This digest discusses using spreadsheets in mathematics education. The case is made that being able to manage spreadsheets is an important skill in the technologically enhanced new millennium. An annotated list of World Wide Web resources is included. (MM)
Using Spreadsheets in Mathematics Education

ERIC Digest

By

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Spreadsheets build an ideal bridge between arithmetic and algebra and allow the student free movement between the two worlds. Students look for patterns, construct algebraic expressions, generalize concepts, justify conjectures, and establish the equivalence of two models as intrinsic and meaningful needs rather than as arbitrary requirements posed by the teacher. (Friedlander, 1998, p. 383)

Electronic spreadsheets have been created and used mainly as tools for mathematical and statistical calculations, as numerical or textual data can be inserted into their columns and rows (http://www.staff.murdoch.edu.au/~kissane/spreadsheets.htm). So, being able to manage spreadsheets has become one of the skills sought for anybody in this technologically enhanced millennium. Therefore, spreadsheets have become an important part of many different curricula at different levels of education. Moreover, they have been used in education, especially mathematics education, as a tool in helping students understand mathematical concepts such as plotting and exploring functions and patterns, exploring probability and statistics, mathematical modeling, and geometric transformations (http://www.freshpond.net/treasures/math/spreadsheet/default.htm). Relationships among different types of representations such as tables, equations and graphs are more easily comprehensible when all representations are visible at once (see Figure 1) and linked to each other, i.e. when one makes a change in one representation, corresponding changes in other representations are offered by the program. Moreover, spreadsheets allow students to focus on the mathematical reasoning by freeing them from the burden of calculations and algebraic manipulations.

Educational research supports the use of spreadsheets both in K-12 and teacher education and in professional development. Abramovich and Nabors (1997) describe how using spreadsheets helped seventh grade algebra students develop problem-solving skills. Molyneux-Hodgson et. al (1999) states that the results of their study “suggest the possibility of enhancing students’ capa-

Figure 1 Snapshot of a spreadsheet
World Wide Resources on Spreadsheets in Mathematics Education

Spreadsheets, Mathematics, Science, and Statistics Education by Erich Neuwirth
http://sunsite.univie.ac.at/Spreadsite/spreaded.html
Presents information about spreadsheets with an emphasis on mathematics and statistics education. Includes spreadsheets in education, recommended books; papers about spreadsheets in scientific journals and books; example spreadsheets and projects (mostly excel 5.0); and further resources for spreadsheets in education on the Internet.

Spreadsheets in the Math Class
http://www.math.byu/~lfrancis/readings302/Spreadsheets.html#TOC
Discusses NCTM's position statements on technology, the definition of and benefits of using a spreadsheet, data analysis ideas from the real world, and sample activities to introduce spreadsheets to students.

Spreadsheet Projects for the Middle School Math Curriculum
http://www.parktudor.pvt.kl2.in.us/Sosenke/nctm2000.htm
Lists the advantages of the spreadsheets and stages in working with spreadsheets. Presents a seventh grade spreadsheet unit, independent short projects, interdisciplinary projects, and references on the use of spreadsheets in the mathematics classroom.

Resources for Mathematics Educators: Spreadsheets in Mathematics
http://www.freshpond.net/treasures/math/spreadsheet/default.htm
Discusses the benefits of using spreadsheets in mathematics teaching and some of the particular areas in which spreadsheets can be useful in teaching and learning math. Provides a list of web sites that provide information on using spreadsheets in mathematics classrooms.

Introduction to Math and Spreadsheets
http://forum.swarthmore.edu/sum95/math_and/spreadsheets/intro.html
Provides a variety of math exercises utilizing spreadsheets.

Spreadsheets in Mathematics
http://jwilson.coe.uga.edu/Allison/Spreadsheet%20home%20page
Discusses the reasons for using spreadsheets in math classrooms. Provides information on how to create a spreadsheet, enter data, copy cells and formulas, and graph. Presents problem sets for elementary, middle, and high school mathematics.

The Use of Spreadsheets in Mathematics Teaching
This essay discusses the possible application of spreadsheets in an Indonesian curriculum setting. It also highlights the advantages and disadvantages of utilizing spreadsheets in school mathematics.

Spreadsheet-Based Tool Kit For Modeling Concepts In Elementary Number Theory by Sergei Abramovich and Andrew Brantlinger
http://forum.swarthmore.edu/clime/961.html
This paper presents pedagogical ideas concerning the use of a spreadsheet-based tool kit for modeling several structures and concepts in elementary number theory such as Pythagorean triples, sums of perfect powers, multiple representations of integers, the Euclidean algorithm, and the Euler phi-function.

References
Mathematics Teacher, 91(50), 382-383.

Finding More Resources
To find more resources on this topic, search the ERIC database online (http://ericir.syr.edu/ERIC/) and use various combinations of the following descriptors;
Set 1: spreadsheets, tables (data)
Set 2: mathematics, mathematics activities, mathematics education, mathematics instruction, teaching methods
Set 3: elementary education, secondary education, elementary secondary education, postsecondary education, adult education
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