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TENTH EDITION

Research in EDUCATION

John W. Best | James V. Kahn
Arbind K. Jha



RESEARCH IN EDUCATION

TENTH EDITION

John W. Best

Butler University, Emeritus

James V. Kahn

University of Illinois at Chicago

Arbind K. Jha

Mahatma Gandhi International Hindi University



To Gabe and Kathleen
—JVK

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Indian Subcontinent Adaptation

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Preface

The tenth edition of *Research in Education* has the same goals as the previous editions. The book is meant to be used as a research reference or as a text in an introductory course in research methods. It is appropriate for graduate students enrolled in a research course or seminar, for those writing a thesis or dissertation, or for those who carry on research as a professional activity. All professional workers should be familiar with the methods of research and the analysis of data. If only as consumers, professionals should understand some of the techniques used in identifying problems, forming hypotheses, constructing and using data-gathering instruments, designing research studies, and employing statistical procedures to analyze data. They should also be able to use this information to interpret and critically analyze research reports that appear in professional journals and other publications.

No introductory course can be expected to confer research competence, nor can any book present all relevant information. Research skill and understanding are achieved only through the combination of course-work and experience. Graduate students may find it profitable to carry on a small-scale study as a way of learning about research.

This edition expands and clarifies a number of ideas presented in previous editions. Additional concepts, procedures, and examples have been added.

Each of the five methodology chapters has the text of an entire published article following it that illustrates that type of research. Nothing substantive has been deleted from the ninth edition. Appendix B contains a data set for use by students in Chapters 10, 11, and 12. This edition, as also was true of all of the editions since the fifth, has been written to conform to the guidelines of the American Psychological Association's (APA) *Publications Manual* (now in its 5th edition). The writing style suggested in Chapter 3 is also in keeping with the APA manual.

Many of the topics covered in this book may be peripheral to the course objectives of some instructors. It is not suggested that all of the topics in this book be included in a single course. It is recommended that instructors use the topics selectively and in the sequence that they find most appropriate. The portion of the book not used in those courses can then be used by the student in subsequent courses, to assist in carrying out a thesis, and/or as a reference.

This revision benefited from the comments of the second author's students who had used the earlier editions of this text. To them and to the reviewers: Mark Isham, Eastern New Mexico University; Richard A. McInturf, East Tennessee State University; and Mary O'Keeffe,

Providence College, we express our appreciation. We wish to acknowledge the cooperation of the staff of the University of Illinois at Chicago Library and Computer Center.

John W. Best
James V. Kahn

Preface to the Indian Edition

With the phenomenal expansion of higher education in general and teacher education (D Ed., B. El. Ed., B. Ed., B. Ed.-M. Ed.-Integrated, M. Ed. M. Phil., Ph. D.) in particular, academic research study suddenly received an unique prominence within the scheme of Indian educational system. To meet the ever-growing need and aspiration of the vast mass of Indian educational stakeholders and to help the educational planners and policy makers alike, there is a need to have a good number of well-groomed educational researchers (at the graduate, postgraduate, and research levels) for the systemic change in education—both conceptually and operationally. And without having an insightful understanding of research, this aim could not be achieved. However, it was felt that there weren't enough good reference books on research methodology that would provide fresh perspectives and are suitable for present times and climes for the educational research as desired by the researchers. Apart from this, most of the books on educational research did not provide newer topics that are essential for today's educational research conducted in India.

