

Preface

On July 23, 1996, 36 researchers from 13 different countries and 6 continents met in Granada, Spain, for an invitational Round Table conference sponsored by the International Association for Statistical Education (IASE). During the five days of the conference, we listened to presentations, viewed software demonstrations, and discussed challenging issues regarding the use of technology with students who are learning statistics.

After the opening presentation by IASE President Anne Hawkins, who set the stage for us by presenting and challenging “myth-conceptions” concerning technology in statistics education, papers and discussions were arranged into five sections, each briefly described below.

Section 1: How Technology is Changing the Teaching of Statistics at the Secondary Level

These papers addressed not only how computers and graphing calculators are changing the statistical content in secondary education, but also how they affect the content being taught and the ways student learning is assessed.

Section 2: Developing Exemplary Software

Demonstrations of some exemplary software programs were accompanied by descriptions of how and why they were developed and how they have been or might be evaluated. Group discussions of these papers focused on requirements for ideal software tools to improve the teaching and learning of statistics.

Section 3: What We are Learning from Empirical Research

Examples of empirical research involving the use of technology were presented. Discussions focused on generalizability issues and methodological problems related to research studies involving the use of computers in educational settings.

Section 4: How Technology is Changing the Teaching of Statistics at the College Level

This set of papers described innovative ways computers are being used in undergraduate and graduate statistics courses and their impact on the way these courses are being taught. Uses of technology discussed included combinations of software programs with new curricular approaches and Internet resources.

Section 5: Questions to be Addressed on the Role of Technology in Statistics Education

The last section of papers focused on important problems related to distance learning and teaching statistics in developing countries.

During the five days of presentations and discussions, four broad issues emerged.

1. The need for information on existing software. Participants quickly realized that there is a need to make available information on current software and its capabilities to avoid “reinventing the wheel.” A beginning effort is the annotated list of software demonstrated at the conference (see Chapter 11). Another

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apparent need was to develop common frameworks to use in evaluating software, taking into consideration its different uses: to demonstrate concepts, to analyze data, and for tutorial or computer-assisted learning. There was a recognition that what constitutes appropriate interaction between students and technology for each of these purposes needs to be further elaborated and explored.

2. The changing role of the classroom teacher. Many issues emerged when considering the use of technology in teaching statistics, including the training of teachers to appropriately use technology and software, the role of technology in replacing the teacher in particular contexts, and the changes in instruction needed as more technology is introduced. Information is needed on the best ways to integrate technology in classroom settings, as well as how to best prepare teachers to use technology.

3. The need for good assessment instruments. One of the biggest challenges in conducting research on the role of technology is the lack of appropriate assessment methods to evaluate student learning. There is a need for good, valid, informative assessment methods and procedures. Much of the current research has been done using individual interviews or is conducted in small-scale settings, procedures that do not transfer well to large classrooms. It was agreed that assessment methods need to accurately measure and monitor changes in students' understanding as they interact with technology.

4. Directions for future research. The scarcity of good empirical research on the role of technology in statistics education indicates a need for some agreement on appropriate methodology as well as assessment methods. Many areas were identified as needing research, to help us to better understand and monitor how students interact with technology and how different strategies best promote understanding. There was a shared concern regarding better dissemination methods to connect research results to the classroom, and better ways to educate teachers to utilize these results. Participants identified a need for research to provide a deeper understanding of statistics learning and thinking processes in technological settings. However, it was clear that different theories of learning and teaching underlie research, as well as the construction of technology and its use by teachers. It was agreed that it is important to make these theories explicit along with assumptions about what is most important for students to learn about probability and statistics. Finally, participants advocated better collaboration among researchers, educators, and the technical experts who develop software tools.

As was true for the previous IASE Round Table Conferences, our participants were a diverse group. Consequently, many of us needed to improve our communication skills in order to fully understand each other, although it was often hard to remember to speak slowly and to use the microphone when making comments. However, by the end of the conference a strong sense of community had emerged among participants. Many expressed a shared vision of the research needed to be done, an enthusiasm for new collaborations and research networks, and plans to meet again at ICOTS 5 in Singapore in 1998.

Based on individual interests and the focus of the papers presented, three working groups were formed: (1) technology in secondary education, (2) technology issues at the college level, and (3) empirical research issues. These three groups met toward the end of the conference to synthesize and discuss issues related to their particular topic and to make recommendations which were presented at our final session. Each working group had a recorder who summarized comments and combined them with the general discussions following individual papers in their section. Gail Burrill, Mike Shaughnessy, and Carol Blumberg are

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gratefully acknowledged for leading these working groups and for summarizing the two sets of discussions. In addition, I am indebted to Dani Ben-Zvi, who, according to one participant “ran all over the University collecting Macs and PCs to put on a special ‘show and tell’ session” so that everyone would have a chance to try out the software being described in presentations. Thanks also to Dani for writing a summary of the discussions on developing software and for gathering details on each software program demonstrated.

Some readers may notice that this proceedings volume differs from previous IASE Round Table proceedings in several ways. First, a decision was made by participants at the end of the conference to use a refereeing process to provide feedback to each author to use in revising and improving their paper. I appreciate the contributions of all participants, both presenters and observers, who served as reviewers for these papers. Another departure from previous Round Table proceedings is the method used to reproduce discussions following each paper. In the past, these discussions were recorded verbatim and included in the conference proceedings. For this volume, a decision was made by the co-editors to instead integrate all discussions of papers in each of the five sections into one summary and to combine this when possible with a working group summary. A third difference involves an editorial decision to use a consistent spelling of words rather than using American and British versions of English depending on each author’s country. Therefore, we modified some of the text that used British English to produce this consistency.

I would like to acknowledge the efforts of several people who helped make this Round Table an overwhelming success. First, I need to thank former IASE president, David Moore, who in the spring of 1994 first invited me to choose a topic and to chair this conference. Many thanks go to the research group at the University of Granada who served as gracious hosts, and in particular, to Carmen Batanero and Juan Godino, the local organizers. All who participated in the Round Table appreciated the magnificent efforts of Carmen and Juan and their colleagues who made sure that our experiences in Granada were extremely pleasant and memorable. I would also like to thank the other members of the program committee: Rolf Biehler, Carol Joyce Blumberg, Gail Burrill, Anne Hawkins, Lionel Pereira-Mendoza, and Mike Shaughnessy. For over a year, they consulted with me via e-mail, advising me on every aspect of the conference. As chairs of two previous IASE Round Table conferences, Anne and Lionel were exceptionally helpful in providing detailed answers to my endless questions. Thanks to Brian Phillips, Dani Ben-Zvi, Carol Blumberg, Gail Burrill, and Mike Shaughnessy for chairing different sections of the conference and for keeping everyone on schedule.

An additional thanks goes to Gail Burrill. In addition to serving on the program committee and arranging to have graphing calculators available for all participants to use at the conference, Gail also agreed to co-edit this conference proceedings with me, making the task more manageable. I wish to thank Holly Miller who succeeded in the challenge of transcribing the hand-written notes submitted to me by participants who took turns recording the discussions after each paper. Finally, a special thanks goes to Jane Schleisman, a graduate student at the University of Minnesota, who served as technical editor for this project. Her expert skills and careful eye for detail were invaluable, and her boundless energy and cheerful disposition were greatly appreciated.

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