative practices during graduate school and postgraduation.

Social work educators would benefit from studies with intentional effectiveness measures as part of their methodology to ensure that this type of instructional method is as effective as it appears to be. As the profession of social work calls for the use of evidence-based interventions in practice, the social work educational system needs to catch up. Knowing more about how virtual reality and simulation improve knowledge, skills, and attitudes is an important next step. The time is now as

higher education is already embracing virtual, immersive environments. Social work can and should be a part of this transition.

Finally, standardization of technical proficiency that is necessary before a student is ready to use the technology effectively is currently missing. Social work students come with varying levels of experience with technology and unless we identify a baseline of proficiency some students may not be prepared or successful. As one of the reasons for integrating virtual reality and simulation into social work education and training is to allow for practicing skills that are an outcome of knowledge and attitudes, it is important for us to ensure an even playing field as a starting point.

Limitations of the research

There were seven limitations of this systematic review. First, during data collection, it was discovered that the results one of us obtained while searching on the university campus were different from those found by the other, who was at a different location. Not as many citations of publications are available to off-campus users, which could have resulted in a limited collection. The participation of both of us in the review process, however, most likely addressed this limitation. A second limitation may have been the use of abstracts as a first step in the review process. This may have eliminated articles that only included the key words in the main text of the article. Third, although we consulted with a librarian at the beginning of the review process, the librarian was not involved in the whole research process. This may have resulted in the exclusion of all possible databases and key words. Fourth, although we considered conference abstracts an important source of current research, none of them had been transformed into published articles, and therefore the content was not included in this review. For example, although a virtual military patient has been developed at the University of Southern California, no published articles were found in our search parameters from the authors' presentation at the CSWE (2010) Annual Program Meeting. Fifth, we decided not to include citations from the final article reference lists under the assumption that any pertinent articles would have been located through the wide literature search that was conducted. The sixth limitation is that although we both participated concurrently in the initial abstract and full article reviews and in final decisions regarding article inclusion, the 82 abstracts selected from the initial selection process were equally divided between us for review. Following this separate review, we discussed inclusion decisions to minimize bias. However, because of the independent work conducted in the research process, this is a noted limitation. Last, the inclusion of only published articles and English-language articles limited the selection prospects for this systematic review, increasing publication bias.

In addition to limitations, an assessment of bias revealed several points to consider. First, only published articles were included in the final analysis. This is primarily because of the need for information more than the presentation included to assess application effectiveness, as per the research question. In the one case where the conference proceedings met the review criteria, a journal article that related to the conference topic was forwarded to us by the author and was included in the analysis (Tandy et al., 2016). Second, the authors of the articles reviewed may have wanted results to be affirmative because of their use of technology in the classroom, resulting in selective reporting. Third, within-study bias could include the potential of students' social desirability bias on posttest and other evaluation measures. Finally, of the conference abstracts reviewed, only one led to publication, and it is unknown if others were submitted and rejected for publication.

Conclusion

This systematic review revealed several themes regarding the use of virtual reality and computer simulation in social work education. The technology is primarily used to teach direct practice skills rather than develop macro-level expertise. Also, it is geared toward the education of students rather than social work practitioners. Third, the technology is focused on classroom instruction versus continuing education with fieldwide accessibility, and training in the use of the technology to ensure

proficiency in research has yet to be established. The literature reveals the nascent stages of virtual reality and computer simulation in social work education through pilot studies and demonstration projects. There is a lack of effectiveness research, although most studies included a feedback mechanism through assignment journals and surveys.

The literature highlighted several ways virtual reality and computer simulation can have a multidimensional influence in social work education, for example, it is customizable, it has the ability to stimulate new ways of thinking about social issues, and it provides a safe practice arena for skill development and creative problem solving. The social work profession is just starting to discover the potential virtual reality and computer simulation can have in education.

Notes on contributors

Carol M. Huttar is a PhD Candidate at the National Catholic School of Social Service at The Catholic University of America. *Karlynn BrintzenhofeSzoc* is Professor at the University of Cincinnati.

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Appendix

Research Question: How are virtual reality and computer simulation technology being used to train social workers, and are they effective?

Abstract Review

If the following three bullets are present, include the article in the systematic review:

- Is the abstract centered on social work, social service, or social welfare?
- Does it address the use of virtual reality, computer simulation, virtual worlds, or virtual community or any variation thereof?

Include term *avatar* or *avatars*

- Is the focus on education or training (students and practitioners)?

Full Text Review

Ensure it is about the social work profession.

Information to be gathered for each included article:

Introduction

- Does intro lead to the study design and methodology?
- Who, where, what, when, why, and how?

Study Design and Methodology

- What is the type of study (e.g., exploratory, experimental)?
- What is the research question?
- Hypotheses?
- What is the population?
- Are there inclusion and exclusion criteria?
- Where does the study take place (city, state)?
- Are virtual reality and computer simulation defined?
- Is the education and training defined?
- For whom is the virtual reality and simulation targeted?

Sampling

- the sample include social work students and/or social work educators or practitioners?
- How large is the sample?
- Sample type (random, convenient, etc.)
- Where is the sample taken from (university, agency, organization)?
- Level of education? Age of sample?

Discussion

- What were the results?
- Any discussion about effectiveness of virtual reality or computer simulation?
- Limitations of study?

Analysis

- Limitations and strengths of the technology?