The present text transcends the traditional approaches and engages with fresh perspectives that are unique in every sense and invites readers to engage with newer and more relevant research issues, methods, and theories as figured in the different paradigms (quantitative, qualitative, interpretative, critical, etc.) of educational research. The present edition of *Research in Education* has accommodated some pertinent changes aimed at making the text friendly in terms of style and content to the Indian research readers and practitioners engaged in the field of education, without compromising with the main content. To this end, special attention has been paid to showcase important topics and sub-topics like the need for research and connecting it with the sources of knowledge, epistemological, and ontological bases for research in education, research as a scientific enquiry and approaches to educational research, underlying assumptions of quantitative and qualitative research, researchable and non-researchable problems in education, mixed method, triangulation and phenomenological research, purpose of historical research on Indian education, the National Sample Survey Organization, the Indian copyright law, funding agencies setup by the Indian government, the purpose and nature of discussion section of a research report, the latest APA (6th) referencing style, epistemological assumptions of qualitative research, credibility of qualitative research and relationship design, etc.

Other than revising the above important content to capture the latest developments and their relevance in the Indian setup, this very edition has also included newer topics like classification of educational measures, nature of statistics and inferential statistics, effects,

main effects and interaction effects, the logic of hypothesis testing, statistical and practical significance, qualitative data analysis software, use of internet in educational research, information retrieval, organization of information on the web, Internet search strategies, and advanced search techniques of web searching.

Arbind K Jha

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Introduction to Educational Research: Definitions, Research Problems, Proposals, and Report Writing

The first three chapters of this book explore the historical underpinnings of educational research, define some basic concepts, describe the processes of selecting a research problem to be investigated and writing a research proposal, and demonstrate a style of writing that can be used to write research reports, research proposals, and term papers.

Chapter 1 introduces the research endeavor. Such matters as methods of science, the importance of theory, the formulation of hypotheses, sampling techniques, and an overview of the methodologies used in educational research are described. Different types of educational research—historical, quantitative descriptive, qualitative, and experimental—are briefly described.

Chapter 2 describes the process by which a research problem is identified. This is one of the most difficult steps in the research process for beginners and sometimes for experienced researchers as well. This chapter also discusses the ethics of conducting research with humans in detail using the Federal regulations. Also included are ethic statements by both the American Psychological Association and American Educational Research Association. Finally, some suggestions for library research and how to write a research proposal are presented.

Chapter 3 describes one style for writing a research report, the style of the American Psychological Association. This style was selected because it is the most commonly accepted by journals in the field of education and psychology. The description includes writing style, preparing the manuscript, referencing, tables, and figures. This chapter also briefly describes an approach to evaluating research reports written by others.

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1

Fundamentals of Research

Why One Should Study Research?

Many students who join Bachelor of Education (B.Ed.) and Master of Education (M.Ed.) courses in India usually wonder why it is necessary to learn the basics of research in education. There are two reasons for which this subject is recommended for study.

First, they will have extensive careers in education (as teachers and teacher educators along with other educational professionals) that would certainly require them to keep abreast of the changes, improvements, and innovations in the field. In order to do this, they will need to be knowledgeable consumers of educational research to become better practitioners. Many reputed practitioners and educators in the field of education believe that students can best learn to be judicious consumers of research and become thoughtful practitioners by understanding the research process from the perspective of researchers who are engaged in the field of education at various levels. To understand the full implications of research, as it might affect them, students need to appreciate the decisions that a researcher needs to make, possible alternatives to those decisions, and the consequences of the results and conclusions. Finally, they need to judge the quality of research and the possibility of generalizing it to their educational setting.

Second, teachers, teacher educators, and other educational professionals continually need to examine what they are doing and compare their practices with different methods used by others in similar settings. To achieve this, they need to be knowledgeable and, thus, they largely depend on four sources of knowledge—personal experience, tradition, authority, and research. And research has become a source of dependable form of knowledge. One may conduct action research to determine if a procedure is working or whether they need to try something different and new with another student or class. In addition, collaboration between teachers and teacher educators and university or independent researchers is becoming a commonplace. As such, it is not unlikely that at some point of time in the near future, a researcher may ask a student of education to collaborate on a project or a student may even ask a researcher to collaborate on one. There is also a possibility that a B. Ed. or an M. Ed. student would like to shape his or her career as a researcher in the field of education instead of becoming a teacher or teacher educator.

