
Conference Report: ICTCM

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The International Conference on Technology in Collegiate Mathematics (ICTCM) is an annual event and the 13th in the series was held in Atlanta from 17-20 November 2000. As usual there was a Pre-Conference Session, which in some ways I often enjoy more than the rest of the Conference as it focuses on one current issue in depth and provides much food for thought. On this occasion it was dedicated to exploring whether the Internet is communication or something different, and what follows is a personal reflection.

Further details of ICTCM-13 may be found at the following Web sites:

- <http://www.awlonline.com/ictcm> for the full conference programme;
- <http://archives.math.utk.edu/ICTCM> for the proceedings of this conference, when they become available, and for all previous proceedings.

This year's Conference will be held in Baltimore, Maryland, from 1 to 4 November.

The Internet: Is it Communication or is it Something Different?

There were three presenters followed by two small group discussions to follow up on the issues raised. The presentations were given by Don Allen (Texas A & M University), Marcelle Bessman (Jacksonville University) and David Mathews (Southwestern Michigan College).

1st Session

Don Allen led the first session about putting mathematics on the Web and admitted that there were many questions and as yet few answers as to best practice. He remarked, and many of us know it only too well, that it can sometimes take 12 to 15 hours a day to set up a mathematics web page! In his opinion the best way to get mathematics on the Web is using T_EX and graphic images. The Scientific Notebook software creates T_EX files and is a Web browser.

On-line help was discussed and the 'virtual whiteboard' was commended. However, there is new software being released called Net Tutor from Link Systems International. It is a Java based tool and comes with a whiteboard 'pallet'. Don recommended that it was necessary to keep 'e-office hours' when interacting with students over the Web, otherwise they can swamp you with their questions and problems!

A key piece of advice which Don gave us for putting mathematics on the Web took me back to the early days of computer algebra systems and which one to choose for using with students. "Make the math look as perfect as you can make it, especially when working with students at sub-degree level." He mentioned that for writing mathematics to the Web, in addition to Scientific Notebook, T_H uses HTML and MathML is coming soon.

Homepages need to be attractive and comfortable to navigate. Student assignments need to be given in great detail, with information inserted daily 'just in time' to keep the students engaged with the assignment and the homepage. Don felt that assignments should be on-going. In his opinion it was a waste of the medium to give the assignment as a one-off for the student to print and file away.

Don suggested an 'onion paradigm' for mathematics on the Web: decide carefully what you want to be in the core, then build the course layer by layer and adapt it at regular intervals. He also spoke wryly of the "ROI model" - Return on Investment, a model especially appealing to administrators! Overall, Don cautioned, "Don't forget the importance of human contact."

2nd Session

Marcelle Bessman first drew a distinction between Web enhanced instruction which employs course management systems and posted course documents, and Web supported instruction which needs tutorials, a research resource, 'chat rooms' for discussion and on-line quizzes. She was fully in support of the second as a medium for teaching and learning but quite categorically stated that, "If I had to put it there by hand, I wouldn't do it!" In other words, Web supported instruction needs a management system and someone other than the teacher to manage it.

Assuming that such support was available (apparently it is at Jacksonville), Marcelle described how her Web delivered instruction covered a region that was manageable for students to be able to come to the campus to take tests. She was cautious about taking tests at a distance - who was actually taking the test and who was invigilating it?

She spoke of 'the global classroom' and how she and Doug Quinney, from Keele University in the UK, have shared 'virtual classrooms' using the software Net Meeting, a Microsoft product with limited availability, apparently. It links one site to one site, has teleconferencing facilities and the option for the teacher to 'take over' a student's screen when necessary. (This sounds like an exciting development and I would be very pleased if Marcelle and Doug wrote a paper about it for IJCAME. I shall be approaching them about this on behalf of the Editorial Board.)

Marcelle believes that, used effectively, the Web provides opportunities for interaction between the teacher and the students, among the students, and provides a common thread for discussion. However, to build conceptual understanding in mathematics on the Web needs careful planning.

