

Educational Research: Much Unexplored Pathway to Career Enhancement of Teachers in Health Sciences

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ABSTRACT

The teachers in medical colleges and health sciences universities in India are facing stiff challenges in achieving career enhancement. This is due to the requirement of research and publication as major criteria for appraisal or career enhancement. While there are several bottlenecks faced by the junior teachers in climbing the ladders of academic leadership, a goldmine of opportunities awaits. Educational research if understood well and done meticulously can result in multiple benefits: funding opportunities on par with clinical research, prospects of publication in new online journals, applying for copy rights, and even patents besides unique contribution to the innovations and best practices in teaching. This article is an attempt to outline the meaning and scope of educational research along with a justification for using it in the Indian context. While discussing the salient features of conducting educational research, a few tips have been given for pursuing educational projects that can culminate in a publication.

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INTRODUCTION

Research is the powerhouse of knowledge for the human beings to solve the problems of the society or to advance the knowledge for the benefit of next generation. Every human activity, be it agriculture, industry, education, or health, is dependent upon the findings of research, which provide the tool for generating new information, proving and improving what has been found, and informing policy issues.

Looking from a systems perspective, the three essential components of any healthcare organization are education, patient care, and research that are interdependent. They are interwoven with each other. In order to produce “output” in the form of effective and efficient healthcare, we need to deploy “inputs” in the form of students, teachers, infrastructure, and resources. For optimizing the outputs, we need to install a “process” that is nothing but research. The healthcare system functions in a dynamic state of equilibrium along with other systems operating externally and influencing all the time.^{1,2}

Now, education itself can be visualized as a subsystem in which we utilize or work upon *inputs* to produce *outputs*, the trained graduates, or the potential workforce who contribute to the healthcare delivery. In this subsystem, the *process* is again research in the form of educational research. Educational research is nothing but a research process that aims to produce new knowledge or apply the existing knowledge in solving educational problems encountered by students, teachers, educational administrators, and policy makers.

The hallmark of any process in a system is the feedback that regulates the output. In the case of research, the feedback is nothing but evidence. Just as evidence is needed for ascertaining the efficacy of an intervention in medicine, it is equally important in education. Evidence is a key factor for judging the relevance, quality, effectiveness, and efficiency of the teaching. It is needed for assessing the quality of teachers or determining the effectiveness of the curriculum. This means that educational research is the yardstick for quality improvement.

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WHAT IS EDUCATIONAL RESEARCH?

Put in a simplest way, educational research is nothing but the application of scientific inquiry to the study of educational problems. It serves four major purposes. First, it helps to develop new theories of teaching and learning. For example, how can the adult learners learn digital skills? Second, it contributes to improve practice. How to improve one’s interactivity in a classroom? Third, it can change a person from opinion-based teaching to evidence-based teaching. For example, can simulation work equally well in teaching certain procedural skills? Fourth, it helps to inform policy issues. For example, should environmental education be part of all health sciences curriculum? Finally, educational research contributes to boost research publication and even intellectual property rights (IPR) activities, especially copy rights that is one of the important criteria for individual promotion as well as institutional accreditation and ranking.

HOW IS EDUCATIONAL RESEARCH DIFFERENT FROM BIOMEDICAL RESEARCH?

While a biomedical researcher is interested in explaining the cause and effect relationship between variables, or predicting an event, the educational researcher would like to mostly

explore new interventions and describe those interventions to gain insight in to the problem. Of course, explaining cause and effect between the independent and the dependent variable or predicting a result from current assessment are also matters of interest, although it is quite challenging for want of an accurate measurement.

Biomedical research follows the tradition of quantitative approach. Here, the hypotheses are formulated based on previous knowledge. The variables are defined. The sampling framework is calculated based on statistical methods. The designs follow observation, case controls, cohort studies, quasi-experimental or experimental design often in the form of randomized control trials (RCT), which is considered as the gold standard. The treatment is controlled by eliminating the confounding variables. Observations are measured by designing tools with high precision and accuracy. The data sets are cleaned up, and statistics is applied to test whether the differences seen in the treatment variable are statistically significant or due to chance factor.

