Silverstein, Sara, Valentino, Kayla, BuShell, Shawna, and Dreher, Megan. "The Ethical Experiment in Radiation Therapy." *AXIS: Journal of Lasallian Higher Education* 11, no. 2 (Saint Mary's University of Minnesota: 2020).

The Ethical Experiment in Radiation Therapy

Sara Silverstein, MPH[1], Kayla Valentino, MPA[2], Shawna BuShell, EdD[3], and Megan Dreher, BA[4]

Introduction

In his article "Can a University Save the World?," Nicholas Lehman[5] wrote of a university composed of practical-minded interdisciplinary scholars who aim to solve problems, sometimes by proposing policy changes and sometimes by actively bringing research out into the field. Everyone is interdisciplinary to some extent and everybody creates connections outside the university. Lehman added that some stay within a particular topic area while others operate across the full range of university expertise, focusing on making connections rather than staying within one domain. This research project stands as a model of interdisciplinary work, with instructional design and radiation therapy programs looking more deeply into the Lasallian work of integrating ethical practice into the curriculum.

Given the clear implications of a university's need for interdisciplinary work, technology stands at the forefront of how to find engaging and effective methods to both challenge our curriculum and impact ethical critical thinking skills. Within a Lasallian university, the role of the Lasallian teacher is to educate students on how to deal with sensitive content in an ethical manner. There is an important intersection between the centuries-old Lasallian educational mission and 21st century technology to further shape the hearts and minds of students in a high-impact modality. The use of avatars can lighten the burden of the task for the educator and broaden the horizons of scenarios that students may face. As an interdisciplinary tool, this approach has shown promise within the health science field, specifically in the area of radiation therapy. Experiential learning promotes ethical consideration and awareness as students interact with the real world. Providing consistent and reflective opportunities to obtain deep learning is paramount in preparing well-rounded, competent, and practiced students.[6]

Literature Review

Ethical considerations are a vital component of any and all professions, but they are an indispensable aspect of radiation therapy. The purpose of having and maintaining visible ethical principles in a field such as radiation therapy is tied to the sensitivity and often severity of the information that is relayed from medical personnel to patients. According to the American Society of Radiologic Technologists (ASRT) Code of Ethics, all radiation therapists are expected to adhere to these aspirational guidelines to ensure protection, safety, and comfort to patients under their care.[7] The society's five pillars of ethical conduct include serving humanity with dignity and respect, providing service that is unrestricted and non-discriminatory, acting in the best interest of the patient, staying within the scope and domain of radiation therapy while providing care, and, finally, engaging in lifelong learning--all while carrying out the duties and obligations of the profession.

These elements of ethical conduct play a key role in defining what the American Registry of Radiologic Technologists (ARRT) considers to be "qualified" radiation therapists. They also foster an environment that values a high standard of patient care.[8] However, this high standard is expected not only upon entering the workforce. Within the classroom, radiation therapy students are able to learn the human relations-based skills needed to handle virtually every probable patient scenario that might come their way. These skills are not necessarily scripted in textbooks, but rather are instilled in students through the values passed on from professor to student. These skills of how to treat a human person are especially encouraged by Catholic universities and fortified by educators who are committed to teach by faith-guided practice.

In a Rahnerian-styled theological analysis of Saint John Baptist de La Salle's teachings by Pang Kah Meng, education can be described as the spiritual art of "touching hearts," during which educators act as spiritual guides or "good shepherds" throughout a student's educational apprenticeship in life.[5] As one of the five core Lasallian principles,[9] which are depicted as a five-pointed star, a quality education is engrained in the mission of the Lasallian vision. This point of the Lasallian star places great emphasis on approaching education with a childlike newness, encouraging traits such as curiosity, creativity, and courage.[10]

According to Tristano, Fox, Luedtke, and Schaefer, it is within the paradigm of the Lasallian university to provide a holistic, values-based education that integrates Catholic thought and tradition with various other traditions and cultures. It also fosters relationships in community, together and by association, with particular attention to the relationship between teacher and student.[11] It is, therefore, the job of the educator "to *teach* Lasallian" in order to guide students "to *be* Lasallian" in their work. When relating it back to the work of those in the medical field, the same Lasallian message of education, guidance, and fostering relationships with patients must be present.