The Search for Knowledge

Human beings are the unique product of their creation and evolution. In contrast to other forms of animal life, their more highly developed nervous system has enabled them to develop sounds and symbols (letters and numbers) that make possible the communication and recording of their questions, observations, experiences, and ideas.

It is understandable that their greater curiosity, implemented by their control of symbols, would lead people to speculate about the operation of the universe, the great forces beyond their own control. Over many centuries people began to develop what seemed to be plausible explanations. Attributing the forces of nature to the working of supernatural powers, they believed that the gods manipulated the sun, stars, wind, rain, and lightning at their whim.

The appearance of the medicine man or priest, who claimed special channels of communication with the gods, led to the establishment of a system of religious authority passed on from one generation to another. A rigid tradition developed, and a dogma of nature's processes, explained in terms of mysticism and the authority of the priesthood, became firmly rooted, retarding further search for truth for centuries.

But gradually people began to see that the operations of the forces of nature were not as capricious as they had been led to believe. They began to observe an orderliness in the universe and certain cause-and-effect relationships; they discovered that under certain conditions events could be predicted with reasonable accuracy. However, these explanations were often rejected if they seemed to conflict with the dogma of religious authority. Curious persons who raised questions were often punished and even put to death when they persisted in expressing doubts suggested by such unorthodox explanations of natural phenomena.

This reliance on empirical evidence or personal experience challenged the sanction of vested authority and represented an important step in the direction of scientific inquiry. Such pragmatic observation, however, was largely unsystematic and further limited by the lack of an objective method. Observers were likely to overgeneralize on the basis of incomplete experience or evidence, to ignore complex factors operating simultaneously, or to let their feelings and prejudices influence both their observations and their conclusions.

It was only when people began to think systematically about thinking itself that the era of logic began. The first systematic approach to reasoning, attributed to Aristotle and the Greeks, was the deductive method. The categorical syllogism was one model of thinking that prevailed among early philosophers. Syllogistic reasoning established a logical relationship between a *major premise*, a *minor premise*, and a *conclusion*. A major premise is a self-evident assumption, previously established by metaphysical truth or dogma, that concerns a relationship; a minor premise is a particular case related to the major premise. Given the logical relationship of these premises, the conclusion is inescapable.

A typical Aristotelian categorical syllogism follows:

Major Premise: All men are mortal.

Minor Premise: Socrates is a man.

Conclusion: Socrates is mortal.

This deductive method, moving from the general assumption to the specific application, made an important contribution to the development of modern problem solving. But it was not fruitful in arriving at new truths. The acceptance of incomplete or false major premises

that were based on old dogmas or unreliable authority could only lead to error. Semantic difficulties often resulted from shifting definitions of the terms involved.

Centuries later Francis Bacon advocated direct observation of phenomena, arriving at conclusions or generalizations through the evidence of many individual observations. This inductive process of moving from specific observations to the generalization freed logic from some of the hazards and limitations of deductive thinking. Bacon recognized the obstacle that the deductive process placed in the way of discovering new truth. It started with old dogmas that religious or intellectual authorities had already accepted and, thus, could be expected to arrive at few new truths. These impediments to the discovery of truth, which he termed "idols," were exposed in his *Novum Organum*, written in 1620.

The following story, attributed to Bacon, expresses his revolt against the authority of the written word, an authority that dominated the search for truth during the Middle Ages:

In the year of our Lord, 1432, there arose a grievous quarrel among the brethren over the number of teeth in the mouth of a horse. For thirteen days the disputation raged without ceasing. All the ancient books and chronicles were fetched out, and wonderful and ponderous erudition was made manifest. At the beginning of the fourteenth day a youthful friar of goodly bearing asked his learned superiors for permission to add a word, and straightway, to the wonder of the disputants, whose deep wisdom he sorely vexed, he beseeched them in a manner coarse and unheard of, to look in the mouth of a horse and find answers to their questionings. At this, their dignity being grievously hurt, they waxed exceedingly wroth; and joining in a mighty uproar they flew upon him and smote him hip and thigh and cast him out forthwith. For, said they, "Surely Satan hath tempted this bold neophyte to declare unholy and unheard-of ways of finding truth, contrary to all the teachings of the fathers." After many days of grievous strife the dove of peace sat on the assembly, and they, as one man, declaring the problem to be an everlasting mystery because of a dearth of historical and theological evidence thereof, so ordered the same writ down. (Mees, 1934, pp. 13–14)