Now think of an educational problem in which you need to find the effectiveness of a new method of teaching, e.g. interactive teaching (A), against conventional lecture (B). Imagine you wish to conduct an experiment. First, you have to draw a small sample of students for experimentation. This will raise ethical issue, as you will be depriving a large number of students from the likely benefit of your new intervention, namely, interactive method. Even if you divide the class in to two groups, the question arises: Are these groups comparable in terms of achievement and motivation? Even if you create two homogeneous groups, by some statistical comparison, it will be difficult to control the treatment. It is practically impossible to find two teachers of equal caliber to give intervention exactly in a similar manner. There is also a possibility that the students after being subjected to two different treatments meet with each other and exchange notes, causing the effect of confounding variables. Therefore, conducting experiments in an educational setting is almost impossible. The obvious way out is to explore qualitative approach that has been popular in social sciences, humanities, anthropology, behavioral science, and education.³

Educational researchers use quantitative, qualitative, or mixed methods to answer their research questions in order to find solutions to their problems or to explore new methods of teaching or assessment.^{4,5} An educational researcher is interested in exploring various methods of teaching suitable for different learning outcomes, such as acquisition of knowledge, leading a group discussion, practising a skill, conducting an enquiry, or participating in a project. This can be achieved by methods other than experimentation, such as observation in a class room or at workplace or conducting a case study in a particular institute. However, the challenge will be to generalize the findings.

A comparative account of the two approaches, quantitative and qualitative, has been given (Table 1)

STEPS IN CONDUCTING EDUCATIONAL RESEARCH

- *Identifying the research problem and formulating the research questions:* The basic steps in biomedical research or the educational research remain the same. One starts with defining a research problem by formulating a research hypothesis or research question, respectively.

Table 1: Comparative account of quantitative and qualitative approach in educational research

<i>Criteria</i>	<i>Quantitative approach</i>	<i>Qualitative approach</i>
Meaning	Measurement of the outcome; mostly numerical	Description of the phenomenon, mostly words and expressions
Purpose and focus	Mainly to explain the cause and effect relationship, and to predict the outcomes of an intervention	Mainly to describe a phenomenon or to explore new ideas and solutions; explanation and predictions are difficult to achieve.
Setting of research	Labs, class rooms, wards, and clinics with instrumentation	Natural context, classroom, campus, community, workplaces, homes
Fields of knowledge	Biomedical science, epidemiology, maths, statistics, technology	Mainly psychology, sociology, anthropology, humanities and literature
Ethical issues	All studies require informed consent and ethical clearance. The benefit of intervention should go to all subjects	No need for ethical clearance for conducting reviews or content analysis; Needed for other methods; participants' identity to be kept confidential
Strategy	Hypothesis formulation and testing guide the strategy	No hypothesis, only research questions guide the strategy
Methods used	Surveys, observations, experiments, controlled trials, case controls, cohort studies, correlation studies	Document analysis, observation, case study, focus group discussion, interview, ethnomethodology
Role of researcher	Objectivity holds the key. Researcher isolates himself or herself from study	Subjectivity is the strength; Researcher has deep involvement
Sampling framework	Sample size is determined by theoretical computation; mostly random, and stratified samples are drawn	Determined based on the purpose of the study (purposive sample); a lot of flexibility exists in deciding sample size.
Tools used	Tools, tests and instruments with high precision, sensitivity, and specificity	Wide variety of tools, documents, reports, photographs, video, field notes, diary
Data collection methods	Statistical packages, software	Observation (participant and nonparticipant), focus group discussion, in-depth interviews
Generalizability: The validity	Highly generalizable and reproducibility	Highly contextual; credible, authentic

- *Ethical clearance:* It is needed unless one is interested in doing a review or content analysis, say conducting item analysis of examination by masking the candidates' identity. Informed

consent gains a lot of importance when you are conducting an interview or a focus group discussion, where again you need to mask the identity by assigning code numbers.

- *Review of related literature is the next step:* If the study focuses on exploration, some researchers avoid a detailed review that can bias the researcher. Educational researchers will prepare a conceptual framework as a part of their research protocols. Needless to add that review of literature has taken a new Avatar in the wake of flooding of information via Google, PubMed, and other databases that are freely available as open sources to some extent. One must plan and go systematically by defining the key terms and gradually filter information according to the requirements in terms of abstracts and full-text articles. The use of software such as Zotero may be highly useful for a researcher. A short orientation to such tools is highly desirable rather than self-learning with trial and error.
- *Collection of data:* The data depends upon the decision taken by the researcher to go for a survey, experimentation or a qualitative method, or mixed-methods approach that is gaining momentum in the current research design. The toolkit of educational researcher is quite varied and customized to the needs of the researcher. For example, if a researcher wants to establish efficacy of podcast against telecast, he or she should aim at collection of evidence in the form of student's attainment (pretest, posttest, and repeat test after some time), combined with students' perception of their efficacy, teacher's perception, analysis of feasibility, and cost and benefit. Obviously, the tool kit will involve tests, rating scales, and devices (software/hardware) to capture evidence of student satisfaction, reports of their implementation, and analysis of outcomes and impact. Kirkpatrick's model of program evaluation is a popular model that captures participants' reaction, learning, behavior (in workplace), and impact.⁶ A special challenge involved in pursuing such qualitative designs is the "entry in to the field." This requires a lot of ingenuity, communication skills, and training on part of the researcher who is concerned about obtaining rich data that are credible and useful for answering the research question.
- *Analysis of data:* Analysis of data is simple in the case of educational surveys that have become common strategies with the popularity of google forms or survey instruments such as "Survey Monkey" that are very handy for administering and analyzing. The next range of tools of observation are the checklists, rating scales, and observation scales based on psychometric properties of validity and reliability, often interrater reliability.

