

REVIEW

Getting Started in Medical Education Scholarship

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Education scholarship and research are critically important in extending our ability to teach and assess effectively. Those considering a scholarly project in medical education should consider the following tips, learned from personal experience and supported by literature: 1) get some training, 2) find a mentor, 3) ask important questions, 4) start small and grow, 5) aim high, 6) don't wait for the perfect study, 7) plan for adequate time and other resources, 8) attend to ethical issues, 9) network with others in the field, and 10) recognize that this is hard work. By following these steps and planning ahead, scholars will be better poised to make meaningful contributions to the art and science of medical education. (Keio J Med 59 (3) : 96–103, September 2010)

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Introduction

Medical education is a rapidly growing field for scholarship and research, with many newcomers each year. While some enter the field with clear ideas of what should be studied and how to do it, many struggle because they don't know where to start. My intent, in this article, is to introduce the concept of medical education scholarship, and share ten suggestions for getting started.

High-quality patient care requires competent healthcare professionals. Education, like clinical medicine, is both an art and a science. Thus, to most effectively train healthcare professionals we must merge tradition and intuition with theory and empiric data. In short, we need evidence to guide our educational endeavors.¹ Medical education scholarship encompasses a wide range of activities² with the common purpose of advancing our understanding of how to assess and improve the competence of future and practicing health professionals.

In 1990, in an attempt to expand the definition of academic productivity to encompass activities other than traditional research, Boyer introduced a framework for thinking broadly about different types of scholarly activity. He proposed four types of scholarship – discovery,

integration, application, and teaching. Boyer argued that each scholarship type should be valued and recognized for the contribution it makes to a field.

Scholarship of discovery includes most original research activities. One example of scholarship of discovery in medical education (selected from countless equally meritorious examples) is a study showing no difference in epidural catheter performance following training using either a high-fidelity part-task trainer or a low-fidelity model built with a banana and bread.³ Another example of discovery is a study finding that adding multimedia images and sound to a high-stakes exam led to increased testing time and worse item psychometric performance.⁴ Scholarship of integration attempts to synthesize information and draw connections across disciplines, often in the form of systematic or narrative reviews. Examples include meta-analyses of Internet-based instruction^{5,6} and a thought-provoking critique of self-assessment.⁷ Scholarship of application employs existing theories and evidence in new ways, often borrowing ideas and research from other fields. For example, neuroscience research on the mirror-neuron system might explain why some computer animations facilitate learning more effectively than others.⁸ Scholarship of

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teaching involves the development of new and evidence-based ways to facilitate and assess learning, as illustrated by a multi-modal course in health policy⁹ and a needs-driven course on complementary medicine.¹⁰

These studies scarcely begin to reflect the breadth of scholarly activity in medical education. Given the seemingly endless stream of unanswered questions, we need more scholars committed to advancing the art and science of education. The following tips will assist those willing to accept this challenge.

1. Get Some Training

Most people conducting medical education scholarship have had years of professional training (for example, in medicine or nursing), and many have advanced degrees. Yet most will still need some additional preparation for the rather different demands of educational activities. Education scholars must understand and use teaching strategies, learning theory, and assessment methods. Training in research design, survey development, program evaluation, and statistical analysis will also prove useful.

This training needs not be extensive; even a basic introduction to core concepts and vocabulary will greatly help as you work with colleagues to plan, implement, and share your results with others. Such training might start locally, through workshops or courses in your institution's college of education or division of statistics. National and international meetings such as the Association for Medical Education in Europe (AMEE), the Ottawa Conference, the Association of American Medical Colleges (AAMC), and the Asia-Pacific Medical Education Conference all offer workshops and precourses on education scholarship. For those wishing more formal training, the AAMC sponsors the Medical Education Research Certificate, and there are a growing number of other advanced courses and master's degrees in medical education. Of course, self-directed learning (e.g., reading books, review articles, and journal reports) plays an essential role as well.

In my own career, I received training in epidemiology and statistics during medical school and took courses on evidence-based medicine during residency, but my first training in medical education took place at the Ottawa Conference and AMEE meetings. Because I enjoyed these courses so much, and with a growing interest in education research, I pursued a Master's degree in Health Professions Education at the University of Illinois at Chicago. I continue to attend workshops and read books and journals to enhance my skills. The successful education scholars I know have followed diverse paths, but all made conscious and consistent efforts to enhance their scholarly skill set.

