Radiologists as Educators: A Narrative Review of the Literature

Kathleen L. Linaker DC, DACBR, PhD*

Dean, Center for Life and Health Sciences Mohawk Valley Community College, Utica, NY

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Abstract

Objective: The purpose of this study was to examine literature on how radiologists are trained to be effective educators for both residents and undergraduates in the health professions.

Methods: A review of the literature was performed using relevant key words. Articles were retrieved through from 1990 through December 2012 using PubMed, ScienceDirect, ERIC, Proquest, and ICL databases along with a manual review of references.

Results: Of the 4716 unique abstracts reviewed by the author, 51 were found to be relevant to the purpose of this study. Faculty teaching skills seem to be solidified during residency. This may be due to a failure to include scholarship of teaching and learning in education and faculty development. Preliminary research shows that creating opportunity for faculty development is beneficial with much of this literature focused on explaining educational concepts to radiologists.

Conclusion: The literature examining faculty training in the area of radiology education is sparse. Several articles address the need for more academic radiologists and the need for better training of academic radiologists. The few articles aimed at providing insight to radiologists in this area introduce basic educational concepts such as lecture creation, examination writing, and learning styles or simply delineating what makes an effective educator.

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Introduction

In the spring of 1995 Professor Scott Johnson asked “Aren’t the most important questions facing our field related to how students learn and how they can be taught more effectively?”¹ Until recently, only a handful of radiology educators have voiced these questions and pursued meaningful answers.^{2,3} As a result, little literature examines how radiology is taught, learned, or evaluated at the resident

* Mohawk Valley Community College, 1101 Sherman Dr, PH301D, Utica, NY, 13501-5394. Tel.: +1 716 931 1952; fax: +1 315 792 5697.

E-mail address: katlinaker@gmail.com.

level, and even fewer articles examine undergraduate radiology education specifically. Therefore, the purpose of this study was to examine literature on how radiologists are trained to be effective educators for both residents and undergraduates in the health professions.

Methods

This article provides a narrative review of the literature from 1990 through 2012 relating to the training and preparation of radiologists to function as teachers that was retrieved using MEDLINE, ScienceDirect, ERIC, Proquest, and ICL databases along with manual review of references. The comprehensive sampling strategy used the terms *radiology OR diagnostic imaging AND education OR teaching OR resident OR medical student OR chiropractic student OR curriculum OR medical education OR medical school OR medical students OR medical curriculum OR chiropractic education, OR chiropractic school OR chiropractic students OR chiropractic curriculum*. Articles were limited to those in the English language and to humans.

Results

The resultant 4716 unique article abstracts and/or titles were reviewed by the author. All articles that appeared germane to effective teaching in diagnostic imaging education were obtained and reviewed by the author, which led to the inclusion of 51 articles in this paper.

Discussion

Ensuring that faculty members are effective educators is an area of interest in the radiology education literature. Scheiner and Mainiero⁴ found that radiology residents were just as effective as attending radiologists at presenting lecture material. This finding suggests that radiology faculty *never improve beyond the teaching skill set that they had as residents*, and this, if accurate, is troubling. This is most likely a result of a failure to include the scholarship of teaching and learning in their educational training; without consciously reflecting upon their practice or integrating new learning, people tend to reinscribe what they experienced as students (KM Hibber, personal communication, University of Western Ontario, January 22,

2012). The author that addresses this area most extensively in the radiology education literature is Dr Jannette Collins. In 2002, she published an article entitled “Motivation of Radiology Residents” wherein she discusses a variety of methods to motivate students to learn, drawing from both educational and psychological foundations.⁵ In 2006, Collins⁶ presented 3 keys to being an effective educator: knowledge, skill, and professional traits. She defines *knowledge* as mastery of facts within an area of expertise and as understanding pedagogy. Skills include communication; professional relationship building; ability to create interactive learning environments and develop organized learning activities with clearly defined goals and expectations; ability to provide quality feedback to students; adequate skills at self-evaluation; ability to adapt to different learning styles; and enthusiasm for teaching. *Professional traits of an effective educator* are defined as engaging in lifelong learning; being an advocate of, and demonstrating, sound ethics in all aspects of life; and collaborating with others to improve the quality of education.

