RSNA R&E Foundation Education Scholar Grant
Education Scholar Grant Application

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NOTE: Personal information for the applicant and other investigators has been removed from this sample application.

Title: DEVELOPING A COMPUTER GAME FOR PROBLEM BASED-LEARNING (PBL) OF RADIOLOGY FOR UNDERGRADUATE MEDICAL EDUCATION (MEDGAME)

Abstract:

Recognized by the ACGME as an essential competency, the development and mastery of teaching skills is not a priority for most residency training programs. A recent survey of radiology residency programs reported that less than one-third of programs offer dedicated programs to enhance the teaching skills of residents. Yet, residents spend up to 25% of their efforts teaching medical students, peers, and faculty. In addition, most training programs focus on residents as learners rather than develop residents as teachers. Ultimately, however, a large percentage of academic radiologists pursue teaching, not research, as their primary academic endeavor. Most traditional resident-as-teacher programs provide didactic sessions focused on a variety of educational topics. Such programs have been shown to be beneficial to some extent, although the long-term benefit has yet to be proven. By providing a structured program whereby residents are routinely observed and critiqued, we aim to develop graduates with exemplary teaching skills. The multi-faceted program would entail a formal didactic component, specialized training in the technique of peer observation, small group microteaching as a means to reflect on one's own educational beliefs and teaching style, and ongoing peer observation of teaching in both small and large group settings. We hypothesize that by providing formal didactic training in adult learning principles and effective teaching methods and by implementing an ongoing peer observation program of teaching, residents will become more skilled and more comfortable with teaching medical students, peers, and other physicians and develop into educational leaders.

Percent of Time Dedicated to this Project:

10% effort to this educational project during the funding period
20% effort to program director position
60% to clinical responsibilities
10% to clinical research

Priority Statement:

Teaching and mentoring has always played a central role in my academic career. After completing my fellowship in breast imaging in 1997, I soon realized how little training I had received on how to teach effectively, yet I was expected to teach medical students, residents, and practicing physicians frequently. Therefore, I actively sought opportunities to learn more about educational theory, different teaching methods, and educational assessment. After participating in the Harvard Macy Institute's program for physician educators in 2002, I gained much insight into how to teach clinical radiology more effectively to varied audiences. This experience provided me with an understanding of the importance of not only creating new curricula or adopting new ways of teaching, but also studying whether these new approaches are effective tools to convey the information. By undertaking several educational research projects over the past ten years, I have become more aware of the critical role that assessment plays in teaching. Continuous feedback from both learners and peers provides an environment in which I continue to grow educationally and in which I am able to impart knowledge more effectively. The RSNA Educational Scholar grant will provide me with an opportunity to further develop my skills in educational theory and assessment by providing funding to attend courses on teaching effectiveness and educational assessment. In addition, it will allow me to apply this new knowledge as I develop and implement a peer observation teaching program. The main goal of this program is to enhance the teaching skills of radiology residents with the hope that some will graduate from residency training and become leaders in education.

In this proposal, we plan to create an innovative educational curriculum that will permit radiology residents to become more effective teachers. After providing residents with the basics of adult learning principles and educational theory through a series of didactic sessions, we will hold an interactive training session on how to perform peer observation effectively. Subsequently, we will implement an ongoing peer observation program whereby residents will be observed by a" trained peer" in a variety of teaching settings, including but not limited to, large group departmental grand rounds, small group medical student sessions, and technologist CEU lectures. A separate workshop will employ the technique of microteaching, in which each participant will be videotaped teaching a short segment and then both the teacher and observers will reflect on the experience, their own educational beliefs, and their teaching style. The peer observers will not only complete a validated peer assessment form but will practice providing constructive non-judgmental feedback to their peer. Residents will complete pre and post assessments of their experience participating in the program in order to provide us with Information regarding knowledge gained about educational theory, overall comfort level with teaching in a variety of settings, and overall perceived value of this type of program.

There is a great need to create radiologists with specific training in education. At our Institution and at the affiliated medical school, peer observation has become a recent area of interest as it is well recognized that residents provide a large proportion of medical student and resident teaching. As much of the expertise on this subject lies with our medical and educational colleagues, we have enlisted their expertise as collaborators on this project, especially during the first year as we gain experience with this type of program. During the second year of the program, our expert educational colleagues will serve as consultants and aid with the statistical aspects of the

evaluation phase. By incorporating this type of peer observation program directly into residency training, this not only will exceed ACGME requirements but also will provide our field with more skilled teachers.