In using the Lasallian message to analyze the work of a radiation therapist, the importance of guidance and relationships immediately impact daily work. When dealing with a diagnosis that is expected to shorten a patient's lifespan, it is important that radiation therapists be adequately trained to explore difficult questions and to have uncomfortable conversations centered around a patient's treatment and quality of life. According to research presented by Fischer, Tulsky, and Arnold, the delivery of a prognosis is one of the most critical components of the treatment journey for the patient.[12] Within that conversation, the medical professional must present an honest, sensitive, and compassionate platform, cultivating a discussion that supports the physical and mental well-being of the patient.[13] As difficult and upsetting as prognosis discussion is for the patient receiving care, it is also a very uncomfortable task for medical personnel. Though it is not the job of the radiation therapist to relay a poor prognosis to a patient, it is within this realm to deal with the immediate as well as long-term fallout of a poor prognosis. There must be room within the educational realm to have practice in dealing with such situations.

Many tools can assist students in learning and practicing the human relations skills needed in the workforce. The use of new technology is a major advantage for both students and educators alike. Students are able to practice their skills in safe, mediated spaces with the use of simulated patient environments. Software, such as Avatar-Mediated Interactive Training and Individualized

Experience System (AMITIES), uses a hybrid intelligence model, allowing for a real person to become the human intellect behind the avatar.[14] Virtual patient, or avatar, cases become a great asset within healthcare education, specifically for training radiation therapy students, because they teach students the physical examination skills, history-taking skills, and communication skills needed in a safe and controlled environment. According to the Duke Case Study, 94% of professional medical schools and 65% of teaching hospitals use standardized patients (SPs) as part of their educational curriculum.[15] Similarly, virtual reality and the use of avatars have shown promise in effectively preparing students, specifically students within the healthcare field, to carry out vital tasks in their careers.

Using avatars as virtual patients has now been well-established in educational contexts.[16] The anonymity of interacting in the virtual world via a programmable avatar often enables individuals to communicate and express themselves in ways they may have been incapable of doing otherwise, thereby "enhancing their level of social connection and feelings of confidence."[17] This claim was also supported by work undertaken by Katz and Rice, who found evidence that cyber-relationships facilitated by the use of virtual environments generally proved to be robust and long-lasting, [18] while Woolgar claimed that cyberspace can act as a support for particular social activities and relationships rather than acting as a substitute for the real experience, as commonly thought.[19]

Antonacci *et al.* stated that virtual worlds hold considerable potential as powerful mediums for learning. They commented that benefits exist in three key areas:

1. virtual worlds give users the ability to carry out tasks that could be difficult for them in the "real world" due to constraints, including cost, scheduling, or location;
2. the persistence of virtual worlds allows for continuing and growing social interactions, which can serve as a basis for collaborative education; and
3. virtual worlds can adapt and grow to meet user needs.[20]

Using virtual patients allows radiation therapy students to be properly educated about the ethical treatment of patients without burdening those who teach. With the use of new technology, students can immerse themselves in a virtual world that enhances their learning experience.[21] The immersion not only removes the pressure and danger of "role-playing" from instructors, but also gives radiation therapy students the opportunity to engage with life-like diverse populations before actually entering the workforce. Through these activities, students engage in high levels of cognitive functioning "such as interpreting, analysing, discovering, evaluating, acting and problem solving," while also being supported to work outside traditional boundaries of reality.[22]

Because these educational cyberspace interactions have only just within the past decade entered the academic sphere, the wisdom gained, according to Sheehy, Ferguson, and Clough will serve as a foundation for future ethical work. Using the medium of virtual reality, the boundaries of participation in virtual reality education environments and scholarly observation will expand.[23] Students and educators alike will have the space to learn "bedside manner" skills and implement the kind of practice that students can eventually convey as ethical treatment to real human patients.

Research Questions

1. Did using virtual patients allow instructors to observe the ethical conduct of radiation therapy students?
2. Will students benefit from the use of virtual patients in the classroom?
3. Can Lasallian values be taught using virtual technology?

