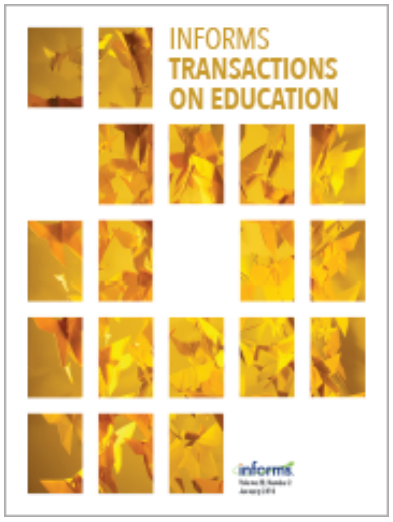

INFORMS Transactions on Education

Publication details, including instructions for authors and subscription information:
http://pubsonline.informs.org

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Denise Sakai Troxell,

To cite this article:
Denise Sakai Troxell, (2006) Introduction to the ITE Special Issue: "Effective Use of Software in the MS/OR Classroom". INFORMS Transactions on Education 7(1):1-2. https://doi.org/10.1287/ited.7.1.1

Introduction to the ITE Special Issue:"Effective Use of Software in the MS/OR Classroom"

Denise Sakai Troxell
Mathematics and Sciences Division
Babson College
troxell@babson.edu

For the past couple of decades, we have been extremely fortunate to have witnessed and benefited from a revolution in the use of technology in the classroom. It is difficult to believe that, not too long ago, instructors relied mostly on an eternally dirty blackboard and a few broken pieces of chalk. Technology in the classroom was limited to out-of-focus handwritten transparencies displayed by an overhead projector. A few instructors were privileged to have access to computer labs at their institutions. However, a visit to the lab often felt like an elementary school field trip to a foreign location where students were more excited about going on the trip than actually learning from it, and instructors were not comfortable enough with the technology to use it effectively in teaching.

Remarkably, technology advanced in a very short time span. Today, we have at our disposal an enormous array of technological tools to support teaching. For instance, many classrooms now have multimedia capabilities that allow the instructor to go back-and-forth between a spreadsheet model and a slide presentation, or between an applet on the Internet and a software application, all in an almost seamless way. More and more students bring laptops to the classroom and are not only able to run software during a lecture but also look forward to doing so. To capitalize on the new technology and the students' willingness to use it, instructors needed to incorporate it in their teaching. As a result, a large portion of us now have several technological tools at the heart of our pedagogy.

There is no doubt that this increasing availability of technology in the classroom has dramatically changed the way we teach Management Science and Operations Research (MS/OR). Software for optimization, simulation, decision analysis and statistics is an integral component of today's MS/OR education. While the usage of software in teaching has received a growing emphasis in recent years, a large amount of the related pedagogical literature still focuses on presenting the software's features rather than on how to effectively incorporate it in our teaching. This Special Issue describes innovative use of software to support modeling, problem solving and critical thinking in teaching various MS/OR topics. Also presented are best practices and strategies for incorporating software instruction and usage in the classroom, as well as various benefits and drawbacks in learning the concepts in the field. The authors were incredibly generous in sharing their experiences in teaching with software and in providing detailed accounts on their approaches. They have also made available a rich collection of their own teaching materials including cases, tutorials, assessment tools, spreadsheet models, software packages, and teaching notes.

Several papers in this Special Issue argue that while the use of the spreadsheet and spreadsheet-based software is ubiquitous and vital in MS/OR education, large scale real-world problems require better spreadsheet engineering or more powerful software, such as algebraic modeling languages. Grossman's paper, for example, presents compelling reasons for introducing spreadsheet engineering to business students as an opportunity for instructors to increase and improve the students' usage of MS/OR concepts and their overall satisfaction with their MS/OR courses. Lee and Raffensperger discuss the importance of the Traveling Salesman Problem in teaching OR and describe their approach using the algebraic modeling language AMPL. They offer a vast list of resources that range from AMPL models and scripts to slide presentations with teaching notes, exams and assignments.

Lee and Raffensperger's paper also uses visualization as a powerful asset in delivering information. Instructors and students alike find that visualization can be very helpful in teaching and in understanding new concepts. This is supported by a sizable literature which also promotes visualization combined with student interactivity for effective learning. Several other papers in this Special Issue use different software

  ISSN: 1532-0545

to construct tools to support this sought-after interactive visualization. They describe the pedagogical goals that motivated the development of such tools and offer details on how they are used in class. In several instances, they also provide evidence of students' learning and satisfaction with the software. Dobson and Shumsky use readily available software tools to create three web-based interactive simulations to assist in the teaching of concepts related to process flow and variability, namely, G/G/1 queues, Little's Law, and inventory control. Tsai and Wardell use a Visual Basic Application driven spreadsheet that takes advantage of the same business scenario to simultaneously illustrate the Central Limit Theorem, interval estimation and hypothesis testing. Leon, Seal and Przasnyski use screen capture software to create several tutorials, with different levels of student interaction, on how to perform simple linear regression analysis in Excel and how to use its Data Table feature to perform sensitivity analysis.

Instructors know that assessing students' learning is very important but daunting. Consequently, the actual planning and delivery of course material often receives more attention than preparing, administering and grading tests. Despite all its benefits, technology has made assessment more challenging as tests now need to adequately assess technology-related learning and, at the same time, be immune to electronic cheating. These challenges are compounded by the high expectations we have for technology-based assessments as the new generation of students expects instant electronic feedback and instructors hope to be able to prepare and grade tests more efficiently. Some of the interactive tutorials by Leon, Seal and Przasnyski mentioned above have built-in quizzes which provide instant feedback for the students to help validate their thought process and mastery of the material. Scheubrein offers more empowerment to individual instructors by providing a spreadsheet-based tutoring system that allows them to create a spreadsheet that guides students to formulate a given model on their own and that also gives feedback during each step of the model's construction. In a second paper, Tsai and Wardell present an Excel macro that generates customized random data sets for each student and provide a generic procedure to assist instructors in creating assignment questions and to automatically grade the students' answers.

Case studies serve as the background for the remaining two papers in this Special Issue. Pachamanova uses a case on pricing channel profitability in accounting to discuss integer programming modeling with Excel Solver, while making students aware of software limitations and pitfalls to validate the rigorous approach to business decisions. Flowers describes a course in Enterprise Resource Planning (ERP) that uses seven integrated cases, all from the same company, that promote the development and implementation of one multi-function MS/OR modeling software package.

I would like to close this editorial by thanking the authors for their generosity in sharing their materials with the ITE readers. I am also grateful to all the anonymous referees who dedicated considerable time and effort to provide helpful comments to the authors which greatly facilitated my job as the Special Issue Editor. Last but not least, I would like to give special thanks to Harvey Greenberg for inviting me to edit this special issue, and to Salwa Ammar, Jim Cochran, and Armann Ingolfsson for their constant support and valuable editorial expertise.

I truly hope that the approaches and materials provided in this ITE Special Issue are useful in your teaching. Enjoy!

  ISSN: 1532-0545