Budget: (*Some budget details have been removed from this sample*)

Project Timeframe: 7/1/2012 - 6/30/2014

Total Project Budget: $152,000

Amount Requested from RSNA: $150,000

Complete Budget Justification

A. Personnel	
Salary support	
Co-PI	$XX,XXX
Co-PI	$XX,XXX
Other Personnel	
Other: Investigator	$ X,XXX
Other: Investigator	$ X,XXX
Other: Investigator	$ X,XXX

B. Supplies

1. Funds are also requested to purchase appropriate audiovisual equipment for videotaping of selected teaching sessions which will be reviewed and critiqued during the microteaching component of the project during the second year of the grant.
2. Supplies, develop web-based peer observation evaluation forms, and to support manuscript preparation during both years of funding.

C. Other Direct Costs $XX,XXX

Other funds are requested to cover tuition for three investigators (the co-PIs and the other Associate Program Director of the radiology residency program at BIDMC) to attend the two didactic courses focused on teaching skills and educational assessment during the first year of funding (tuition approximately $850.00/person and $4500/person, respectively). The first course is based at Harvard Medical School and consists of a three-day overview of adult learning principles and effective teaching skills. The second course is based in Cambridge, MA and is designed to develop skills in educational evaluation. A portion of the course is focused on a project which in this case will be this peer observation teaching program. This didactic foundation is critical to develop in each of these investigators in order to ensure sustainability of the program once it is developed and implemented into the radiology residency.

Total Year 1: **$XX,XXX**

Year 2

A. Personnel	
Salary support	
Co-PI	$XX,XXX
Co-PI	$XX,XXX
Other Personnel	
Other: Investigator	$ X,XXX
Other: Investigator	$ X,XXX
Other: Investigator	$ X,XXX

Total Year 2: **$XX,XXX**

TOTAL PROJECT RSNA COST: $150,000

Other Investigators:

Name: Ronald L. Eisenberg MD, JD
Role: Dr. Eisenberg will serve as the Co-PI on this grant. He will devote 10% effort to this project. His priority statement is included below:

Throughout my academic career, my focus has been on teaching radiology to a variety of audiences. I have published 19 imaging textbooks for both practicing radiologists and referring clinicians that have been widely used and with several in advanced editions. I applied the concept of using an algorithmic approach to imaging and edited my first book in radiology on this topic. As imaging patterns became more prevalent in the radiology literature, I wrote Gastrointestinal Radiology: A Pattern Approach, my first single-authored book and currently in its fourth edition. In this work, as in numerous subsequent books, my approach was to take material on a particular subject from the extensive literature and synthesize it into a style that would be clear to the reader.