Methodology

The overall mixed-method approach to this research was to utilize qualitative and quantitative data.[24] The students were given questions using survey forms created for this purpose. These were formatted as both Likert scale and open-ended and ranged from the impact of the avatar on the student to how the interaction will improve his or her clinical skills. Additionally, a faculty observation rubric was created based on a data collection instrument that was utilized by Mursion,[25] our partner in delivering the simulation for virtual environment interactions.

The participants in this study were all third-year students enrolled in the Fall 2017 Radiation Therapy II course at a four-year radiation therapy bachelor's degree program in a metropolitan New York area. All students enrolled in the course participated as a part of the course's requirements. The cohort consisted of ten students (nine females and one male). The students were between 19 and 50 years of age.

The students' interactions with the virtual patient were scheduled during class time and reflected topics currently being covered in the course. Two 30-minute sessions were scheduled. Students were randomly assigned to five groups of two partners each.

Session 1 interactions were held in the students' usual classroom, with the virtual patient present on the Smart Board. A table, where one partner group sat at a time, was set up with a direct view of the virtual patient. Non-participating groups observed from their seats. All groups were introduced to a virtual patient who was experiencing tardiness and anxiety about her appointments and scheduling. Each group interacted with the patient with the same demeanor and were asked the same questions. The duration of this interaction was approximately three minutes per group. After the first session, each student was given a first survey, which asked them to reflect on the experience.

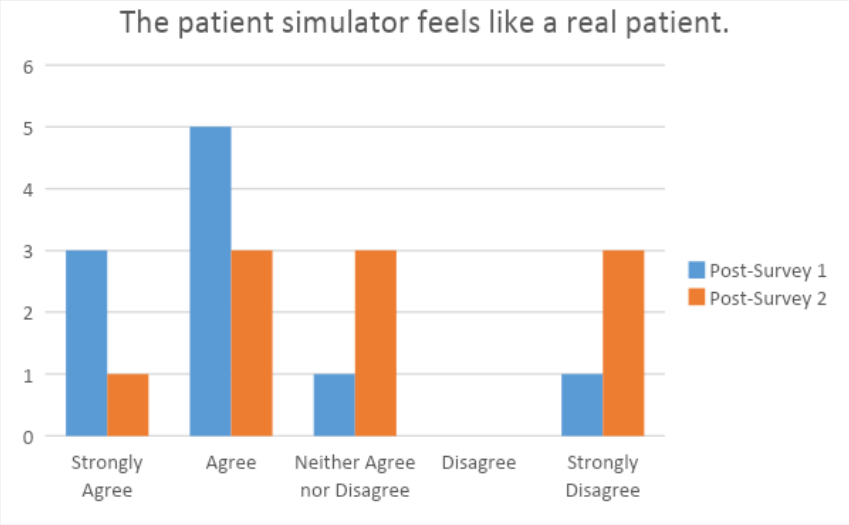
Session 2 was also held in the same location with the same set-up. However, for this session, each group interacted with a different virtual patient. Each patient had a different race/culture along with a different personality ranging from sad to angry. The more emotional virtual patient asked each group five varying ethically charged questions regarding radiation therapy, such as "Does it hurt?" and "Am I safe around my children?"

Also, during the second session, the students were observed by a faculty panel that documented each student's behavior, body language, and emotion with the virtual patient. Students were rated on a scale from "poor" to "excellent." These observations are discussed in the findings.

After the second session, each student was given a second survey, which asked them to reflect on their second experience. At the end of the two sessions, the researchers gathered, tabulated, and analyzed all data.