2. Find a Mentor

Mentors play an essential role in fostering an academic career,¹¹ and this is nowhere more true than in medical education scholarship. Mentors can guide you in obtaining appropriate training, asking the right questions, designing a project to yield defensible results, sharing results with others, and establishing connections with others in the field. Unfortunately, you may find yourself in the situation I did early in my career, when I could not find mentors at my institution skilled in education research. However, I did find someone. Although not an education researcher, Denise Dupras counseled me through several early and important decisions, helped me write my first abstract, co-authored my first papers, and assisted in my first workshop. I also found support from local colleagues with specific skills in clinical teaching, biostatistics, and oral presentation, and gradually incorporated associates from other institutions into my growing circle of mentors. I've found that some of the most influential mentoring has come through my peers rather than my superiors. Collaborating, critiquing, and most of all listening, we have been able to grow together in our expertise.

From this I've learned four lessons: First, mentors need not be experts in your chosen field. Second, it's often helpful to identify multiple mentors, each meeting a specific need or playing a specific role in your scholarly development. Third, don't be afraid to look for mentors outside your own institution. Finally, peer mentors¹² are invaluable.

3. Ask Important Questions

The most important part of an education scholarly activity is to ask and answer an important question.^{13,14} The most rigorous study, if not focused on an important question, will fail to attract much interest. Your work must make a contribution to the field. While there is always some subjectivity in what constitutes "important," there are steps you can take to maximize the chance that others will view your work as a contribution.

First, identify a question that's important to you. Where will you find such questions? Some questions will be handed to you (e.g., an assignment from your Dean). Others will press upon your mind as you read an article or attend a conference. Most, however, will emerge from your daily work. As you teach, assess, and administrate, you will find yourself asking, "I wonder what is the best way to do this?", "How can we do this better?", or "What would happen if we ...?" Each such question is a potential opportunity for scholarship.

Second, make sure the answer isn't already known. Just because an idea or question is new to you, doesn't mean someone else hasn't thought of it or answered it. As a journal editor and as a peer reviewer, the most com-

mon flaw I encounter in education manuscripts is a failure to critically examine the literature to see what others have done. Empiric evidence confirms that critical literature reviews are important¹⁵ yet infrequent.¹⁶ Thus, the diligent literature review is a critical step in successful scholarly activity. Searching the medical education literature isn't always easy^{17,18} but you can't skip this step.

Third, highlight the gap in understanding. If your literature review didn't answer your question, then by definition a gap exists in our understanding. Gaps might arise from an unexplained finding in a research study, absent or deficient evaluations of a given teaching approach for a new topic or group of learners, or a new or incompletely evaluated assessment method. The more clearly you can identify this gap (also known as a problem statement) and the larger the gap, the easier it will be to see how answering your question will advance the field.

Fourth, frame your question in the context of a broader conceptual framework if possible. Conceptual frameworks (theories, models for how things work, or study approaches) allow you to develop hypotheses about expected results, and help you to interpret results by suggesting potential explanations for why something worked or failed. They also enable you and others to apply (generalize) findings to new situations.¹⁹ Conceptual frameworks help most when they form the foundation for a study, rather than being tacked on at the end (for example, when interpreting results).

Fifth, try to ask questions that enable improvements and application in new contexts. To this end, I find it helpful to classify education questions or studies into three groups: description, justification, and clarification.²⁰ Description studies describe what was done, often with little or no evaluation. Such studies are useful when a field is in its infancy (as Web-based learning was 15 years ago), but people quickly demand more than just a description. Justification studies typically come next, comparing the new approach (intervention) to no intervention (a control group) or the current standard (an active comparison group). While such studies demonstrate the utility of a given intervention for a specific context and learner group, they do not tell us what might happen with different learners, contexts, or comparison interventions, or how to improve the current course. Thus, justification studies have limited value to people at other institutions. Clarification studies, by contrast, help explain why or how things work and how to make them better. Conceptual frameworks are a central component of clarification studies.²⁰ Unfortunately, clarification studies constitute a small minority of published work in medical education.²⁰ The field would benefit from more frequent use of conceptual frameworks and more clarification-type questions.