Analysis becomes challenging in case of data collected from observations, focus group discussions (FGDs), and interviews. Since many of the areas of observation are highly subjective, it is challenging to capture all the data in a dispassionate manner and then using the researcher's lens to interpret the findings. Educational researchers use a method called "triangulation" to converge the findings from three sources. The three sources can be data collected from quantitative tool, a qualitative tool, and researcher's own observation and interpretation of findings. This is how educational researcher brings credibility to the study.

The transcripts of the interviews and FGDs pose huge challenge in terms of analysis. The transcripts should be read by the researcher and one more person independently by coding the responses and placing them in to themes and subthemes. This is called thematic analysis, which forms the basis for research reporting.

While the quality of biomedical research is judged by its reliability, reproducibility, and generalizability to the study population, educational research especially in qualitative approach is concerned with the "thick description" of data. It addresses the trustworthiness, credibility, and authenticity that might have been captured by the researcher who often takes neutral, dispassionate, and even self-critical look at himself or herself. This is what makes educational research a unique contribution to complement the search of truth.

- *Reporting of educational research:* Educational research basically forms the same format as prescribed by the scientific community. The format of the thesis and the submission requirements are laid down by the Universities in line with the Regulations passed by the UGC. However, a research paper should follow the scientific norms besides the publication policy laid down by the journals from time to time. While scientific paper follows IMRAD structure, a paper in education either takes form of a review paper or original study that looks for a story of success or failure that is more useful for the practitioners.

A thesis includes, therefore, a description of the context and the background of the problem, why the intervention was needed, a statement of aims and objectives of study (Introduction), how the study was conducted (methodology), what lessons were learned (results), and what are the strengths and limitations of the study (discussion) and their implications for further research. The factors that matter are the relevance of research findings to the theory or practice in the given field, the originality of the contribution, clarity of message, ethical compliance of the study, and the accuracy of the results described graphically or in a narrative form, in a language that is discernible to the readers. The ethical considerations include the scrutiny check for plagiarism, authorship issues, and conflict of interest of the researchers in reporting the study.

ORIGIN AND DEVELOPMENT OF EDUCATIONAL RESEARCH

The origin of medical education research in the United States can be traced back to 1955 to 1959 with the initiative taken by American Association of Medical College (AAMC) to start the *Journal of Medical Education* (JOME), which later became *Academic Medicine*, which is one of the leading current journals.⁷ The earlier research in medical education followed the tradition of experimental psychology practiced by medical educators and behavioral scientists. The clinicians and the basic scientists later entered and enriched field of medical education research. Another major initiative taken in medical education research was Best Evidence Medical Education (BEME), which is the application of evidence-based medicine to medical education. A series of studies were published in "Medical Teacher," another leading journal published from UK. By 2011, a study of top themes in medical education research revealed a wide range of issues. (Table 2) The top four areas researched most often are student assessment, clinical skill teaching, clinical clerkship, and problem-based learning.⁷

Indian Scenario

Educational research in India is in a formative state. A number of articles confirm this statement.⁸⁻¹⁰ An excellent analysis of the Indian scenario has been discussed in an Educational Research International Conference (ERICON) held at Sawangi, Wardha, Maharashtra, India, in 2017.¹¹ The various barriers to the growth of

Table 2: Top themes in medical education research across the world

1. Student assessment and evaluation	16. Use of simulations
2. Clinical skills training	17. Admission to medical school
3. Clinical clerkships	18. Medical licensing exams
4. Problem-based learning	19. Knowledge retention
5. Community-based training	20. Specialty choice
6. Clinical competence assessment	21. Patient safety
7. Teaching the clinical sciences	22. Scholarship in education
8. Communication skills training	23. Humanities in medicine
9. Student characteristics	24. Teaching through lectures
10. Objective structured clinical exam (OSCE)	25. Interprofessional education
11. Teaching the basic sciences	26. International medical graduates
12. Nature of clinical reasoning	27. Women's health
13. Professionalism in medicine (incl. attitudes, cultural competence, ethics)	28. Underrepresented minority students
14. Costs of medical education	29. Computer-assisted instruction
15. Faculty development	

this field have been identified as lack of faculty awareness about educational research, poor organizational support, and absence of policy in place to guide the research, education system that is insulated from research focus, financial constraints, and absence of a culture of research.