Subsequently, I wrote imaging companions to Harrison's Textbook of Internal Medicine and Schwartz's Textbook of Surgery. Later I expanded this idea to books for radiologic technologists, including the highly successful Comprehensive Radiographic Pathology, which is now in its fourth edition and has become the standard textbook in many schools for radiologic technologists. My most popular book, Clinical Imaging: An Atlas of Differential Diagnosis was recently published in a fifth edition and has become a standard textbook for radiology residents preparing for their Board exam. In response to the financial constraints imposed by Health Maintenance Organizations, which penalized the scattergun approach to ordering radiologic studies, I teamed with my former residency chairman in developing the book entitled What to Order When. This book was designed for referring clinicians and presents the most cost-effective imaging approach for 300 clinical scenarios (signs and symptoms; most likely diagnosis). Now in its third edition (with a slightly different title), it has had a positive impact in clinical practice around the country. A new facet of my 360? Interest in education is a recently published book, A Patient's Guide to Medical Imaging (Oxford University Press, 2011). This describes in simple language what the lay reader needs to know about a wide spectrum of diagnostic and therapeutic imaging procedures. It is designed to alleviate as much as possible the natural fear of the unknown experienced by the patient preparing to undergo a radiological examination or procedure. While serving as Chairman of Radiology at the Alameda County Medical Center, a county facility serving to an underserved community, I developed a question-and-answer newspaper column that was syndicated in Northern California. Called Doctor/Doctor, it generated hundreds of letters with questions from readers throughout the Bay Area and this column became a fixture in the features section of 5 newspapers for 12 years. At the same time, I was also approached by Lippincott to edit a popular radiology journal, The Radiologist, which was published for 10 years. Since coming to the Beth Israel Deaconess Medical Center in 2007, I turned my focus to resident education. I have developed two new series devoted to residency education that are now appearing in the American Journal of Roentgenology. The first, entitled "Pattern of the Month," is an outgrowth of my two major books described above that focus on a different way of learning radiology. By agreement with the journal, the first authors of all articles in this series are residents or fellows at BIDMC. This provides a unique research opportunity for our trainees as well as exposure to academic publishing. The second new series, entitled "Career Path," deals with a broad gamut of topics (e.g., the value of being a chief resident; private practice versus academics) that are vital to the career of young radiologists but are not taught in residency or fellowship. In order to advance the Grand Rounds and Visiting Professor activities at BIDMC, I co-authored a study in which we surveyed all residency programs throughout the country to determine various alternatives that we could implement at this institution. In response to our evaluation, I developed a new board review course based on the pattern approach that was attended by fourth-year radiology residents from programs throughout the Greater Boston area and which included faculty from BIDMC and four other programs. I have also been asked by to be the editor of a new series of 10 case-based radiology board review books and will be the first author of at least three of them (chest, musculoskeletal, and gastrointestinal radiology). I have been extremely gratified by the response of the residents to my teaching and mentoring activities. In addition to excellent ratings provided by those residents who have worked with me on clinical rotations, I was honored to receive the 2009 Norman Joffe Award, which recognizes the faculty member who best exemplifies the all-around talent of the general radiologist. In recognition of my initiatives in education, I have been named an Associate Director of the Radiology Residency Program. The RSNA Educational Scholar grant will provide me with a formal opportunity to learn about educational theory and assessment by providing funding to attend courses on teaching effectiveness and educational assessment. In addition, it will allow me to apply this new knowledge as I develop and implement a peer observation teaching program. The main goal of this program is to enhance the teaching skills of radiology residents (which is not being addressed in many programs) with the hope that some graduates will become leaders in education.

Name: Lori Newman M.Ed.
Role: Ms. Lori Newman is an associate in medicine at Harvard Medical School. She serves as the director of faculty education for the BIDMC Center for Education, co-director of the Rabkin Fellowship in Medical Education, and co-director of the BIDMC Academy for Medical Educators. Lori has been with Beth Israel Deaconess Medical Center since 1989. From 2000-2005, she served in dual roles in both the Shapiro Institute and the Division of General Medicine and Primary Care, for which she developed educational programs, curricula, and instructional material for Harvard Medical School students, residents, fellows, and faculty. In her current role, Lori oversees professional development in medical education for the Center for Education and is instrumental in designing and evaluating innovative curricula and faculty development in clinical teaching. She conducts medical education research and is currently leading a study on the peer review of medical lecturing for which she received an HMS Commendation Award for Scholarship in Medical Education. She serves as co-director of a national HMS CME Course focusing on the principles of medical education, and is co-chair of the Shapiro Institute's National Millennium Conference. Lori is a Harvard Macy Scholar and has written articles relating to clinical teaching published in the Academic Medicine, Medical Teacher, and Teaching and Learning in Medicine. She is a recipient of Harvard Medical School's Jim Wiczai Award for Leadership, Excellence, and Innovation in Medical Education. Ms. Newman will devote X% effort to this project.

Name: Justin Kung MD
Role: Dr. Kung is an Instructor of Radiology at Harvard Medical School and serves as one of the Associate Program Directors for the residency in radiology at Beth Israel Deaconess Medical Center. He will participate in this project by undertaking formal educational instruction on adult learning principles along with the co-PIs and aid with the logistical implementation of the peer observation program.

Name: Michael Larson
Role: Mr. Larson is based in Radiology Media Services in the Department of Radiology at Beth Israel Deaconess Medical Center. He will assist with video-taping for the microteaching sessions.

Name: Statistician, TBD
Role: As we will be undertaking evaluation of the program, we will enlist the support of a statistician skilled in educational program analysis.