Finally, write your question clearly. A clear question (which can interchangeably take the form of a research hypothesis or study purpose or goal) should state the in-

dependent variable (what you, the investigator, are doing; often an intervention or [for validity studies] assessment instrument), the dependent variable (the outcome), and the population (usually the group of learners to whom you wish to apply your results).^{13,16} This question should be "FINER"²¹ – feasible, interesting (to you and to others), novel, ethical (more on this later), and relevant to your practice.

Remember that the question must always precede the answer. At some point you will likely find yourself teaching a new course or analyzing a set of evaluation data, and wonder how you can turn this activity into a scholarly project. Such situations present wonderful opportunities but they are really means to an end, which is to answer an important question. The question must come first. Projects in which the opportunity overshadows the question are difficult to interpret and generalize. By way of analogy, if I were given an electric saw as a gift I would not start cutting the nearest piece of wood. Rather, I would carefully consider ways in which I might use this tool to create something useful or beautiful. Whenever you encounter an opportunity (a new course or a dataset, for example), first use the steps above to identify a clear knowledge gap and an important and novel question.

4. Start Small and Grow

By now you may be saying, "I could never do that." If so, you may be partly correct. It might not be possible for you to lead a hypothesis-driven clarification-type study right now. But with some training and experience you could most likely do it (or something similar) down the road. Thus, I encourage new scholars to start small and grow at their own pace.

My first research project – which had nothing to do with education – was never published. However, the experience I gained in that project proved invaluable in later activities. My first publication was a descriptive study – no outcomes – of a Web-based course.²² My second publication reported a pretest-posttest single-group study evaluating the same course – a justification study (comparison with baseline).²³ My third study was a randomized controlled trial comparing a different Web-based course to the then-standard paper course.²⁴ This justification study had limited generalizability, because a) even minor changes to the paper course or the Web-based course would require an entirely new evaluation, and b) it didn't help me design a better course the following year. Several years and several projects later, I finally designed my first clarification study, which found that adding self-assessment questions to a Web-based course improves learning outcomes.²⁵

I share this to illustrate three points. First, one shouldn't expect to start off with a large-scale project; it's entirely reasonable – in fact, often preferable – to start realisti-

cally small, and grow as you gain experience and momentum. Second, no single study is likely to revolutionize the world. On the contrary, most research involves incremental steps that accrue over time to enhance our understanding of a field.²⁶ Third, I found success as I engaged in continuity of research – building on my previous results. Such programmatic research is key to academic success.²⁷

So, go ahead and do that descriptive study of a novel instructional approach (making sure, of course, that it really is novel). Or accept the Dean's request to evaluate a course using a pretest-posttest design. You can present your work at a national conference, and perhaps publish it. In doing so you will build momentum, gain experience, and be better poised to ask and answer insightful questions in the future.

5. Aim High

It is acceptable to start small, but don't settle for mediocrity. Whatever you do, you will want to do it well. Glassick proposed six standards²⁸ by which to assess the quality of scholarly activities. These standards apply equally to all of Boyer's scholarship types.

First, your activity should have clear goals. If you don't know where you are going, it is unlikely that you will get there.

Second, you will need to demonstrate adequate preparation. This involves a diligent search to understand the current state of the field, including previous scholarship and research, relevant theories, ongoing activities at other institutions, and essential next steps. It also involves making sure you have appropriate skills, resources, and mentoring.

Third, you need to employ appropriate methods. The specific methods will vary according to the activity. For scholarship of discovery (original research) these are your research methods. For scholarship of integration you might employ rigorous methods to conduct a systematic review. For application and teaching, you will need to use methods appropriate to the objectives and contexts, and based on current best practices.

Fourth, you need outstanding results. This does not mean statistically significant results ($p < 0.05$), but rather that the results make a substantial contribution to the field. Making this judgment often involves review by a peer, either internal (a local colleague) or external. Outstanding results are most likely to be achieved if you identified clear and important goals, prepared well, and used appropriate methods.

Fifth, you need to communicate results effectively. Your communication must be transparent, well-organized, and complete. Many resources are available to assist you in this important step.^{29–31}

Sixth, you need to demonstrate reflective critique. This requires you to step back and analyze the strengths and

limitations of what you did. What went well? What would you change if you were to do it again? How could you improve? And, what are the next steps?

Again, these standards apply to all scholarly activities, large or small. It is not the size or the expense of a project that determines its quality, but rather the degree to which your results are defensible and advance the field. Plan ahead, and be sure to consider all of Glassick's criteria.