The method of inductive reasoning proposed by Bacon, a method new to the field of logic but widely used by the scientists of his time, was not hampered by false premises, by the inadequacies and ambiguities of verbal symbolism, or by the absence of supporting evidence.

But the inductive method alone did not provide a completely satisfactory system for the solution of problems. Random collection of individual observations without a unifying concept or focus often obscured investigations and therefore rarely led to a generalization or theory. Also, the same set of observations can lead to different conclusions and support different, even opposing, theories.

The deductive method of Aristotle and the inductive method of Bacon were fully integrated in the work of Charles Darwin in the nineteenth century. During his early career his observations of animal life failed to lead to a satisfactory theory of man's development. The concept of the struggle for existence in Thomas Malthus's *Essay on Population* intrigued Darwin and suggested the assumption that natural selection explains the origin of different species of animals. This hypothesis provided a needed focus for his investigations. He proceeded to deduce specific consequences suggested by the hypothesis. The evidence he gathered confirmed the hypothesis that biological change in the process of natural selection, in which favorable variations were preserved and unfavorable ones destroyed, resulted in the formation of new species.

The major premise of the older deductive method was gradually replaced by an assumption, or *hypothesis*, that was subsequently tested by the collection and logical analysis of data. This deductive-inductive method is now recognized as an example of a scientific approach.

John Dewey (1938) suggested a pattern that is helpful in identifying the elements of a deductive-inductive process:

A Method of Science

1. Identification and definition of the problem
2. Formulation of a hypothesis—an idea as to a probable solution to the problem, an intelligent guess or hunch
3. Collection, organization, and analysis of data
4. Formulation of conclusions
5. Verification, rejection, or modification of the hypothesis by the test of its consequences in a specific situation

Although this pattern is a useful reconstruction of some methods of scientific inquiry, it is not to be considered the *only* scientific method. There are many ways of applying logic and observation to problem solving. An overly rigid definition of the research process would omit many ways in which researchers go about their tasks. The planning of a study may include a great deal of exploratory activity, which is frequently intuitive or speculative and at times a bit disorderly. Although researchers must eventually identify a precise and significant problem, their object may initially be vague and poorly defined. They may observe situations that seem to suggest certain possible cause-and-effect relationships and even gather some preliminary data to examine for possible relevancy to their vaguely conceived problem. Thus, much research begins with the inductive method. At this stage imagination and much speculation are essential to the formulation of a clearly defined problem that is susceptible to the research process. Many students of research rightly feel that problem identification is one of the most difficult and most crucial steps of the research process.

Frequently researchers are interested in complex problems, the full investigation of which requires a series of studies. This approach is known as *programmatic research* and usually combines the inductive and deductive methods in a continuously alternating pattern. The researcher may begin with a number of observations from which a hypothesis is derived (inductive reasoning). Then the researcher proceeds deductively to determine the consequences that are to be expected if the hypothesis is true. Data are then collected through the inductive method to verify, reject, or modify the hypothesis. Based on the findings of this study, the researcher goes on to formulate more hypotheses to further investigate the complex problem under study. Thus, the researcher is continually moving back and forth between the inductive method of observation and data collection and the deductive method of hypothesizing the anticipated consequences to events.