She offered her email address, mbessma@ju.edu, to anyone who wanted to have access as a guest user of her website, <http://www.users.ju.edu/~mbessma>

3rd Session

I have known David Mathews for over five years now and for me it is always a pleasure to hear him speak. He has written extensively about the use of technology for the teaching and learning of mathematics and I have used ideas suggested by him in my own work. It was therefore an intriguing surprise to find his session having the title, "So You Want To Go On-line?", and to find him putting a case against on-line distance learning of mathematics.

David's session was controversial, and it was an excellent balance to the optimistic, if cautious, "Let's go for it" approach of Don Allen and Marcelle Bessman. Consequently, on behalf of the IJCAME Editorial Board I shall be approaching him to write a paper for us explaining more fully his views. We hope that a future edition of IJCAME will contain the contributions of Marcelle Bessman and Doug Quinney alongside those of David Mathews so that you can judge for yourselves their points of view.

Throughout his presentation David was as positive as ever about the use of technology for teaching and learning mathematics but he made the following points about the Web:

- teaching and learning mathematics is hard, not the "how to" but the "why?"
- should we spend our limited resources of money and energy into teaching students thousands of miles away or should we spend these resources better in reaching, teaching and serving our current students?
- mathematics can be taught on the Web, but should it?
- "it's the technology, stupid!" - the technology is there and its power is compelling; how much of this is a half-truth and how much is driven by market forces?
- it is time consuming for staff to get involved with
- it can interfere with the assessment of full-time 'non-virtual' students
- staff have tolerated for a long time doing their best with limited resources, so they don't talk about this any more, they don't 'rock the boat', they don't try to change the 'status quo'
- suddenly resources are available for new 'glitzy things'; where have these resources come from and how do administrators expect long-term, hard pressed staff to respond?
- cheating and denial: in the USA surveys have shown that 70% of students report that they cheat

in their campus-based examinations while 60% of staff report that students never cheat in these examinations; are staff going into denial mode about the examination system; are staff going to seriously address this issue?

- how shall we invigilate Web-based examinations and could there become a 'black market' in examination taking?
- access to technology and the 'digital divide': surveys in the USA have shown that access to technology is correlated to location on the socio-economic scale; will the access of low-income groups still be under-represented in distance learning?
- staff resources: on 14 May 2000 the Washington Post reported that there had been a 100% increase in the employment of part-time staff in educational institutions over the past 10 years, and over the past 15 years a 15% decline in the number of full-time staff; why use the precious time allocation of full-time staff to divert them from their primary task?
- if the process goes on, will the next generation of students expect all university/college courses to be Web-based, if so what controls will be required to assure quality and standards?

Conclusion

I believe that these are serious questions and opinions which the whole education system of every country needs to address. David Mathews has been, and continues to be, an exemplar of good-practice in the use of technology for teaching mathematics. His critique is timely and challenging, as are the final points of his talk.

- if it is not we, the 'professional educators', who take control of this new medium who will do so? AOL, Time-Warner and Disney are already queuing up to become the purveyors of on-line education
- in which direction should we devote our technological energy in mathematics education? - the generation of on-line tests, perhaps; continue to provoke mathematical thinking using technology, certainly; demanding the resources to continue to do what we already do so well with our students, without doubt.

MSOR Announcements

New Research Project on "The Mathematical Components of Engineering Expertise"

MCEE is an 11-month project (February-December 2001) based at the Institute of Education in London, and funded by the Economic and Social Research Council. It will investigate how mathematical ideas and techniques are used in the practice of engineering, by undertaking detailed observations of professional engineers working on design projects in a large civil engineering firm.

The work builds on a previous study (the "Towards a Mathematical Orientation" project, 1995-98) carried out by the Mathematical Sciences Group at the Institute, which investigated the epistemological and psychological issues involved in relating the mathematical and professional knowledge of nurses, bank employees and commercial pilots. As with the previous, this project is concerned with the observation of mathematics as used in workplace activities, rather than merely asking people to describe what they think they do. It will look beyond those elements of work conventionally described as mathematical (such as techniques learnt in school or university) to try to observe situations in which a more general, and harder to specify, "mathematical literacy" is involved.