6. Don't Wait for the Perfect Study

No study is perfect. You might worry because you cannot randomize, or because your sample size is small. True, these are important considerations. However, even randomized trials can have fatal flaws, and having a large sample size does not guarantee quality results. If your question is important and novel, then it merits answering – and any answer is probably better than none. Moreover, as noted in Tip 4, the results of an imperfect study will provide the starting point for future investigation. Rather than focusing on study designs, I encourage you to think about threats to study validity, study reproducibility, and meaningful and relevant outcomes.

Ultimately, we don't really care about the study methods or even the results. We care most about our interpretations of those results, and how those interpretations can inform future actions. Of course, the methods, results, and interpretations are all inextricably intertwined; stronger methods permit stronger inferences and greater confidence in our actions. Anything that interferes with inferences is called a validity threat. A detailed discussion of validity threats is beyond the scope of this article, but **Table 1** summarizes several threats; other resources contain more information.^{32–34} Overcoming validity threats generally involves one of four solutions: using a control group (if possible), randomizing groups (if possible), standardizing conditions between groups (if possible), and obtaining more information on the participants and on what actually happened during the study (always possible).

Naturally, there are trade-offs in cost and feasibility with each solution. How can one know if the right balance has been achieved? Cronbach proposed a three-step thought experiment to address this issue.³⁵ The scholar asks: Would we expect sufficiently similar results if: a) we used the same design and a different sample (different group of study participants), b) a different investigator used the same design and sample, or c) we used a different design? If the answer to all three questions is yes, then the design is likely to yield acceptable conclusions. If not, then perhaps some revision is in order. Of course, "sufficiently similar" is a judgment call.

In recent years we have seen greater emphasis on "higher-order" outcomes such as physician behavior and effects on patient care.³⁶ While I appreciate the intent of

Table 1 Threats to study validity

Threat	Description	Example	How to Minimize the Threat
Subject characteristics	Differences among participants at start of study	A college teacher compares face-to-face and online versions of the same course; learners can self-select which section they join (problem: people who elect face-to-face format might be systematically different than those electing online)	Randomization
History	Unplanned events unrelated to the intervention that might impact outcome	Pretest-posttest single-group study of online modules on bioterrorism begins August 2001 (problem: it is impossible to distinguish the effects of the intervention from the generally increased awareness of bioterrorism that began September 2001)	Concurrent control group
Maturation	Changes in participants over time unrelated to particular events	To evaluate a 1-hour lecture on ECG interpretation on day 1 of a 2-month cardiology rotation, investigators give a pretest, and then a posttest at the end of the rotation (problem: it is impossible to distinguish the effects of the intervention from other learning experiences over the 2-month rotation)	Concurrent control group
Instrumentation	Changes in scoring rubric or instrument calibration, including rater fatigue	A single rater codes 100 five-minute videotapes in a single session (problem: rater fatigue may affect scoring consistency over the course of the session)	Control group; rating quality control; information on instrumentation procedures
Regression to the mean	Participants selected or groups assigned based on high or low performance will be closer to average upon subsequent testing ⁴⁷	Students in the lowest 5% of the class participate in a special remediation activity and are then retested (problem: on average students will show improvement upon retest even without remediation)	Control group (intervention not based on baseline performance)
Testing	Taking a pretest can affect study outcomes ⁴⁸	To evaluate a series of Web-based modules, an investigator administers a pretest, then the modules, and then the same test as a posttest (problem: learners might do better on the posttest for reasons unrelated to the intervention itself, such as studying to the test, familiarity with questions, and motivation to improve low scores)	No pretest
Mortality (loss to follow-up)	Participants leave study	Thirty-six people attend day 1 of a four-session course on communication skills, whereas only 17 attend on day 4; the course evaluation survey indicates very positive ratings (problem: the 19 people who didn't return likely would have given lower ratings)	Prevent loss; collect information on those lost
Participant attitude and motivation	Learners involved in something they consider novel, or who are being observed, tend to be more motivated (conversely, those in the comparison group may be demotivated)	Students are told they will be part of a "very exciting research project" (problem: participants will likely be motivated to demonstrate better than normal behavior)	Blind participants to study hypothesis
Implementation	Variation in the learning experience, e.g., differences in the expertise of the instructors, the opinions of instructors regarding the efficacy of the intervention, or the actual amount of instruction received (e.g., did participants skip class?). Learning outside the curriculum (how much learners studied on the topic beyond that intended by the intervention) falls into this category as well.	A teacher with extensive training and experience in problem-based learning (PBL) plans a randomized trial comparing PBL to lecture; to control for content, the teacher will both lead the PBL groups and give the lecture (problem: the teacher is an expert at PBL but not at lecture, which would favor the PBL intervention; ⁴⁹ moreover, the teacher may unwittingly favor the PBL group)	Careful planning of study interventions; collect information on actual experiences (both within and without the study)

