Conducting Educational Research

SECOND EDITION

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HARCOURT BRACE JOVANOVICH, INC.

NEW YORK SAN DIEGO CHICAGO SAN FRANCISCO ATLANTA

ISBN: 0-15-512981-3

Library of Congress Catalog Card Number: 77-15319

Printed in the United States of America

PREFACE

When the first edition of *Conducting Educational Research* was written, it was intended to introduce students to the concept of variables in terms of their definition, manipulation, and measurement—as the raw materials or building blocks of educational research. A second aim of the book was to assist students in their efforts to do research in the real world of the school by providing designs and procedures of sufficient flexibility to allow the "noise" of the school to be dealt with and controlled.

The feedback I have received from readers of the first edition has served to strengthen my conviction that to teach the methodology of educational research, one must present techniques for dealing with variables in field settings, and that these techniques must be presented with a strong emphasis on *clarity* and *applicability*. The wide use of the first edition, wide in terms of both academic background of student user and section of the country inhabited by the user, encouraged me to think about, to prepare, and, finally, to publish this new edition.

This second edition of *Conducting Educational Research* follows the first edition closely in its teaching approach—both works placing great emphasis on the requirement that concepts and techniques be clear enough to be not only understood but applied. To this end the second edition equals the first in its use of illustrations and examples of each technique or concept. Indeed, the second edition goes beyond the first in this regard by virtue of its inclusion of a sample proposal, which can be found among the appendixes along with three new sample studies. More than appendages, these materials are referred to throughout the text, where they provide meaningful examples.

The second edition also features two new chapters, one on searching the literature (Chapter 3) and one on doing classroom research (Chapter 13). The chapter on searching the literature introduces the student to the many and varied sources of published and unpublished research in education, and to how these sources may be used. The chapter on classroom research illustrates the application of the research steps covered in

the book to a most popular and important arena for the educational researcher—the classroom.

Other chapters in the book remain in title and basic coverage as they were in the first edition—a fact that reflects the basic stability within the field of educational research methodology—but they have been "refitted" with examples from the book's new sample studies and from other recent studies found in the educational literature. In particular, Chapter 12, on writing the research report, includes a whole new set of examples drawn from current research journals and dissertations.

The hope of making the learning of educational research methodology as rational and systematic a process as the methodology itself has always guided my writing and revising in the field. And each time a student understands the research process better and thereby produces a better, more meaningful study—more meaningful both to himself or herself and to the field—I will be encouraged to continue my active role as an author and teacher of research methodology, and thus as a disseminator of its rules, both old and new.

Many individuals and organizations were gracious in letting me reprint materials they have published. I am indebted also to the literary executor of the late Sir Ronald A. Fisher, F.R.S., and to Oliver & Boyd, Edinburgh, for their permission to reprint four tables (Tables I, II, III, and VII in Appendix B) from their book *Statistical Methods for Research Workers*.

BRUCE W. TUCKMAN

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The Role of Research

OBJECTIVES

Identify the role of internal validity. / Identify the role of external validity. / Describe the relation between internal and external validity. / Describe the characteristics of the research process. / Identify the steps in the research process. / Identify ethical considerations in research and their resolution.

1.1 WHAT IS RESEARCH?

Research is a systematic attempt to provide answers to questions. Such answers may be abstract and general as is often the case in *basic research*, or they may be highly concrete and specific as is often the case in *demonstration* or *applied research*. In both kinds of research, the investigator uncovers facts and then formulates a generalization based on the interpretation of those facts.

Basic research is concerned with the relationship between two or more variables. It is carried out by identifying a problem, examining selected relevant variables through a literature review, constructing a hypothesis where possible, creating a research design to investigate the problem, collecting and analyzing appropriate data, and then drawing conclusions about the relationships of the variables. Basic research does not often provide immediately usable information for altering the environment. Its purpose, rather, is to develop a model, or theory, that identifies all the relevant variables in a particular environment and hypothesizes about their relationship. Then, using the findings of basic research, it is possible to develop a product—product here being used to

include, for example, a given curriculum, a particular teacher-training program, a textbook, or an audio-visual aid.

A further step is to test the product, the province of applied research, often called demonstration. In effect, applied research is a test or tryout that includes systematic evaluation.

1.2 VALIDITY IN RESEARCH

Achieving validity in research is not an easy task, as the following examples will demonstrate.

A physicist is designing a new instructional program for college sophomore physics. He has at his disposal films, textbooks, lectures, lab experiments, and filmstrips with voice-over, and he needs to find out which of these approaches to use and in what combination. To do this he decides to teach the first unit, on force, using the lecture-textbook approach, and the second unit, on motion, using films. He can then see which has the better effect and be guided accordingly. But the physicist has created a logical trap for himself.

Suppose the unit on force were easier than the unit on motion. If this is the case, students might perform better on the end-of-unit test for force simply because the concepts covered in this unit were easier. It is possible, too, that films are a particularly good way to teach motion because of the nature of the subject matter but a poor way to teach force. If this is the case, any generalization about the advantage of films beyond the teaching of motion would be invalid. It is also possible that the particular film the physicist has chosen for teaching motion is a poor one, and its failure to instruct would not entitle him generally to condemn films for instruction in physics. Of additional concern is the fact that what the students learned about force might help them learn about motion, thereby predisposing them to do better on the second unit, regardless of pedagogical technique. Even if the two units were fairly independent in terms of subject matter, the sophistication gained in the first unit might help in mastering the second unit. Furthermore, one of the end-of-unit tests might be easier or more representative of the learning material than the other. Finally, the outcome in the two units might occur once but have little likelihood of recurring. It might simply be an unstable outcome due to chance.

What is a researcher to do in dealing with this morass of potential pitfalls? Let us dig the hole a bit deeper with another example before trying to fill it.

A graduate student is interested in exploring the similarities and differences between teachers and disadvantaged students in matters of motivation and values. He plans to collect data from a group of 150 disad-