Name: Grace Huang M.D.
Role: Grace Huang, Director of Assessment for the Shapiro Institute of Medical Education, will assist with the design and evaluation of the peer observation program including statistical analysis of the data. She is a hospitalist at Beth Israel Deaconess Medical Center and an assistant professor of medicine at Harvard Medical School. She has received extensive training as an educator, having completed the Rabkin Fellowship in Medical Education (2003), the Academy Fellowship at Harvard Medical School (2006), and the Macy Program for Educators (2006). She serves as the Director for Assessment at the Shapiro Institute for Education and Research (at HMS and BIDMC). As such, she is responsible for conducting educational research, faculty development, and faculty mentorship as it relates to educational outcomes of programs in medical education. Her specific skills are in data collection/instrument design, educational research design, and data analysis

Detailed Education Plan: **(See Next Page)**

Detailed Education Plan

Introduction

Rationale and Purpose

Recognized by the ACGME as an essential competency, the development and mastery of teaching skills is not a priority for most residency training programs (1). Yet, residents spend up to 25% of their efforts teaching medical students, peers, and faculty (2). Indeed, medical students estimate that one-third of their knowledge can be directly attributed to house-staff teaching (3). Although many residents enjoy teaching and consider it to be an important component of their training (3) and residents who teach acknowledge mastery and retention of their assigned topics, many feel inadequately prepared to teach (5) and desire formal instruction in effective teaching methods (6). A recent survey of radiology residency programs indicated that less than one-third of programs offer dedicated programs to enhance the teaching skills of residents (7).

Although there is evidence that teaching courses improve resident self-assessed teaching behaviors, self confidence as a teacher, and result in higher learner evaluations of residents, there are many obstacles to the implementation of such courses during residency training. Teaching courses can be time intensive for both residents and faculty. Similarly, many academic faculty do not have adequate time or education to teach these courses (4). The long-term impact of a didactic course is also not known (8).

Gunderman astutely observed that residency programs focus most of their energy on residents as the learner rather than the teacher (9), while in fact there is great benefit in developing residents as teachers during training as a means to improve mastery of the material as well as to develop skilled teachers (10). Currently in most programs, residents spend substantial time interpreting imaging studies whereas very little time is devoted to teaching the teacher how to become a more effective teacher. Such an approach serves only to convey to residents that teaching is not very important (11). Ultimately, however, a large percentage of academic radiologists pursue teaching, not research, as their primary academic endeavor. The future of radiology hinges in part on attracting top residents into academic practice to maintain and improve the quality of teaching in the field.

Therefore, we propose to develop and implement a peer observation teaching program to enhance the teaching skills of radiology residents in our program. The proposed intervention will be multi-faceted and consist of five key components:

1. Didactic sessions on adult learning principles, educational beliefs, and teaching methods
2. Formal training on how to perform peer observation of teaching and how to provide non-judgmental constructive feedback
3. Direct observation of recognized skilled teachers within radiology and outside the Department
4. Microteaching experience where participants reflect on their own teaching and educational beliefs
5. Peer observation of teaching in small and large group environments

We hypothesize that by providing formal didactic training in adult learning principles and effective teaching methods and by implementing an ongoing peer observation program of teaching, residents will become more skilled and more comfortable with teaching medical students, peers, and other physicians, with some of them even becoming educational leaders.

Objectives:

In summary, the primary objectives of this proposal are:

1. To improve resident understanding about educational methods and adult learning principles through formal didactic sessions;
2. To enhance teaching skills of radiology residents by implementing a peer observation program; and
3. To evaluate the logistics and sustainability of a peer observation teaching program in an academic radiology training program.

Student Population:

The study population will include the 40 radiology residents at Beth Israel Deaconess Medical Center in Boston, MA. The didactic curriculum would be experienced by all residents, whereas participation in the peer observation program would be voluntary. However, given that many of our residents have already expressed an interest in learning more about education, we predict that nearly all, if not all, of the residents will opt to participate.

Previous Experience:

The PI has extensive experience in undergraduate, graduate and postgraduate education as outlined in her NIH biosketch. Her area of interest lies in innovative curricular development and evaluation. One such program, which focused on using the ACR Appropriateness Criteria to teach evidence-based imaging, was awarded the Whitley Award from the Association of University Radiologists. In addition, the PI has held multiple educational leadership roles and has published 10 papers on the educational impact of a variety of curricular innovations ranging from radiation oncology exposure during medical school to the role of departmental student-facilitated radiology-pathology correlation conferences to teach multidisciplinary patient care.

Project Plan

Activities

1. Development of Teaching and Evaluation Skills: The co-PIs and Associate Program Director of the residency program will participate in two separate didactic programs. The first course will be the Harvard CME course entitled, “Principles of medical education: maximizing your teaching skills” which will build upon their foundation in educational theory and provide a context for the development of the didactic sessions. The second course will be the Harvard Macy course on educational assessment entitled, “A systematic approach to assessment in health science education”. Through this course, we will develop skills in evaluation which will be applied to the assessment of this peer observation teaching program.
2. Didactic Sessions: We intend to hold 4-6 45 minute to 1.5 hour didactic sessions on adult learning principles, teaching methods, and other pertinent topics in education. These sessions will be integrated into existing protected conference time.