See Fraenkel and Wallen,³³ Campbell and Stanley,³² and Cook and Beckman³⁴ for more information on these threats.

this movement and agree with it in principle, in many instances it is counterproductive. Overemphasis on higher outcomes risks failure to establish a causal link between the intervention and outcome³⁷ and can result in undue focus on measurable outcomes rather than the most important outcomes. It also serves to discourage research in general by setting the bar so high as to be achievable by only a select few. I prefer to choose outcomes based on the educational objectives (what will determine learner success?) and audience needs (what will be meaningful to the people who read your report?). Intermediate outcomes such as knowledge or skill, process measures such as attendance, and narrative comments often provide more insight than higher-order outcomes. Other sources contain more information on selecting outcomes.^{38–40}

7. Plan for Adequate Time and Other Resources

Leading a scholarly activity to successful completion will require many resources, not the least of which is time. How to find time for your project will depend on the circumstances, but it is essential that you plan for this up front. You should also ensure you have other needed resources such as administrative support, money, and willing participants.

8. Attend to Ethical Issues

The ethical implications of education research are increasingly recognized.^{41,42} Learners constitute a “vulnerable population” because teachers (who are often the investigators in such studies) also control grades, letters of recommendation, and even job offers. Moreover, learners may worry about actual learning that might be gained or lost by participation in a research study. Investigators must be sensitive to these issues and take appropriate measures to safeguard learner rights. Such measures might include obtaining informed consent, making participation truly voluntary, keeping data confidential, and ensuring that reported data cannot be traced to the individual. Many journals, including *Academic Medicine*⁴³ and *Medical Education*,⁴⁴ now require a statement of institutional review board (IRB) approval or other indicators of ethical research conduct before a manuscript will even be considered.

9. Network with Others in the Field

As noted above, one of the great benefits of engaging in medical education scholarship is the opportunity to establish relationships with wonderful people around the world. However, networking with colleagues is more than just a social activity; it is also essential for your career. Colleagues locally and at other institutions can provide support when morale is low, a sounding board for

ideas, and opportunities for collaboration on projects. You can build these networks within your own institution, at national and international meetings, through involvement in societies and multi-institutional committees, and informally over the Internet.

In my experience, relationships are built most effectively when you approach an individual with a purpose in mind. I’ll never forget the time I went up to a renowned investigator and introduced myself. He said, “It’s nice to meet you,” and then – as I had nothing more to say – he walked on. As I stood there, I realized that I had done nothing to establish a relationship or make myself memorable, and I was quite certain he would soon forget me. However, six months later we had the opportunity to discuss some research of mutual interest over breakfast, and it was the beginning of a friendship that has lasted years and resulted in several productive collaborations. Purposeful meetings might involve asking a question, sharing an idea, inviting involvement on a project, or enjoying a meal or beverage together.

10. Remember This is Hard Work (Plan Ahead)

As Gruppen noted, medical education scholarship is fun, but it is not easy.⁴⁵ Study groups are often biased, treatments are typically confounded and rarely standardized, assessments are imprecise and poorly validated, and funding is difficult to find.

I don’t say this with the intent of discouraging you, but rather to emphasize that quality work requires an investment of time and energy. Making the most of this investment requires careful planning. The more you plan (in advance, if possible), the easier and more successful your activities will be. I advocate a three-step approach:⁴⁶ 1) identify the scholarly question, 2) use appropriate methods, and 3) select appropriate outcomes.

Closing

Education research and scholarship are critically important to extending our ability to teach and assess effectively. If you are considering a scholarly project in medical education, I encourage you to get some training, find a mentor, ask important questions, start small and grow while continuing to aim high, accept that your study will likely be imperfect, plan for adequate time and other resources, attend to ethical issues, network with others in the field, and recognize that this is hard work. As you follow these steps and plan ahead, you will be better poised to make meaningful contributions to the art and science of medical education.

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