

# Purposes and Methods of Research in Mathematics Education

*Alan H. Schoenfeld*

*Bertrand Russell has defined mathematics as the science in which we never know what we are talking about or whether what we are saying is true. Mathematics has been shown to apply widely in many other scientific fields. Hence, most other scientists do not know what they are talking about or whether what they are saying is true.*

*—Joel Cohen, “On the nature of mathematical proofs”*

*There are no proofs in mathematics education.*

*—Henry Pollak*

**T**he first quotation above is humorous; the second serious. Both, however, serve to highlight some of the major differences between mathematics and mathematics education—differences that must be understood if one is to understand the nature of methods and results in mathematics education.

The Cohen quotation does point to some serious aspects of mathematics. In describing various geometries, for example, we start with undefined terms. Then, following the rules of logic, we prove that if certain things are true, other results must follow. On the one hand, the terms are undefined; i.e., “we never know what we are talking about.” On the other hand, the results are definitive. As Gertrude Stein might have said, a proof is a proof is a proof.

Other disciplines work in other ways. Pollak’s statement was not meant as a dismissal of mathematics education, but as a pointer to the fact that the nature of evidence and argument in mathematics education is quite unlike the nature of evidence and argument in mathematics. Indeed, the kinds of questions one can ask (and expect to be able to answer) in educational research are not the kinds of questions that mathematicians might expect. Beyond that, mathematicians and education researchers tend to have different views of the

purposes and goals of research in mathematics education.

This article begins with an attempt to lay out some of the relevant perspectives and to provide background regarding the nature of inquiry within mathematics education. Among the questions explored are the following: Just what is the enterprise? That is, what are the purposes of research in mathematics education? What do theories and models look like in education as opposed to those in mathematics and the physical sciences? What kinds of questions can educational research answer? Given such questions, what constitute reasonable answers? What kinds of evidence are appropriate to back up educational claims? What kinds of methods can generate such evidence? What standards might one have for judging claims, models, and theories? As will be seen, there are significant differences between mathematics and education with regard to all of these questions.

## **Purposes**

Research in mathematics education has two main purposes, one pure and one applied:

- **Pure (Basic Science):** To understand the nature of mathematical thinking, teaching, and learning;
- **Applied (Engineering):** To use such understandings to improve mathematics instruction.

These are deeply intertwined, with the first at least as important as the second. The reason is simple: without a deep understanding of thinking,

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# Research In Mathematics Education

**CL Gary**



## **Research In Mathematics Education:**

This book delves into Research In Mathematics Education. Research In Mathematics Education is a vital topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Research In Mathematics Education, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:

- Chapter 1: Introduction to Research In Mathematics Education
- Chapter 2: Essential Elements of Research In Mathematics Education
- Chapter 3: Research In Mathematics Education in Everyday Life
- Chapter 4: Research In Mathematics Education in Specific Contexts
- Chapter 5: Conclusion

2. In chapter 1, this book will provide an overview of Research In Mathematics Education. This chapter will explore what Research In Mathematics Education is, why Research In Mathematics Education is vital, and how to effectively learn about Research In Mathematics Education.

3. In chapter 2, this book will delve into the foundational concepts of Research In Mathematics Education. The second chapter will elucidate the essential principles that must be understood to grasp Research In Mathematics Education in its entirety.

4. In chapter 3, the author will examine the practical applications of Research In Mathematics Education in daily life. This chapter will showcase real-world examples of how Research In Mathematics Education can be effectively utilized in everyday scenarios.

5. In chapter 4, the author will scrutinize the relevance of Research In Mathematics Education in specific contexts. This chapter will explore how Research In Mathematics Education is applied in specialized fields, such as education, business, and technology.

6. In chapter 5, this book will draw a conclusion about Research In Mathematics Education. The final chapter will summarize the key points that have been discussed throughout the book.

This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Research In Mathematics Education.

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