Epistemological and Ontological Bases for Research in Education

Almost all social science researches in general, and educational researches, in particular, based on varied philosophical assumptions, are carried out distinctly by taking cue from certain orientations. There are a number of approaches which are used within the context of

educational researches. Varied orientation along with epistemological and ontological assumptions as well as approaches influence the methods and methodologies that are adopted in the process of collection and generation of data and its analysis. There is no particular way of conducting educational research, which is valid in all sense. Similarly, how the research findings will be known and conveyed do not depend on a certain way of conducting researches in education. Epistemological questions like what and how of known knowledge in terms of its knowability do not depend on the legitimacy of conducting educational research in a particular way. While designing and conducting educational research, epistemological orientations and its reflections do help the researchers to identify the measures suitable for a particular context and the people concerned.

Educational research is largely focused on finding out how educational world is understood based on people's larger social and cultural lives, behaviors, dynamic interactions, and, above all, life stories. It is more interested in the processes than the product, and for this reason, the dynamics of social as well as cultural context and people's own perspectives—on life and the world—based on their experiences are considered important ingredients while conducting research. Meaning and its understanding, life spaces, life stories and accounts, experiential life, dialectics, and perceptual understanding of education are some of the key points which are researched upon by educational researchers in the domain of overall epistemological and pedagogical practices prevalent in education.

Ontological understanding in education orients us to the two most fundamental questions, which are, what constitutes educational reality and how can we capture this reality? Epistemological understanding acquaints us with the two most seminal questions—what is valid knowledge and how can we know it? The epistemological and ontological understandings lead us to comprehend that in educational researches, there exists a triangular relationship among epistemological and ontological positions and its methodological approach. That is to say that the methodological approach will largely depend on what is to be and can be researched upon, and how the same can be known. Similarly, in an educational study, it is the researcher's world perspective (ontological position) that influences epistemic position and methodological approach. Combining all these three, the researcher identifies and uses a method or technique to gather data and analyze it for understanding the nature of educational reality.

In educational discourse, knowing the context is emphasized more often, especially in terms of knowing people. Knowing people and their context demands two different kinds of knowledge—one is ontological and the other is epistemological. Therefore, in educational research, which is largely centered on people and their context, the researchers often commit mistakes of comparing different sets of data ontologically and epistemologically.

To this end, the seminal question arises: why should the epistemology of the known subject be considered as the epistemological and ontological bases of educational research? Primarily, it is the people's world and existence around which educational research revolves. Therefore, ontological perspective and its understanding will equip the educational researchers to comprehend the identity and existential issues which are important to the understanding of human existence in larger pedagogical space. Similarly, epistemological understanding will allow the educational researchers to understand and capture the epistemic dimension of human existence, so that the significance of cognitive interface between the learning ecology and the organism in the process of cooperative

knowledge construction can be encapsulated and understood in the paradigm of educational research.

Science

The term *science* may be thought of as an approach to the gathering of knowledge rather than as a field or subject matter. Science, put simply, consists of two primary functions: (1) the development of theory and (2) the testing of substantive hypotheses that are deduced from theory. The scientist, therefore, is engaged in the use, modification, and/or creation of theory. The scientist may emphasize an empirical approach in which data collection is the primary method, a rational approach in which logical and deductive reasoning is primary, or a combination of these approaches, which is most common. Regardless of the emphasis, the scientist begins with a set of ideas that direct the effort and with a goal that entails the development or testing of theory.

Research as a Scientific Inquiry and Approaches to Educational Research

Research as a Scientific Inquiry

As per perceived knowledge, a scientific inquiry may be defined as searching knowledge using three fundamental steps—collection of data through recognized and established methods, its analysis, and meaningful interpretation. Every inquiry has to have a purpose. Scientific inquiry also has a purpose—the purpose is to explain various natural phenomena, understand the co-relationships among these, and use the understanding to forecast and influence certain desirable behavioral changes. In the existing literature available on science and scientific inquiry, there is no mention of any universally accepted description of the elements of scientific inquiry. However, scientific process have been described in terms of some of the interrelated principles of inquiry like posing questions that can be investigated empirically; using methods that allow for investigation of the research question; providing an orderly and explicit chain of reasoning; replicating and generalizing across studies; linking research to pertinent theory; and disclosing research to encourage scrutiny and critique.

