

## **PREFACE**

It is our conviction that the integration of language and mathematics has profound implications for fostering a critical perspective in our schools. In this book we show that when numbers are embedded in an argument or used as a policy justification, people are often reluctant to question them. We surmise that this genuflecting before numerical information is due to people's learned trust in numbers. "Who am I to question the 'facts?'" some might ask.

To counter this prevailing attitude, we argue that mathematical information is a human construct, and not a sacrosanct edifice of unassailable truths. Just like language, data should be interrogated. Yet numbers have this abstract, scientific, apolitical aura that often makes them impervious to challenge and debate. This perception about the nature of mathematics has concerned us for some time. In our book we endeavor to make this problem explicit and to show that children, even young ones, can begin to understand that since numbers are constructed they can also be questioned, challenged, and revised.

In Chapter 1 we outline the pervasiveness of statistical texts in our world: and advocate the cultivation of critics who analyze and evaluate these texts. We support this argument by citing researchers in the field of language and mathematics who urge the development of this critical thinking. We introduce a model and a heuristic that describe different aspects of the data-gathering process and that offer a critical frame for interrogating data-infused texts.

In Chapter 2 we examine in more depth how the wording and format of a question in a survey can affect the results. We discuss the complexities within seemingly "simple" questions, and show how motives, ideology, and other social factors are embedded in the questions one poses.

The issue of the definition of terms and the categorization of the data are the focus of Chapter 3. We argue that how one defines a term, such as homelessness or unemployment, determines what gets counted, and it is through these definitions that authors of texts construct their version of reality that positions others to view the world in particular ways. Decisions that authors also make about which categories to use, omit, or combine play a significant role in concealing some relationships and revealing others.

In Chapter 4 we show that visual texts, just like any form of communication, are not neutral but reflect an author's interests, values, and beliefs. Since there is no one-to-one correspondence between a set of data and its visual referent, authors have choices about how to represent those data. Their decisions about the visual display of the data can clarify some ideas and obfuscate others. We illustrate the power of this decision-making by exploring how alternative ways to display the same data can tell quite different stories.

In Chapter 5 we highlight how any report of statistical information is only a partial account. When choices are made about data some information is always sacrificed. We discuss limitations, such as the nature of the sample, the relationship

*Learning to Read the Numbers*  
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between results and conclusions, and the potential benefits and drawbacks to certain mathematical choices. Some of these mathematical choices include deciding whether to use absolute or relative (ratio) data; or to express average through the mean, median or mode. Each choice can frame an issue or problem from a different perspective.

Finally, in Chapter 6 we show how the integration of critical literacy and critical numeracy develops over time as a group of fifth-grade students gathered data about television advertisements directed at children. They researched marketing strategies, gathered data about cereals, and constructed survey instruments for their peers. They used their analysis of those data to create an informational PowerPoint presentation for their classmates and to write letters of protest to politicians and governmental and corporate agencies.

Throughout the book we present examples of children's work as well as examples from the media. In this way we show how the same critical issues permeate the construction of all texts. Children are doing the real work of any author as they grapple with the same problems, negotiate the same tensions, and confront the same limitations. Ideology and motives are always embedded in the work. The personal interests and intentions that even young children have about their social worlds are mirrored in the same way by companies and governmental agencies.

Another important idea threaded throughout this book is that children must be both critical composers as well as critical readers of texts. We argue that this ability begins with teachers giving children regular opportunities to create their own data-infused texts. As children confront the challenges of posing questions, defining terms, categorizing the data, and creating a visual representation, they come to understand the complexities of the task. They also come to realize that all these choices they have affect the results they receive, and this choosing is a form of power and control. Only as they experience these insights as authors themselves can they use this perspective to critique the statistical claims of others.

We wrote this book for classroom teachers K-8 as well as university instructors who teach classes in curricular issues, critical literacy, as well as the content areas of mathematics, English language arts, social studies, and science. We intend the book for several audiences because we view this critical stance as a perspective that cuts across all grades and all areas of the curriculum. It is work that every educator must be involved in if we are to create the kind of democratic schooling that the twenty-first century demands.

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