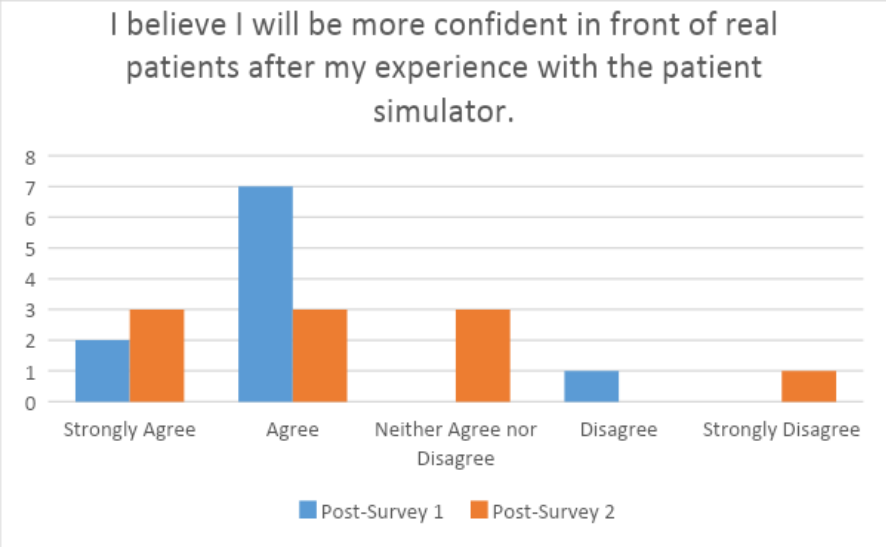
Findings

Figure 1. Whether or not the simulator felt like a real patient.



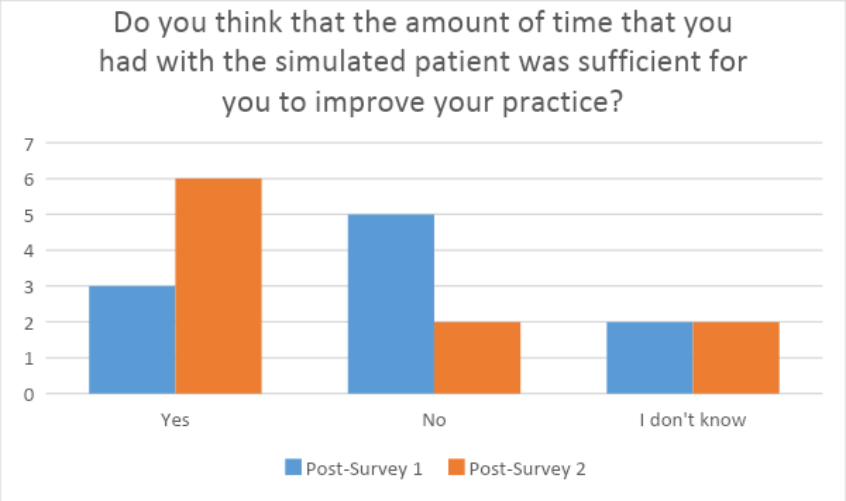
When asked if the patient simulator felt like a real patient, 80% of students agreed across both surveys that the simulator felt like a real patient. After the second survey, more students shifted their responses and disagreed with the statement, which could possibly have been the result of their increased clinical exposure. This could also have been as the result of the virtual patient simulating a more difficult interaction in the second encounter, as compared to the first. The time between the two surveys was three months; during this three month interval the students had more interactions with real patients, which also may have contributed to their response that the simulation felt less genuine to them.

Figure 2. Expected level of confidence in front of real patients after experience with simulated patients.