3. Peer Observation Training: The residents will participate in a 2-hour training session on how to perform peer observation effectively and how to provide non-judgmental feedback.

4. Observation of Experienced Teachers: Residents will be provided with the opportunity to observe skilled teachers within and outside the radiology department as they can serve as role models of effective teaching. They will be relieved of their clinical duties and will provide a written reflection on their experience.

5. Microteaching: Each resident will be videotaped teaching for 5-10 minutes in a small or large group setting. The "teacher" will then reflect on his own teaching in order to gain insight into his own educational beliefs and style. A small group of 4-6 residents will provide constructive feedback to the "teacher". Each participant will also be exposed to a wide array of teaching approaches by direct observation of teaching and review of the videotapes.

6. Peer Observation: Peer observation will provide residents a safe and effective means to continually enhance their teaching skills over time. Trained observers will used validated evaluation forms and provide timely verbal feedback to the teacher. The departmental Chief Rounds, in which residents deliver 15-minute presentations, will serve as the large group setting. The required medical student fourth-year clerkship in diagnostic radiology offers the ideal setting to evaluate small group teaching skills. Evaluation of teaching technologists rather than medical students during their departmental CEU program will also permit assessment about how well the lecturer adapts to different audiences. By evaluating the impact of peer observation over time, we will be able to determine whether teaching effectiveness improves with continual feedback.

Time Schedule

Didactic sessions – September to December 2012

Peer Observation Training – January-February 2013.

Observation of Experienced Teachers – Beginning in January 2013

Microteaching sessions – February 2013 through June 2014

Peer Observations – February 2013 through June 2014.

Courses to be completed during Spring 2013 by the co-PIs and the Associate Program Director:

1. Harvard Medical School CME course entitled, “Principles of Medical Education: Maximizing Your Teaching Skills”
2. Harvard Macy course entitled, “A systematic approach to assessment in health science education”

Outcomes

The primary outcomes that we plan to evaluate include resident knowledge about educational theory and teaching methods and the overall comfort level of residents regarding teaching in different settings (small vs. large group) and to different learners (students, peers, attending, and/or technologists), and to assess longer-term impact of this type of educational intervention. Secondary outcomes entail logistics and sustainability of such a program.

Evaluation

A pre assessment web-based survey will be distributed to the residents prior to implementing the program in order to determine the baseline understanding regarding adult learning principles, to gauge comfort levels of teaching in both small and large group settings, and to better comprehend the expectations and teaching goals of the residents. We will then undertake a 4-6 hour didactic program integrated into the formal residency curriculum. After completion of these sessions, we will assess whether the residents found the sessions useful by completing a web-based survey consisting of both multiple choice questions and case scenarios to test understanding of key adult learning principles and successful educational teaching methods.

For the residents who opt to participate in the peer observation training, we will be able to assess their mastery of appropriate use of the validated feedback form as they observe peers teach, since each observation will have at least two observers. By looking at interobserver variability, we will gain insight into the effectiveness of the training session. We will also assess perceived benefits about the microteaching experience by having participants complete a series of questions using a 5-point Likert scale.

For the large group peer observation sessions, the observers will use the Peer Assessment of Medical Lecturing Instrument developed and validated at BIDMC and HMS by the Shapiro Institute for Education and Research. This instrument assesses multiple parameters relating to 11 criteria that have been deemed essential for effective teaching including delineation of educational goals, communication of topic importance, overall organization, enthusiasm for topic, mastery of topic, explanatory skills, engagement of and monitoring understanding of audience, utilization of audiovisual aids, mechanics of communication, and inclusion of lecture summary. Each of the 11 criteria is rated on a five-point Likert scale ranging from “excellent demonstration of skill” to” not demonstrated”. The observer will subsequently meet with the teacher to provide a verbal debriefing and to review the completed assessment tool. The participants will complete pre and post intervention survey to assess the perceived value of this type of interaction and its impact on their teaching. Observers will also provide short narratives reflecting on what they learned about their own teaching by assessing the lecturer and complete a brief survey assessing how they valued the program. A similar form and assessment will be undertaken following the small group teaching sessions.

During the second year of the program, we will continue the evaluation process and be able to determine the longer term impact of this type of program on teachers, observers and learners.

References:

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