Editorial

Computers & Education: Looking back and looking forward

'Computers & Education' is the longest-running, established journal in the field and recently reached the milestone of 50 volumes.[1] The journal has provided an interdisciplinary forum for communication in the use of all forms of computing and other forms of digital technologies, marrying the behavioural, economic and technical aspects of computer uses for learning.

The last 2 years has been a particularly successful period for the journal. According to Journal Citation Report (JCR), in 2004, the journal was ranked 30 among 91 journals in the Education and Educational Research subject category with an impact factor value of 0.625. Since then it has continued to gain status as measured by an improving impact factor and other bibliometric measures. For the 2007 JCR, the journal was ranked 8/105, and in 2008 it is now ranked 6/112 of education journals with an impact factor of 2.190. Such high rankings are usually confined to more general journals and are exceptional for a specialist journal such as *Computers & Education.*

This progression is also reflected by the number of full-text downloads. While in 2004, there were some 100,000 full-text downloads, by 2008 this had increased to more than 500,000. This exponential growth is indicative of the health of the journal.

Computers & Education Impact Factors, 2004-08
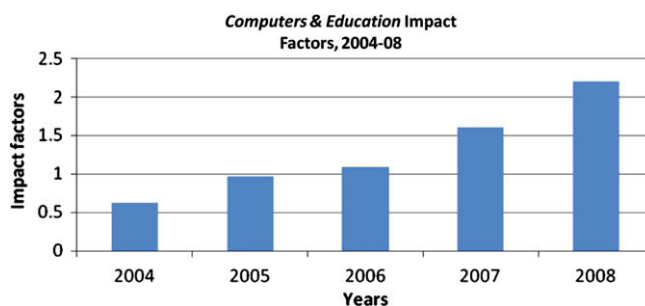
As we prepare for the next 50 volumes, a look backward is in order. Our first issue included 6 articles: "A necessary redirection for certain educational technologies" by John Neuhause, "Teaching programming: A spiral approach to syntax and semantics" by Ben Shneiderman, "A state-space model for automatic instruction" by John Self, "Computer assisted testing: an alternative assessment option for students" by Joseph Thorman, "A computer-based economic game and its evaluation" by J. Robinson and "Computers in teaching of differential equations" by C.W. Leininger.

Clearly, over time some issues have changed. In 1977–1979, no one was researching the impact of the internet on education, even though ARPAnet was already more than 10 years old. Articles continued to focus on the traditional pedagogies and traditional topics for computers: mathematics and what we have come to know as computer science.

What at first blush might seem quaint in Joseph Thorman's paper on assessment really still holds a research agenda for today, albeit one that has to be made a bit more current. He suggested "Evidence indicates that students will voluntarily avail themselves of the retest option when it is offered in a course and will earn significantly higher grades with a more positive attitude toward their learning experience. The computer can be a valuable tool for teachers in generating multiple tests. Multiple tests can be easily constructed by placing a pool of test items in the computer and having the computer randomly select and print the number of test items wanted in each test or subtest. The computer printout of selected items can be reproduced for as many copies of the test as wanted" (p. 207).

While the first papers were focused on the main streams of mathematics and computer science, today there is universality around computers in education. As computing has left the lab, we address all areas of Knowledge Domains and all nooks and crannies to computer usage. Computing is not longer lab or mainframe bound. Current papers describe mobile learning at every level from desktop to online to mobile phones. Read Chen et al.'s "Ubiquitous learning website: Scaffold learners by mobile devices with information-aware techniques" Vol. 50 (1), 2008 to understand how "the portability and immediate communication properties of mobile devices influence the learning processes in interacting with peers, accessing resources and transferring data". In fact, the most downloaded manuscript is "Mobile learning: A framework and evaluation" by L.F. Motiwalla, Vol. 49(3), 2007.

Just think about how each phrase or sentence in the Thorman paper can guide our research. "Research" is a challenge to us to provide situated, rigorous research into the uses of computers in education. While prototypes, case students and student surveys are useful to

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[1] *Computers & Education* has published two volumes per year since 1990.

prepare the field for deep research, we must take research seriously, work to define our terms, our methodologies and critique our findings carefully.

"Students avail themselves" brings to mind the many manuscripts we process today that address student engagement. The challenges often described concern how to continue to engage students in computer-based dialogue, blogs, discussions and online learning. We know that the drop out rate for online learning is steep. See, for example: "Comparing dropouts and persistence in e-learning courses", Y. Levy, Vol. 48 (2), 2007 and "Dropout prediction in e-learning courses through the combination of machine learning techniques", Lykourentzou et al., Vol. 53 (1), 2009.

"The computer can be a valuable tool" is no longer a 'can' but 'is' reality. Classroom and administrative processes could not function without the computer tools we use everyday. Productivity tools have changed how students read and write and compute. New tools such are suggested in every issue, such as Madden et al.'s tools for young writers in "Cartoons beyond clipart: A computer tool for storyboarding and storywriting", Vol. 52 (1), 2009, or those in virtual reality as noted by Barbour and Reeves in "The reality of virtual schools: A literature review", Vol. 50 (1), 2008.

In the most referenced paper, "The functions of multiple representations", Vol. 33 (2–3): 131–152, 1999 Shaaron Ainsworth provides a taxonomy of multiple representational environments that "is used to ask how translation across representations should be supported to maximise learning outcomes and what information should be gathered from empirical evaluation in order to determine the effectiveness of multi-representational learning environments".

It is hard to remember when "The computer printout of selected items can be reproduced for as many copies of the test as wanted" was the state of the art. In today's world many of us use a tag line on our emails suggesting: "Please consider the environment. Do you really need to print this e-mail?" More to the point, e-books, web-books, course management software and data-repositories of materials are the source of studies. Review Korat and Shamir's article "The educational electronic book as a tool for supporting children's emergent literacy in low versus middle SES groups" Vol. 50 (1), 2008, as an example of the current status of (non)printed material.

Finally, as we begin our second 50 volumes, it is not enough to write about lifelong learning, we, too, must be lifelong learners. In our many articles concerning the research imperative on lifelong learning (see "Self-organising navigational support in lifelong learning: How predecessors can lead the way" by Jansssen et al., Vol. 49 (3), 2007) we are urged to think broadly about computers in education – the classroom is no longer the boundary, nor is school age the limiting step. We need to address computers in education in a variety of settings for a variety of learners from the youngest child to the most senior adult.

While *Computers & Education* continues to be the premier journal in the field of computers, perhaps better termed digital technologies, in education, countries that are the leaders in this published research area have changed. Before 1988, research was originating in the US, the UK and Canada, followed by the Netherlands and Italy. From then to 2006, the leading countries were the US, the UK, Taiwan and the Netherlands. Since then Taiwan has become the major source of research in the published areas for the journal, followed by the US, the UK and Spain.

The success of the journal has resulted in a commensurate increase in submissions from 408 in 2006 (including original submissions and revised manuscripts) to almost 900 an in 2009. Professors Heller and Underwood have encouraged Elsevier to appoint a third Co-Editor in order to maintain the quality of service to authors. We take this opportunity to introduce and welcome Professor Chin-Chung Tsai from National Taiwan University of Science and Technology to serve the third Co-Editor of the journal. Situated in Taiwan, he brings an Asia–Pacific voice to the journal, making the journal cover different perspectives about the issues of computers and education.

The increasing number of submissions also means that there is a need for a larger pool of reviewers. We are always keen to search potential reviewers to provide insightful comments to the submissions. If you are interested in reviewing papers for us, please e-mail to any Co-Editor. If you have any comments or suggestions for the improvement for the journal we would be happy to receive them.

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