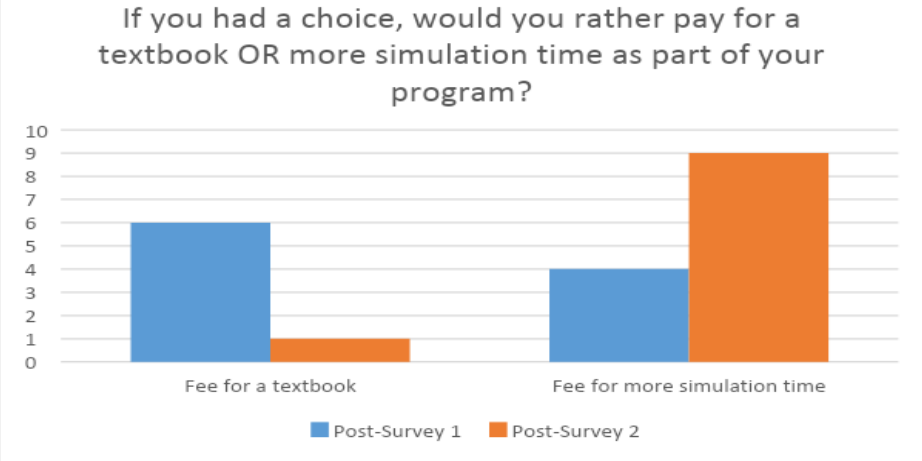
After the first survey, 9 of the 10 students felt they would be more confident with patients after interacting with the simulator patient. Again, during the three-month gap between the first survey and the second survey, students continued with their clinical internships and interacted with real patients. This group of students responded differently during the second survey, which may have been the result of their experience working with real patients. Students may have initially responded over-confidently, not realizing how much of a skill and challenge it is to engage and build confidence with patients through constant practice and exposure. Results may suggest that some students recognized the challenge of building confidence with patient interactions as well as the benefit of a more consistent environment in which to practice this interaction dynamic.

Figure 3. Adequate time to interact with the simulated patient to improve clinical practice.



The majority of students felt that after two interactions, communication with their actual patients had improved. They agreed that time with the virtual patient could improve their practice while currently being in a clinical setting and dealing with live patients.

Figure 4. Choice of paying for a textbook or more simulation time in the program.



As expressed in Figure 4, in order to get more practice time, students would choose to purchase more simulation time in lieu of a textbook. They felt this would increase their exposure to the virtual patient and provide more opportunity for practicing their communication skills.

Figure 5. Benefits of students' experience with the simulated patient.

The words that stood out after combining all students' open-ended submissions to the questionnaire were: peer interaction, be cheerful, be more aware, manners, viewpoints, and differences. It was clear that students learned from the experience that awareness of the differences in culture and demographics was extremely important. This may have caused viewpoints to change because students were more aware of the emotions and reactions patients could have and how it was necessary to be considerate with patients simply by having good manners.

Figure 6. Drawbacks of students' experience with the simulated patient.

Here, the students' comments for the question on drawbacks of their experience with the simulated patient revealed a few key feelings: apathetic, awkward, unreal, time, and shyness.

These comments are expanded upon in the findings summary and conclusions sections, where potential improvements to the experiential process are addressed.

Figure 7. Improvement in communication with real patients based on experience with the simulated patient.

This third word cloud aggregated the open-ended answers to the question, "How has your experience with the simulated patient improved how you will communicate with real patients?" As can be seen from Figure 7, students collectively felt that their experience with the avatar was an emotional one. Students left the experience understanding they needed to stay calm, be much more aware of others, and give themselves permission to be empathetic with their future patients.

Findings Summary

When asked if the patient simulator felt like a real patient, 60% of students across both surveys agreed that the simulator felt like a real patient. After the second survey, more students shifted their responses and disagreed with the statement. This could be a possible result of their increased clinical exposure or perhaps of the virtual patient simulating a more difficult interaction in the second encounter, compared to the first. The time between the two surveys was three months, during which students acquired more interaction time with real patients; and some felt the simulation was feeling less genuine to them.

After the first survey, 9 of the 10 students felt the likelihood of more confidence with patients after interacting with the simulator patient. Again, the three-month gap between the two surveys allowed students to continue with their clinical internships and interact with real patients. This group of students responded differently during the second survey, which may have been the result of their experience working with real patients. Students may have responded over-confidently without realizing the level of skill and challenge needed to engage and build confidence with patients through practice and exposure. These results suggest that some students did recognize the challenge of building confidence in patient interactions as well as the benefit of having a more consistent environment in which to practice this interaction dynamic.

The majority of students felt that after two interactions communication with their patients would improve. They agreed that time with the virtual patient could improve their practice while currently being in a clinical setting and dealing with live patients. As presented in Figure 4, if given an opportunity to get more time, students would choose to purchase more simulation time in lieu of a textbook, thereby increasing their exposure to the virtual patient and providing more practice of and for their communication skills.

