Technology in Health Professions
Education and Training

How is technology used in educating and training the health care workforce?

With changing roles of health professions and scope of practice restrictions, the modes of educating and training the workforce have advanced to meet the evolving needs. Various forms of education technology have been integrated into the health care from educational video games to mandatory mobile devices.

Although there are many innovative uses of education technology, two main methods have received the most attention in the health care field as they continue to grow in popularity:

- **Training through Simulation Technology:** The use of simulation technology as a mechanism for training health providers has become more prevalent for a variety of health professions including dentists, pharmacists, nurses, physicians and more. For more see, "How is simulation technology used to educate health care providers?"
- **Online Distance Education:** Online education has increased the training opportunities for working professionals and rural-located students and providers. For more information see, "How has technology impacted access to education and training?"

Health information technology (HIT) has also begun to play a larger role in educating health care students. A 2013 article from the American Academy of Family Physicians highlights the importance of exposing medical students to electronic health records (EHR) systems during their training.

How is simulation technology used to educate health care providers?

Many forms of simulation have been a part of health care education for many years, including volunteers role-playing patients, practice suture pads, and anatomical replicas. However, improvements in technology have advanced the capabilities of the simulation tools available to students. A 2010 report from EDUCAUSE on the use of simulation technology in higher education observes that simulation technology is most often used to practice low-frequency

events that require high acuity (e.g., emergency procedures) and irreversible procedures (e.g., surgery).

Two methods of simulation technology methods were discussed in a 2011 study of simulation in medical education by the Association of American Medical Colleges (AAMC):

- **Mannequin Simulation**: The AAMC study indicates that the most common type of simulation equipment is the full-scale mannequin, most often a computerized adult. The report defines full-scale mannequins as the "life-sized robot that mimics various functions of the human body, including respiration, cardiac rhythms, and pulsation." As of 2011, 95% of medical schools and 93% of teaching hospitals were utilizing this technology.

- **Screen-based Virtual Reality**: Although less common, screen-based virtual reality, or "screen-based simulation" is also being used to educate providers. The AAMC study defines screen-based simulation as "a program, exclusively computer-based, that allows learners to interview, examine, diagnose, and treat patients in realistic clinical scenarios. Examples include virtual patients, virtual environments, or physiologic simulations." As of 2011, 60% of medical schools and 55% of teaching hospitals were utilizing this technology.

These forms of simulation technology are used in educating a variety of health care professionals. The National Council of State Boards of Nursing is currently conducting a study of the use and impact of simulation technology in nursing education with the final results to be completed in December of 2014. Simulation technology has also been utilized in the training of emergency medical technicians (EMT), as highlighted in this 2012 article on EMS training in Arizona.

**How has technology impacted access to education and training?**

**Online Education**: The ability to provide instruction through the Internet has improved access for health care students in a variety of locations and situations. Students and practicing health care professionals without access to a campus location, such as those in rural locations, have the ability to receive training online from a distance.

Also, online education can cater to a variety of life situations, including students that work full-time during the day and those with children that lack child care. A 2011 report by HealthForce Minnesota highlighted the example of allied health professions "who were ‘trained on-the-job’ now find their professional certification boards will be requiring a 2-year college degree as minimum qualifications in their field." Online modes of education allow individuals in these situations to continue working while advancing their education.

In recent years, many programs have utilized technology to successfully expand access. For example:
• **Continuing Education for Public Health Professionals:** A 2011 article describes an online continuing education opportunity for public health professionals in California. A 2012 literature review also highlighted the use of simulation in clinical settings as a method of continuing education.

• **Expanding Nursing School Capacity:** A program funded by Robert Wood Johnson in 2009 utilized online courses as a method for expanding the capacity of a registered nursing program in Salt Lake City.

• **Internet-based Training for Rural Clinicians:** A 2011 article discusses an Internet-based program that trains clinicians "to provide 'big city' quality of care to patients at remote (rural) clinics."

**Mobile Simulation:** Mobile simulation units also play a role in expanding the reach of health care education. Mobile simulators include patient mannequins and virtual reality devices placed in a replica medical facility room to simulate various medical scenarios. These units, often housed in a bus or mobile trailer, can deliver hands-on learning opportunities to rural practitioners. For example, South Dakota’s SIM-SD provides five mobile simulation units used to deliver health care training throughout the state.

**How has the use of simulation technology and training impacted the preparation of the workforce?**

The Society for Simulation in Healthcare lists some of the benefits realized by using simulation technology to train the health care workforce, including:

- Accessible learning situations that are rare in real life
- Freedom to make and learn from mistakes without drastic consequences or the intervention of a trainer
- Recorded evaluation of student performance during simulation tasks
- Customizable learning experiences

Various studies have examined the impact of simulation technology education on the quality of instruction, including:

- A 2011 article from the Journal of the American Medical Association evaluated outcomes from the use of "technology-enhanced simulation" and found large positive impacts on clinician behavior outcomes and moderate positive impacts on patient care.
- A 2012 article from The Journal of the Society for Simulation in Healthcare compares technology-enhanced simulation to other methods of education and found that simulation technology methods result in higher learning outcomes.
- A 2009 article from the Mount Sinai Journal of Medicine provides a literature review of articles examining the impact on education technology in various health care settings to clinical outcomes and found conflicting results.
What are some of the challenges and disadvantages to using technology in education?

Although many students’ experiences with education technology have been positive, there are challenges to face when integrating technology into the classroom. A 2008 report from The Economist Intelligence Unit provides results from a survey of leaders in higher education throughout the world. Challenges for implementing technology discussed in the survey included:

- **Cost**: Cost was the greatest concern for 68% of survey respondents from university settings. This is especially a concern with health care education technology. A 2009 article in the Mount Sinai Journal of Medicine reported that "depending on the fidelity of a simulator, the price for equipment alone can range from $6,000 to $250,000."
- **Faculty Reluctance**: While some faculty members are fully onboard with evolving methods of instruction, others feel more comfortable with traditional teaching styles and may be reluctant to change. This also introduces a challenge for institution leaders, as they must reform faculty evaluation standards to include their willingness to integrate technology in the classroom.
- **Lack of Foundational Knowledge**: Some educators and administrators are concerned that the rapid access to specific facts through the Internet reduces the amount of foundational knowledge that students receive in certain subjects.
- **Technological Distractions**: One concern is that too much technology is a bad thing. Student’s attempting to multitask with the use of technological devices may not be as engaged in the instruction as they would be if these distractions were removed.
- **Cheating and Plagiarism**: Introducing technology in testing, homework, and other modes of instruction may provide new avenues for students to cheat, steal other’s academic work, and portray their level of knowledge dishonestly.

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