Others have observed that experts may not always be the best instructors because their depth of knowledge may render them unable to view the material from the learners’ point of view.⁷ Indeed, individuals who are often deemed excellent instructors are often the individuals who simply show a “sincere commitment to the comprehensive welfare of those they teach”.^{8(p329)} In short, excellent instructors are mentors as well as teachers^{9–12} and create supportive learning environments¹³; in effect, they are student-centered individuals. Mentoring can be an important part of successful career development¹⁴ and is perceived by radiology residency program directors as important for residents to establish mentoring relationships.¹² This is supported by recent research that found that involving medical students more in imaging procedures and fostering a mentor-mentee relationship improve the interest of the student and result in an increased likelihood of the student choosing a radiology residency.¹⁵ In fact, a 2011 *Journal of the American College of Radiology* article reviews mentorship characteristics and provides an outline of how to develop a formal mentorship program in the academic setting.¹⁶

A current shortage of academic radiologists, combined with financial difficulties, has resulted in an increased reliance on computers and digital imaging for at least part of the teaching workload in most radiology departments.¹⁷ Another result of this shortage was the piloting of a 3-month residency elective in education at the Indiana University School of Medicine. This pilot

project resulted in very positive feedback from the participants regarding their increased educational skills and in the development of a successful electronic radiology tutorial program.¹⁸ Donovan¹² found that, although radiology residents often teach medical students and other residents, only about one-third of radiology residency programs provide instruction on teaching skills to residents. In addition, he found that most program directors believe that there is a need for a structured training program to develop the teaching skills of radiology residents. Resident teacher training workshops are being offered in recent years, and the perception is that they are beneficial.¹⁹ The University of California, San Francisco, Department of Radiology and Biomedical Imaging has developed a Clinician-Educator Pathway for radiology residents that is designed to develop skilled radiology educators²⁰ to address the shortage of academic radiologists.

A few articles are directed at providing guidance to academic radiologists to assist them in becoming better teachers and in understanding the complexities of teaching radiology to students at various academic levels.²¹ The articles explain concepts such as “adult learners,” “expert learners,”²² “co-operative learning,”²³ “active learning,”²⁴ “problem-based learning,”^{25–28} “simulation-based training,”²⁹ and “evidence-based practice in education,”^{30,31} along with suggestions for implementation of these concepts. Roberts and Chew³² offer a review of the literature examining 6 different teaching techniques used in radiology residency programs. The authors explain how and why each teaching technique is useful and offer suggestions to improve these learning experiences. Feedback, for example, can be beneficial, harmful, or even useless to the student, depending on both how it is presented and how it is perceived. Gunderman and Williamson³³ provide a lighthearted look at how and how not to provide feedback. Through the entertaining use of tongue-in-cheek examples of conversations between faculty and residents, the authors illustrate how to provide feedback that will enhance residents’ educational experience. Articles discussing learner-centered education also assist the academician in becoming a better teacher. By presenting various concepts that embody the ideal of student centeredness, such as respecting the learner, providing experience-based learning, assisting the student to develop intrinsic motivation, understanding different learning styles, and providing various methods of instruction, the authors are attempting to prepare educators to guide students toward becoming engaged learners.^{34,35} Collins has published a series of articles

aimed at improving radiology educators’ skills to cover a range of topics, including basic concepts such as creating and giving PowerPoint lectures^{36,37} and writing multiple-choice examinations³⁸ and more complex concepts such as explaining the principles of adult learning and how to design learning experiences.^{39,40} Arogundade⁴¹ provides an excellent review of the literature on adult learning principles and ties them directly to teaching radiology. A few articles are being published about the efficacy of various learning experiences such as blended learning.^{42–44} Other authors are providing instruction on examination methodologies⁴⁵ and the use of games as assessment tools⁴⁶ to increase student learning and retention and provide valuable and accurate assessments. Dunnick⁴⁷ provides a concise summary of the 3 areas of an academic radiologist’s responsibilities: clinical service, education, and research, while making clear the need for financial support for academic radiology departments to operate successfully. Numerous authors argue that radiology departments should invest in improving the quality of their radiologists’ teaching abilities and should recognize excellent teaching skills as an important part of their faculty members’ value to the department.^{48–50} Accordingly, institutions are beginning to recognize clinician educators in the tenure process.⁵¹

Limitations

This study was limited to articles available in the English language and therefore is not comprehensive of all literature worldwide. The search did not include the gray literature or other potentially relevant sources. It is possible that the search terms did not identify all relevant articles.

Conclusion

Although the literature examining faculty training in the area of radiology education is sparse, the need for more academic radiologists is apparent. Perhaps, more importantly, academic radiologists need opportunities to learn how to be effective, caring educators, and institutions should incorporate these valuable skills into evaluation, promotion, and tenure processes.

A few studies have aimed at providing training to current radiologists to introduce basic educational concepts such as lecture creation, examination writing, and learning styles or simply delineating what makes

an effective educator. The most current literature suggests that inadequacies are beginning to be recognized and with that recognition will come further research and hopefully movement toward addressing these needs.

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