Open-ended questions were extrapolated into word clouds to represent students' comments in a visual way for the question, "What are the benefits of your experience with the simulated patient?" Students clearly felt the benefits of using avatars in simulating patient interactions, namely the ability to learn with peers and derive different viewpoints when discussing the use of different techniques. Students were forced to be aware of different viewpoints and reactions that resulted from watching peers dealing with the same scenario.

During the faculty observations, 100% of students fell into the satisfactory rating during their virtual patient interaction. Mean averages ranged from a high end of 3.4 to a low end of 3.25. Students, on average, scored the highest in the behavior category and scored the lowest in the emotion category.

	Disposition	Body Language	Behavior	Emotion
Mean Average Satisfactory Score	3.38	3.39	3.4	3.25

Conclusions and Recommendations

This research sought to evaluate the implementation of an unconventional approach in addressing ethical dilemmas in the course of educating radiation therapy students. Through the use of virtual patients, students could experience difficult conversations without the intrusions and negative consequences of these conversations happening for the first time with real patients. Since radiation therapists are expected to maintain a high level of ethical conduct while providing protection, safety, and comfort for patients (ARRT 2018), we, as the researchers and instructors, could observe the ethical conduct of the students who are the future of the profession.

Our research indicated that students agreed that the use of virtual patients to role play ethical discussions in the classroom was beneficial to their education and to the development of their communication skills with patients. By utilizing this unique and innovative concept, we expanded our Lasallian educator role by providing a holistic, value-based education in our approach to fostering our students' relationships with their patients.

In reviewing the findings of this research, we were able to posit potential improvements that would create more comprehensive and impactful interactions with the virtual patient in the future. The awkwardness of communicating with a virtual patient was initially distracting to the students. To create a more comfortable environment, we would better prepare both the virtual patient and the students. For example, we would request the environment/background of the virtual patient to reflect more of a radiation therapy department instead of an examination room.

We would also introduce students to a virtual patient prior to setting up interactions that consist of ethical dilemmas to familiarize them with this technology tool.

We also noticed that some student feedback mentioned that the environment in which the interactions took place was uncomfortable because of simultaneous peer/rater observations. In order to remove this extra influence and discomfort from the students during their interactions, we would include only those students who are interacting with the virtual patient in the room. These interactions would be recorded and reviewed later with all students for a debriefing and feedback session.

As we return to our initial research question of how we as Lasallian educators find engaging and effective methods to challenge our curriculum to impact ethical critical thinking skills, we believe that these virtual technologies can help meet that end. The use of avatars can lighten the load on the educator while broadening the horizons of typical scenarios that students may face in the field. Embracing the capabilities of experiential learning, as supported by our research, promotes ethical consideration and awareness as students interact with a simulated world. Additional benefits of the immersion of students into an ethical scenario provided students and instructors with the reflective opportunity to grapple with day-to-day issues and to experience deeper learning so that we can ensure that students become more well-rounded, competent, and practiced radiation therapists.

Endnotes

1. Sara Silverstein, who earned her MPH at New York Medical College, is the clinical coordinator of the radiation therapy technology program at Manhattan College.

2. Kayla Valentino, who earned her MPA from Walden University, is the program director of the radiation therapy program at Manhattan College.

3. Shawna BuShell, who earned her EdD in instructional technology and media from Columbia University's Teachers College, is an adjunct assistant professor in the school of education at Manhattan College.

4. Megan Dreher, who recently earned her BA *summa cum laude* in both philosophy and communications at Manhattan College, is currently a member of the 2020 Masters Cohort in the department of philosophy at Brandeis University.

5. Nicholas Lehman, "The Chronicle of Higher Education" (2019): 89-90. Retrieved December 10, 2019 from https://www.chronicle.com/ interactives/20191121-Lemann???Lehman.

6. Gay Dungey and Hazel Neser, "Radiation Therapy Students' Perceptions of Their Learning from Participation in Communication Skills Training: An Innovative Approach" in *Journal of Medical Radiation Sciences* 64, no. 2 (2017): 138-145.

7. American Society of Radiologic Technologists, "Radiation Therapist Code of Ethics, 2019." Retrieved on November 5, 2018 from www.asrt.org/docs/defaultsource/practice-standards/codeofethics.pdf.