However, proactive initiatives taken by the regulatory agencies in the recent past have turned the table around to boost research and publications at all levels. The “pressure to publish” as a major criteria for promotion or accreditation has also resulted in side effects such as mushroom growth in the predatory journals and malpractices such as plagiarism, authorship conflicts, and commercialization of publication.

The launching of competency-based medical education (CBME) by the Medical Council of India and the requirements for accreditation by the NAAC has exercised a high degree of stimulus for educational research.^{12,13} Competency-based medical education is a golden opportunity to explore the issues that hover around Indian Medical Graduate (IMG). How to teach and assess clinical skills, team-building skills, interpersonal communication, professionalism, and lifelong learning skills is a new challenge for the educational researchers.

Way Forward during Post-COVID-19 Era

The pandemic of COVID-19 has resulted in the need for overhauling the whole education system, including research focus. One of the major offshoots is the utilization of online teaching by the colleges and universities. Is this approach adequate for teaching? Related to this issue is the need for harnessing diverse technology, especially simulation and virtual learning powered by artificial intelligence, data analytics, and machine language. While digital literacy is a must, there is also a need for promoting teamwork, ethics, attitudes, and professionalism to enable the teachers for training a complete IMG. How to deal with these crucial aspects?

COVID-19 has given impetus to a lot of online education, including webinars and other modes of training. It is time to

Table 3: Reasons for pursuing educational research

1. Educational research provides a flexible approach of combining a variety of methods and approaches
2. Educational research deals with the improvement in teaching practices that determine the quality of products
3. The results of educational research have high chances of getting published in national and international journals
4. There is no financial constraint for supporting educational research. It is too low compared to biomedical instrumentation that is costly to set up
5. Educational research will be a rewarding experience, as it will contribute to the institutional development for accreditation
6. For a researcher, it is a satisfying experience for career enhancement

research the quality and impact of these online modalities to be conclusive about their utility. COVID has also exposed our inadequacy to address issues beyond traditional curriculum. For example, how can we network with other health professionals to promote interprofessional education? How can we develop skills such as caring for the downtrodden, the migrant workers, slum dwellers, aged, and the disabled? How can we address wider issues of well-being (salutogenesis) beyond public health? Will it need altogether a different paradigm of mind body medicine and psychoneuroimmunology? Can ancient Indian techniques like Yoga help? The justifications for pursuing educational research are obvious. (Table 3).

Although the platform for educational research in the past were limited to a few journals such as *Academic Medicine*, *Medical Education*, *Medical Teacher*, and occasionally *JAMA* and *New England Journal of Medicine*, of late many journals have opened up in India and South East Asia. The hubs of educational research in India are the National Teacher Training Centers, MCI-recognized Regional and Nodal Centres, and FAIMER Regional Institutes (Mumbai, Ludhiana, Coimbatore and Manipal), besides several Health Sciences Universities in India who are evincing keen interest in all spheres of research, including educational research. Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, and Datta Meghe Institute of Medical Sciences (DMIMS), Savangi, Wardha, Maharashtra, have taken bold steps to launch PGDHPE, MPhil, and PhD programs that are likely to give impetus to educational research.

Future of Educational Research

Educational research in the future is likely to move in two directions. One it will be embedded in various specialties and will grow as discipline-based educational research. Second, the research Paradigm itself is likely to shift. It is bound to embrace a new field of meta-research. Meta-research is the “research on the research.” It explores issues such as appropriateness of the methods used in research (how to do it), the right way of reporting the research, reproducibility of the research, evaluation of the research findings, and the incentive mechanisms for research. This will obviously require synthesis of information drawn from diverse fields such as philosophy of research (epistemology), statistics, psychosocial aspects, data science, bibliometrics, operational research, ethics, communication science, and behavioral economics. In either ways, educational research is bound to contribute and create a win-win situation for the research as well as the researcher.

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