Using the Internet in the Teaching and Learning of Mathematics: a research bibliography

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In contrast to other areas of mathematics education research about the use of technology (such as dynamic geometry, Micromath research bibliography, Autumn 2002 issue), research into the use of the internet in the teaching and learning of mathematics is still in its infancy. The use of the internet is probably most developed in higher education teaching (where such developments have been funded). Yet, even here that does not mean that there is very much published research, and indeed proposals for research are still in development (for example, Bookman and Malone, to appear).

While some research (listed below) is beginning to reveal aspects of the impact of the use of the internet on the teaching and leaning of mathematics, one study (by Mioduser and colleagues of 436 educational Web sites focusing on mathematics, science, and technology learning) suggests that one problem is that many educational Web sites are still predominantly text-based and do not yet fully exploit the interactivity that is possible over the internet. As the availability of more interactive sites develops, the lack of research means that there is much scope for well-designed studies.

Bookman, J. and Malone, D. (to appear), The Nature of Learning in Interactive Technological Environments - A Proposal for a Research Agenda Based on Grounded Theory, Research in Collegiate Mathematics Education V., Providence, RI: American Mathematical Society.

Based on observations of students, this paper develops a set of research questions designed to understand how students learn in technology-rich learning environments.

Day, R. (1998), An Experiment in Using the Internet in Teaching and Learning Mathematics, Journal of Science Education & Technology, 7(3), 249-58.

Describes a multiphase teaching experiment designed to determine if the world wide web is a viable means of students accessing course materials.

Frid, S. (2001), Supporting primary studentsÕ on-line learning in a virtual enrichment program, Research in Education, 66, 9-27.

A study of factors that assist and hinder primary studentsÕ use of a mathematics enrichment program offered on-line via the Internet. Offers insights into how both on-line and face-to-face teaching may be designed to enhance studentsÕ learning.

Gerber, S., Shuell, T. J. and Harlos, C. A. (1998), Using the Internet To Learn Mathematics, Journal of Computers in Mathematics and Science Teaching, 17(2-3), 113-32.

A case study of four 13-year-old students using the Internet over a period of five weeks to obtain data for a mathematics project. Concludes that students need adequate preparation to achieve optimal benefit from using the Internet.

Jones, K. and Simons, H. (1999), Online Mathematics Enrichment: an independent external evaluation of the NRICH project 1998-99. Southampton: University of Southampton Centre for Research in Mathematics Education.

Systematic study of the use of the Nrich website by students, parents and teachers. Found that most use of Nrich, at the time, was by teachers looking for good problems to use with their classes.

Mioduser, D., Nachmias, R. & Lahav, O. (2000), Web-based Learning Environments: current pedagogical and technological state. Journal of Research on Computing in Education, 33(1), 55-76.

Evaluates 436 educational Web sites focusing on mathematics, science, and technology learning and finds that most do not exploit the interactivity that is possible over the internet.

Sources of teaching ideas (in addition to Micromath) that might be useful to any research project:

Ameis, J. A. (2002), Mathematics on the Internet: a resource for K-12 teachers. Upper Saddle River, N.J.: Merrill. 2nd ed

Barrow-Green, J. (1998), History of Mathematics: Resources on the World Wide Web, Mathematics in School, 27(4), 16-22.

Butler, D. (1998), Using the Internet: mathematics. Cambridge: Pearson,

Glazer, E. (2001), Using Internet Primary Sources To Teach Critical Thinking Skills in Mathematics. Westport, Conn: Greenwood.

Miller, D. (1998), Making the Most of Resources for Mathematics Found on the Internet, Teaching Mathematics & its Application, 17(2), 55-63.

Pritchard, C.and Wilson, G. (1999), Sources of data on the Internet, Mathematics in School, 28(1), 44-6.

Rich, W. and Joyner, J. (2002), Using interactive Web sites to enhance Mathematics Learning, Teaching Children Mathematics, 8(6), 380-383.

Mircomath Research Bibliographies

Every year hundreds of teachers engage in classroom-based research for a variety of purposes. As more and more opportunities arise for teachers to get support for engaging with research, Mircomath is devoting a section to a series of research bibliographies designed to provide details of the most pertinent research on using particular ICT applications in the teaching and learning of mathematics.

As sources of support for classroom-based research continue to change, probably the best way to keep up-to-date is to use the following website and follow the links under Òresearch opportunitiesÓ
http://www.teachernet.gov.uk/research/

Previous Mircomath research bibliographies are:
Dynamic Geometry Software, Mircomath, 18(3), 44-45.
Four-function Calculators, Mircomath, 19(1), 33-34.

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