Based on our analyses, we hope to be able to draw conclusions concerning the kinds of mathematical education which are appropriate to engineering students, and thus to offer an empirically-grounded contribution to current debates amongst university teachers and professional engineers.

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For more information, email p.kent@ioe.ac.uk or Professor Richard Noss, rnoss@ioe.ac.uk, or see the project web site at <http://www.ioe.ac.uk/rnoss/MCEE>

MathGate has now added a browse facility to its site. It is now possible to search for resources in the MathGate Internet resource catalogue and/or browse the catalogue according to MSC2000, the classification scheme that is used by MathGate. MathGate reviews and describes electronic mathematics resources. This allows users to search for electronic maths resources using mathematical terms or browse for records in mathematical subject areas. Currently there are just over 300 records in the MathGate database and more are being added all the time. MathGate is looking to contract content providers to help add to the catalogue.

If you are interested in being a content provider for MathGate, or would like any more information, or wish to comment on the MathGate catalogue then please contact Greig Fratus, MathGate Manager, University of Birmingham, Edgbaston, Birmingham B15 2TT, tel 0121 414 2758, fax 0121 471 4691, email G.J.Fratus@bham.ac.uk

QM PERCEPTION v2.5 has been released and includes an entirely new Browser Based Authoring application, a new version of Enterprise Reporter with extra report types, and faster information processing for the use of Perception with SQL and Oracle. Upgrading has been made simpler by including all these improvements in one download. This latest version is free for existing Perception v2 users who have current support licences. More info at <http://www.qmark.com/perception/help>

The MathML standard can now be used to present Perception questions. Using WebEQ you can add mathematical equations into your Perception questions, choices and feedback, which will work in Java-enabled browsers. A knowledgebase question has already been added to the Perception support site that explains how it is done. More details at www.qmark.com/perception/help/kbase/ques025.html

CRISTALL SOFTWARE is a mathematical modelling program that "runs rings around spreadsheets". You can download a 30 minute rolling demonstration and/or a 14 day full system together with online help and the option to download a manual in Word 7 format. More info at <http://www.cristall.co.uk>

FREE DPGraph Viewer is software for viewing and manipulating dynamic photorealistic graphs from two to 8 dimensions, including examples contributed by users from around the world. You can distribute DPGraph Viewer for free along with your own papers, software, web-based courses, textbooks or other materials. More info on downloading from <http://www.dpgraph.com>

MATHEMATICA v4.1 has now been released, with new capabilities including Java integration, faster statistics functions, and support for additional Linux platforms. See www.wolfram.com/products/mathematica/newin41

webMathematica examples which bring the power of Mathematica to the web, can be viewed at <http://library.wolfram.com/explorations/web>

MATHCAD 2001: Authoring, web publishing and application development tools, time-domain simulation, real-time data import and expanded functionality are among the highlights of the latest version of Mathcad. Extensive integration with other Windows applications, and new real-time data acquisition capability lets you monitor and test from within Mathcad. Also IBM's techexplorer Hypermedia Browser, which lets you read and edit MathML as well as read TeX and LaTeX. More info at <http://www.adeptscience.co.uk/go?pg=E36>

MATHCAD EXPLORER allows non-Mathcad users to read and interact with Mathcad files. Download from <http://www.mathsoft.com/mathcad/explorer>

STUDYWORKS MATHS DELUXE is now available at a special price on the MathSoft website at <http://www.mathsoft.com/webstore>

FREE MAPLE POWERTOOLS. Maple Power Tools are available free of charge to Maple users. Providing useful Maple functions and algorithms as well as example worksheets, there are research PowerTools for nonlinear programming and statistics; applications PowerTools for electrical circuits and symbolic dynamics routines for 3D flexible multi-body systems; and a selection of PowerTools for education. Download from <http://www.adeptscience.co.uk/go?pg=E59>

JavaMath v1.0 API: JavaMath is free (GPL) software to enable mathematical programs in Java to use the computational capabilities of existing compute engines. While JavaMath can be used for stand-alone applications, the API is oriented toward the easy construction of Internet based client-server systems and Web pages. So far, JavaMath implements compute sessions with Maple and GAP. The first beta release is now available at <http://javamath.sourceforge.net>