New Skills Acquisition

Sal Martino, *Ed.D., R.T.(R), CAE, and* **Teresa Odle,** *B.A., for the Health Care Industry Advisory Council Task Force on New Clinical Skills Acquisition.*

Dr. Martino is executive vice president and chief academic officer of the American Society of Radiologic Technologists (ASRT) and chief operating officer of the ASRT Education and Research Foundation.

Ms. Odle is a freelance writer and editor.

A complete list of the HCIAC collaborators appears at the end of this article.

Everything that can be invented has been invented.

- Charles H. Duell, commissioner, U.S. Patent Office, 1899.

Nobody today faults Mr. Duell for his lack of vision at the end of the 19th century. After all, he witnessed Wilhelm Conrad Roentgen's amazing discovery of the x-ray 4 years earlier. But could Dr. Roentgen or Mr. Duell have envisioned computed tomography (CT), magnetic resonance imaging or filmless radiology departments? For that matter, could a radiologic technologist in the 1950s forecast molecular imaging or could a radiologic technologist today picture the use of NASA and government technology in medical imaging design?[1] "The only certainty is that what we see today is just the beginning," said Wolbarst and Hendee of Georgetown University Medical Center in Washington, D.C.[1]

The ASRT Education and Research Foundation and its Health Care Industry Advisory Council (HCIAC) have taken steps to ensure that radiologic technologists continue to gain the skills they need to practice effectively in the years ahead.

Background

In May 2006, the 10-member HCIAC Task Force on New Clinical Skills Acquisition finalized a white paper that outlined best practices for improving new skills acquisition for technologists. Two major industry imperatives drove the task force and the American Society of Radiologic Technologists' (ASRT) cooperation on the project. First, HCIAC has asked the ASRT to join the council in responding to major advances in technology and changes in the radiology industry to improve new skills development and education for R.T.s. In addition, trends outlined by FutureScan, a 3-year research project undertaken by ASRT, demonstrate challenges and opportunities that will affect R.T. education and future practice.

Several key findings in FutureScan relate directly to new skills acquisition[2]:

- The rapid evolution of smaller, faster and less-expensive technology affects R.T.s today and will exponentially influence everyday practice and education in the future. Molecular imaging may shift radiology's role from diagnosis and cure to detection and prevention.
- Emerging technologies are changing how students receive instruction. Educators must help students interpret concepts and become lifelong learners. Radiologic technology students are older and often in a second career.
- The workplace is changing rapidly. Computer skills are critical for technologists, and professional growth is becoming more structured.
- Legislative, regulatory and reimbursement influences could restrict radiology use and demand that health care providers demonstrate competence.

The HCIAC Task Force on New Clinical Skills Acquisition is a subcommittee that focuses on how the industry can work with the ASRT, educators and employers to respond to the thrusts of major change, meeting continuing needs for radiologic technology education and new skills acquisition. The task force met in October 2005 to review the concepts of adult learning, revisit the FutureScan findings and discuss challenges and barriers to technologist training and skills acquisition. From this meeting, task force members generated a list of best practices for new skills acquisition.

The best practices are based on input from industry and ASRT representatives, an understanding of adult learning perspectives and the incorporation of technology for gaining new skills. Today, the average student in a radiography program is older than 25 years, often enters the program with prior work experience and has a degree in hand.[3] Educators are aware that adults engage in the learning

process differently. Brain-based learning stresses the effect of experience on skills retention.

The American Society for Training and Development (ASTD) has reported that over the next 10 years, about 74% of today's working Americans will require retraining and that technical skills will require updating every 4 years. The ASTD also reports that Web-based or computer-based training has begun to replace many in-person training sessions.[4]

Unlike other industries, health care professions and radiologic sciences, in particular, have changed at the core. The basics of imaging have evolved from image capture in x-ray tubes and processing with film and chemicals to digital acquisition and computer processing. In the near future, radiologic technologists will have to master the core concepts of molecular imaging.

The message is clear that technologists will best succeed when poised for dynamic, lifelong skills acquisition. The HCIAC task force meeting and white paper represent the first concentrated and collaborative effort to identify best practices and recommendations for new skills acquisition.

Best Practices and Recommendations

■ **Implement knowledge and skills preassessment prior to training technologists on new technology, followed by postassessment to demonstrate training value.**

Radiologic technologists enter a training situation with different experience levels and educational backgrounds. As the sophistication of technology increases, these differences become more noticeable. The learning experience of everyone involved, and the resulting effectiveness of a training program, can be compromised when inconsistencies in backgrounds are acute.

Use of preassessment may help determine core knowledge and skills, leading to improved educational program design. Because R.T.s learn differently, preassessment and postassessment may help with the design of training and education programs. The ability to assess technologists' skills and knowledge before and after an educational course or application training program can help evaluate a program's effectiveness and value and also can be used to evaluate and document a participant's progress.