8. American Registry of Radiologic Technologists, "ARRT Standards of Ethics, 2018." https://www.arrt.org/d https://www.arrt.org/docs/default-source/governing-documents/arrt-standards-of-ethics.pdf?sfvrsn=c79e02fc_24ocs/default-source/governing-documents/arrt-standards-of-ethics.pdf?sfvrsn=c79e02fc_24.

9. For an explanation of the five core Lasallian principles, see "The Five Core Principles of Lasallian Schools: Their Origins, Integration with Catholic Identity, and Resonance Today" by George Van Grieken, FSC in *AXIS: Journal of Lasallian Higher Education* 10, no. 1 (2019): 21-39.

10. Alfred Pang Kah Meng, "What Child Is This? A Rahnerian Interpretation of the Child in Lasallian Pedagogy" in *AXIS: Journal of Lasallian Higher Education* 7 no. 3 (2016): 89-90, 91.

11. Richard Tristano, Mary Catherine Fox, Melissa C. Luedtke, and Judith Schaefer, "Lasallian Assessment: Charism and the University" in *AXIS: Journal of Lasallian Higher Education* 1, no. 1 (2009): 41-60.

12. Gary Fischer, James Tulsky, and Robert Arnold, "Communicating a Poor Prognosis" in *Topics in Palliative Care* 4 (2000): 75.

13. Fischer *et al.*, 89.

14. Norman Berman, Steven Durning, Martin Fischer, Soren Huwendiek, and Marc Triola, "The Role for Virtual Patients in the Future of Medical Education" in *Academic Medicine* 9, no. 9 (2016): 1217-1222.

15. Berman *et al*.

16. "VR Medical Training Simulations for Student Learning: Mursion." Virtual Reality Training Simulation Software by Mursion, 2020. https://www.mursion.com/services/healthcare/; David Cook, Patricia Erwin, and Mark Triola, "Computerized Virtual Patients in Health Professions Education: A Systematic Review and Meta-Analysis" in *Academic Medicine* 85, no. 10 (2010): 1589-1602; Susan Mitchell and Jeffrey Ring, "Avatars and Virtual Worlds: New Technology Solutions for Teaching and Learning Shared Decision Making" in *Shared Decision Making in Health Care: Achieving Evidence-Based Patient Choice*, 3rd edition, chapter 16 (Oxford University Press, 2016): 99-104.

17. John Martino, "The Avatar Project: Connected but Not Engaged – The Paradox of Cyberspace" (2007). Retrieved June 14, 2019, from https://soma.sbcc.edu/Users/Russotti/SL/PowerofVirtual %20WorldsEdu_0708.pdf.

18. James Katz and Ronald Rice, *Social Consequences of Internet Use: Access, Involvement and Interaction* (MIT Press. 2002).

19. Steve Woolgar, *Virtual Society? Technology, Cyberbole, Reality* (Oxford University Press, 2002).

20. Dave Antonacci, Salli DiBartolo, Nancy Edwards, Karen Fritch, Barbara McMullen, and Rick Murch-Shafer, "The Power of Virtual Worlds in Education." ANGEL Learning White Paper, 2008: 3.

21. Gary Falloon, "Using Avatars and Virtual Environments in Learning: What Do They Have to Offer?" in *British Journal of Educational Technology* 41, no. 1 (2010): 108-122.

22. Antonacci *et al.*

23. Kieran Sheehy, Rebecca Ferguson, and Gill Clough, "Learning in the Panopticon: Ethical and Social Issues in Building a Virtual Educational Environment" in *Open Research Online* 2, no. 2 (2008): 89.

24. Jonathan Grix, *The Foundations of Research* (Macmillan International Higher Education, 2018); Susan McKenney and Thomas C. Reeves, *Conducting Educational Design Research*, 2nd edition (Routledge, 2019); Robert K. Yin, *Case Study Research and Applications: Design and Methods* (Sage, 2017).

25. Mursion, Inc., is "a virtual reality simulation company that delivers experiential learning for essential skills in the workplace."