Medical education

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Anatotion: *This article provides clinician-teachers with anoverview of the process necessary to move from an initialidea to the conceptualization and implementation of anempirical study in the field of medical education. Thisarticle will allow clinician-teachers to become familiarwith educational research methodology in order to a)critically appraise education research studies and applyevidence-based education more effectively to their practiceand b) initiate or collaborate in medical .*

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The focus of the majority of researchin medical education has been on reporting outcomesrelated to participants. There has been less assessment ofpatient care outcomes, resulting in informing evidence-based education to only a limited extent. This articleexplains the process necessary to develop a focused andrelevant education research question and emphasizes theimportance of theory in medical education research. Itdescribes a range of methodologies, including quantitative, qualitative, and mixed methods, and concludes with adiscussion of

dissemination of research findings. A majorityof studies currently use quantitative methods. This articlehighlights how further use of qualitative methods canprovide insight into the nuances and complexities oflearning and teaching processes. Conclusions Research in medical education requiresseveral successive steps, from formulating the correctresearch question to deciding the method for dissemina-tion. Each approach has advantages and disadvantagesand should be chosen according to the question beingasked and the specific goal of the study. Well-conductededucation research should allow progression towards theimportant goal of using evidence-based education in ourteaching and institutions.

Post-course designs: Post-course design is popular inmedical education research where data collection occurs atthe end of an educational intervention. Typically, surveysare employed that usually comprise closed and open-endedquestions to elicit both numerical and text-based data. Thisdesign has the main advantages of being inexpensive, straightforward, quick to conduct and analyze, and oftenwith high response rates. This is largely because there isonly one point of data collection; participant investment oftime is relatively small; contacting potential participantspresents few problems; and data can be analyzed readily.However, Skeff et al. have written, ‘‘when training influ-ences participants’ criteria for their self-ratings (responseshift), the validity of the traditional pre/post comparisons issuspect’’.38Instead, they propose an alternative modelcalled retrospective pre/post self-assessment ratings inwhich pre and post self-rating occurs only after theteaching intervention. They found this model to be moreaccurate than the traditional one. Even with this type of model, a post-course design is aweak design, and as there is no collection of baseline data,it is difficult to account for reported change convincingly.Also, if data collection occurs in the final session ofmedical education activity, as is frequently the case, thelonger-term impact of the education on practice cannot beassessed. Short post-course questionnaires devised forthese studies are sometimes described as ‘‘happy sheets’’because they capture little more than participants’

imme-diate reactions to a learning experience. Before and after studies: Another popular design is thebefore and after study where the researcher collects datashortly before and after a learning opportunity. Again, theuse of surveys (and sometimes interviews) is common-place. This design is more robust than a post-course design, as it can detect changes resulting from a learning activitymore accurately because there is data collection at twopoints in time, i.e., before and after the activity. If possible, obtaining paired data (where a respondent's pre- and post-course responses can be linked) for numerical measures orranks permits the use of more powerful statistical tests thanobtaining unpaired data alone. The close proximity of datacollection to course delivery makes tracking participantseasier than in studies that also collect follow-up data. Despite gathering data at two time points, a before andafter study design is still limited in providing a rigorousunderstanding of change as it cannot state accuratelywhether the change was attributable to the intervention orsome other confounding influence. This is where the use ofa control group is helpful (see below).

Randomized controlled trials: Controlled before andafter studies can be redesigned to become randomizedcontrolled trials (RCTs) by randomly selecting learners forinclusion in either the intervention or the control groups. Randomized controlled trials can provide a more robustunderstanding of the nature of change associated with anintervention. The randomization of participants in a coursemeans that bias related to selection or recruitment is min-imized. Although RCTs are used widely in clinicalresearch—in which they are often considered the goldstandard—they are not common in educational research.19Randomized controlled trials require a precise sample sizebased on the hypotheses to be tested.

Insider and outsider positions Researchers should reflecton their internal or external (outsider) research approach. Each has advantages and disadvantages. Nowadays, manyteachers and researchers in medical education are alsohealthcare professionals.4As insiders, they can benefitfrom extensive knowledge of the history and context of theprogram, but that can make it difficult for them to interpretthe data in a neutral manner. Insider researchers may alsosuffer from lack

of time and resources to undertakeempirical work. The need to deliver the program nearlyalways overrides the need for empirical study. Neverthe-less, insider researchers are well placed to contribute theirfindings to course development and to formulate relevantpreliminary research questions. In contrast, outsider researchers generally will havededicated the time and resources for their purpose. It maybe easier for outsiders to view an intervention from a moreneutral viewpoint and to obtain more candid data fromparticipants. However, they often need to spend timedeveloping an in-depth understanding of presage and pro-cess issues related to the activity they are studying. External research studies are often accorded greater weightbecause they are seen as more impartial and/or moreauthoritative. The differentiation between an insider and anoutsider position may not always be clear. Both insider andoutsider views are important in the collection and inter-pretation of data if a comprehensive picture is to beobtained.

Conclusion

research, research in medical educationrequires several successive steps, from the formulation ofthe correct research question to the decision regarding themethod of dissemination. More specific to research ineducation, it relies on multiple types of rigorous methodsthat could be a challenge to master. Each method has its advantages and disadvantages and should be chosenaccording to the research question and the specific goal ofthe study. This article scratches merely the surface ofthe many methodologies and conceptual and theoreticalframeworks in the field of education research. Clinician-teachers should become familiar with these methods inorder to appraise research studies critically and apply evi-dence-based education more effectively in their practice. We stress the importance of formulating a precise question,choosing the correct methodology (even if initially unfa-miliar), and harnessing the expertise of experiencedresearchers in the field. Without well-conducted educationresearch, we cannot move toward the important goal ofusing evidence-based education in our teaching andinstitutions.

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