■ **Achieve a strong commitment for R.T. skills acquisition from management at the institutional and administrative levels.**

Maintaining a continuous learning environment for technologists will require industry leaders, educators

and R.T.s to work with R.T. employers to reach a shared goal of skills acquisition. They must base this goal on evidence to overcome time and cost barriers.

A 2000 report showed that, despite industry efforts, imaging department managers were not always allotting the time required for technologists to complete applications training programs to ensure proper operation of newly installed equipment. In addition, 1 manufacturer's internal report showed that applications specialists were spending 40% of their time waiting for technologists to return to applications training after being pulled away to perform patient examinations.[5]

While training time often is dependent on medical imaging and radiation therapy personnel shortages within a facility or within the industry, other studies have shown a waning lack of commitment in health care to information technology training. In 2004, health care executives rated cost pressures as the business issue that would have the most impact on health care the next 2 years.[6] However, when asked about the next 5 years, health care executives cited increasing patient safety, reducing medical errors, adopting new technology and improving operational efficiency as among their top 5 business issues. Appropriately educating radiologic technologists in new clinical and applications skills is highly relevant to each of these strategies.

Within health care, innovative solutions are underway to educate nurses and other health professionals in spite of time constraints.[7] Other industries, such as metalworking, are developing creative solutions in partnership with industry suppliers and managers to teach new skills without sacrificing productivity or profitability.[8]

Successful alliances will require partnership from the highest management levels, as well as support from staff. Obtaining management support will require demonstration of the value of R.T. education to patient safety, error reduction, operational efficiency and return on investment.

■ **Provide off-site learning opportunities.**

Continuing education opportunities could include self-directed learning, off-site workshops or on-site activities. Applications training traditionally has been conducted on site, although some training has involved travel to distant locations. New and advanced technologies may require travel to specialized learning centers. Industry leaders and management can partner to find ways to allow technologists to attend this training for the most technical and complex skills acquisition, when necessary.

Often, the selection of off-site training arises from

the educator's desire to present a complete and uninterrupted program. Many industries have turned to an Internet-based curriculum or other technological solutions that balance a worker's time away from the job with the availability of training professionals. Use of distance learning and electronic solutions has increased traditional education programs and undoubtedly will continue to increase.[4,9] Managers appear to be open to a combination of learning methods (Management panel discussion notes, May 5, 2005); additionally, the FutureScan report encourages flexibility.[2]

Offering off-site learning provides the opportunity to combine other best-practice recommendations that promote innovative solutions, such as self-directed computer-based learning and preassessment. The employer may support paid time off for the technologist's learning; industry can work with senior management to provide instructional materials or equipment for learning.

Learning highly technical or clinically-based skills via computer might seem idealistic, but researchers recently taught nonphysician crew members aboard the International Space Station to perform complete ultrasound examinations in orbit.[10] Live e-learning and Web conferencing can enable greater flexibility in scheduling and the ability for staff to come together with an instructor under a model other than the traditional on-site training or a model that requires travel to off-site locations. It also can enable learning closer to the moment when the radiologic technologist most needs the information, otherwise known as "just-in-time learning."

■ **Educate appropriate users and potential trainers.**

Ensuring new skills acquisition means training the appropriate users, not just a supervisor who seldom performs patient care procedures. If frequent users are excluded from training, it compromises training effectiveness and eventually affects efficiency and patient care.

Ideally, every radiologic technologist who uses new technology will receive appropriate training and commit to lifelong learning. Until that occurs, educating a "super user" who in turn educates others for new skills acquisition can be a solution in some instances. In fact, that practice occurs today, at least on an informal basis. In an ASRT survey of technologists who perform CT scans, 68% of respondents said they rely on radiologists and other technologists to remain up-to-date in their specialty.[11]

■ **Educate entry-level technologists about the influence of technology and the importance of lifelong learning.**

Commitment to lifelong learning and continued acquisition of new skills begins with education. The technologist's initial education forms the core skills needed to grasp the concepts on which new technologies are based. Although this charges the educator with the responsibility of continuously updating the entry-level curriculum, the ASRT, industry members and management at clinical sites can support their efforts. This ensures that graduating technologists remain current in their knowledge base.

In the Environmental Scan of the Radiographer's Workplace, Phase 2, radiologic technologists said that patient care was the most important aspect of their job. Remaining current on new skills is critical to quality patient care. And, 95% of technologists reported that "feeling they've mastered the profession" was an important attribute for job satisfaction.[12]

In addition, a 2002 survey found that, although fulfilling registry and state licensing requirements was the primary reason for seeking continuing education, more than 93% of technologists cited updating discipline and specialty skills and knowledge as the reason they sought continuing education. Nearly 90% of respondents also reported that "broadening my knowledge of the radiologic sciences in general" was a reason for seeking further education.[13]

These findings reflect the degree of technologists' self-motivation for lifelong learning. However, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) places some burden on the health care employer. JCAHO standards include HR3, which states, "Processes are designed to ensure that the competency of all staff members is assessed, maintained, demonstrated and improved on an ongoing basis."[5]

■ **Develop mentoring programs.**

The highest level of knowledge is understanding, the process where a learner moves from absorbing and internalizing knowledge to the point where using the knowledge is generally intuitive. Technology can offer innovative methods of delivering education about new skills, but only interaction with a teacher or mentor can move these skills to promote understanding.