Developing the educational knowledge foundation is one of the main goals of research as a scientific inquiry in the field of educational research. Research as a scientific inquiry involves describing and examining the phenomena and their relationships precisely and more importantly, testing the causality of the relationship among phenomena.

The other goal of science as a result of scientific inquiry is to produce a theory. A theory is generally identified as a set of propositions which explain the relationships among various phenomena. It is also a means for understanding the complex realities of the phenomena in its simplest form. Characteristics of scientific inquiry are: objectivity—a single, reasonable inference or interpretation of the observed phenomena on the basis of data analysis and its results; controlling bias—personal beliefs, attitudes, or perspectives not influencing research; willingness to change; verifiable—others can verify results; inductive—general conclusions can be drawn from specific observations; precise—concepts should be defined with sufficient detail to convey exact meanings; truthful—conclusions are considered as provisional explanations open to alteration, provided new fact is presented.

Approaches to Educational Research

It is commonly alleged that methodological education lacks a single and appropriate method to study it. In fact, the nature of education is such that it does not allow having a single method to study education and educational phenomenon. There are three basic approaches to educational research—positivism, interpretivism, and critical theory. The positivist paradigm is generally perceived as the scientific paradigm of research. The practitioners of this paradigm assume that any reality could be observed. In the positivist paradigm of educational research, the aim is to prove or disprove a hypothesis and conducting the research using the scientific method. The other two important characteristics of positivist research are—statistical analysis and the ability to generalize. In this paradigm of research, pre-test and/or post-test design is used and there are two groups—experimental and control. Precise empirical observation is used to find out probabilistic causal laws that can be used to predict general patterns of human actions.

Positivist paradigm has its own philosophical (ontological and epistemological) assumptions. Its ontological assumptions delineate that reality is peripheral to the educational researcher and is symbolized by objects in space; meaning of these objects remain independent of any consciousness of their existence and reality can be encapsulated by human senses and consequently predicted. As outlined by the indicators of epistemological assumptions, the methodology of natural sciences should be used to study social and educational reality. Truth can be attained on the premise that knowledge lies on a set of indisputable truths, is objective, and can be obtained deductively from a theory or hypothesis.

The interpretivist paradigm is generally considered as anti-positivist. It is even referred to as constructivist as it emphasizes on the ability of an individual to construct meaning. This interpretivist paradigm is established on the basis of meaning-making cyclical process. There is a need to take into account the subjective interpretations of human beings, their insight of the world before they start comprehending about any social or educational phenomena. Different people perceive and interpret social reality differently, causing multiple perspectives. The main tenet of interpretivism is that research can never be observed and conducted objectively from outside rather it should be observed and conducted from inside on the basis of the direct experience of the people being observed.

There is a belief in critical theory that educational research is conducted not only to search knowledge but also to emancipate the individual as well as groups in a given society. Thus, a critical educational researcher should not only aim to understand or make available an account of behaviors in societies but also suggest (or strive) to change these behaviors into desirable ones. The critical theory that originated from this observation is that educational research was too technical and concerned only with efficiency and rationality of design, neglecting social inequalities, and issues of power (Gage, 1989). Therefore, the researchers should be looking for political and economic foundations of construction of knowledge, curriculum, and teaching, and schools play an explicit part in this process based on power in a given society. Educational research and schools like other social institutions, such as the media and the legislatures, must be the scenes of the necessary struggles for power.

A cursory survey of educational research highlights that most of the researches in the field of education fall either in the category of quantitative or qualitative paradigm without any sufficient reference to either critical or interpretative model. This artificial distinction between the two inquiries—quantitative and qualitative—has divided the field of educational research, and it is