Mentoring programs can help R.T.s develop a commitment to lifelong learning. Mentoring begins in the clinical education setting and should continue as a structured, positive experience when a radiologic technologist enters the work force or acquires a new skill. Peer-to-peer information transfer in the clinical setting leads to better understanding of new technologies and techniques. The best practices in new skills acquisition

for R.T.s will appropriately combine innovative technology and mentoring as the learning situation demands.

Conclusion

How likely is it that a completely new imaging technology or modality could burst onto the scene over the next few years? And when it does, will those professionals who are called upon to perform the new service be educated and prepared? With best practices in new skills acquisition, the profession can carve the way.

The key to best practices in new skills acquisition for technologists may emerge from relating new skills acquisition and lifelong learning to the needs of those who must commit to the process. To accomplish this, radiologic technologists will understand the relationship between continuous professional development and their goals of quality patient care and keeping current in practice. Management will see the return on investment gained from committing time and dollars to continuing radiologic technologist skills acquisition. Educators will recognize the importance of instilling a commitment to lifelong learning as an integral part of radiologic technology practice in graduating professionals; they also must find it rewarding to update curricula continuously to match technology. Industry leaders can cooperate in educating and motivating technologists by providing new skills acquisition tools to educators, management and technologists. Those who educate radiologic technologists on new skills can understand and incorporate adult learning principles, strengthened by general education. All involved can commit to a culture of lifelong learning for technologists.

Most importantly, the partners in these efforts must come together to gather and share information and create innovative solutions. The HCIAC Task Force on New Clinical Skills Acquisition will continue a dialog with those involved and incorporate findings with the ultimate goal of improved patient care in the medical imaging and radiation oncology settings. ◆

Members of the Health Care Industry Advisory Council Task Force on New Skills Acquisition: Barbara Black, Annette Coleman, Carol Foyles, Steve Hinkle, Jennifer Pardue, Cheryl Provost, Jerry Reid, Nancy Rindlaub, Cheryl St. Julien, John Valencia and Nanci Wozniak.

References

1. Wolbarst AB, Hendee WR. Evolving and experimental technologies in medical imaging. *Radiology.* 2006;238(1):16-39.

2. American Society of Radiologic Technologists. FutureScan. Albuquerque, NM; 2004.

3. American Society of Radiologic Technologists. Faculty Development Needs Assessment Survey. Part 2, Educational Program Details. Albuquerque, NM; 2004.

4. Bersch C. Can you go the distance? Let the knowledge Olympics begin. *Commun News.* 2004. Available at: www.comnews.com/stories/articles/c0401distance.htm. Accessed Dec. 1, 2005.

5. Aroha G, Johnson H, Lipman E, Schenck J. Engaging the medical imaging department in new technology applications training: a comparative study of competency levels. Paper presented at: American Society of Radiologic Technologists Annual Meeting, June 2002; Albuquerque, NM and American Healthcare Radiology Administrators Annual Meeting, August 2002; Nashville, Tenn.

6. Healthcare Information and Management Systems Society. 15th annual HIMSS leadership survey. Vendors project that EMR implementation and patient safety will be top priorities for their clients in the next two years, while focus on HIPAA privacy and security requirements is expected to decline; 2004. Available at: www.himss.org/2004survey/ASP/vendorceo_final4.asp. Accessed Nov. 2, 2005.

7. Sanli M. Mastering healthcare applications. Toronto hospital uses self-directed and computer-based training to meet clinical staff's learning needs. *Health Manage Technol.* 2005. Available at: www.healthmgttech.com. Accessed Dec. 1, 2005.

8. Management perspective. NAFTA nurtures partnerships. *Manufacturing News.* 2001. Available at: www.manufacturingncenter.com/man/articles/m0801mp.htm. Accessed Dec. 1, 2005.

9. Moe MT. Emerging trends in postsecondary education – the view to 2012. Available at: www.usdla.org/html/aboutUs/researchInfo.htm. Accessed Dec.12, 2005.

10. Foale CM, Kaleri AY, Sargsyan AE, et al. Diagnostic instrumentation aboard ISS: just-in-time training for non-physician crewmembers. *Aviat Space Environ Med.* 2005;76(6):594-598.

11. American Society of Radiologic Technologists. Computed tomography educational needs assessment: 2005. Available at: www.asrt.org/content/RTs/ResearchLandingPage.aspx. Accessed Jan. 17, 2005.

12. American Society of Radiologic Technologists. Environmental scan of the radiographer's workplace. Phase 2. Albuquerque, NM; 2002.

13. American Society of Radiologic Technologists. Continuing education needs assessment. Albuquerque, NM; 2002.