Envisioning the Future

By Diana Fingal

Illustration by Percy Franklin

Dave Moursund speaks about what's ahead for educational technology.

Last February, *L&L* kicked off a yearlong commemoration of ISTE's 30th anniversary with an article on Dave Moursund, the organization's first executive director. We shared excerpts of his editorials dating back to 1974, many of which seem downright prophetic today. Take, for example, these words penned (or we should say *typed*) in 1977:

> By the time elementary school students come to seek a career, massive changes will have occurred due to computers (among other things). The teachers should be aware of how computers are affecting the careers and educational training needs, and orient students to this changing world concept. … Elementary school students should be oriented toward a world in which computer-assisted communication and information retrieval are commonplace.

Many readers said they were delighted to read Moursund's words to discover how his beliefs are still relevant. To wrap up our anniversary coverage, we circle back to Moursund and find out what he thinks about educational technology today. We've come a long way for sure, but as Moursund points out in the Q&A that follows, we still have to keep at it.

L&L: Are there current examples of information and communication technology (ICT) that are shunned by some educators that you think should be embraced?

DM: One of the most important goals in education is to help students gain increased expertise in a variety of areas. ICT provides a powerful aid to representing and solving problems in every academic discipline. A person who learns to make effective use of this technology in a particular discipline has gained expertise in that area.

Our educational system and the typical teacher do not understand the message in *Two Brains Are Better Than One* and in *Computational Thinking*. (See Recommended Reading on page 25). We need an education system that helps prepare students to work in team environments that involve one or more human brains and one or more computer brains. This is a key idea in empowering students.

In addition, think about the idea of having most testing done in open-computer, open-connectivity environments, and based on students demonstrating their higher-order, creative, problem-solving, and task-accomplishing capabilities. That is the environment in which millions of us work. Our current educational system is doing quite poorly in this area.

L&L: What are the biggest challenges regarding technology integration in the classroom that you see today?

DM: Here are two of my beliefs: 1) The average teacher in the United States and in other countries does not meet the sixth grade ISTE NETS for Students, and 2) the ISTE NETS for students and for teachers are terribly weak in addressing roles of computer technology in problem solving and critical thinking.

The fundamental issue is two-fold:

Computers can solve or greatly assist in solving a large range of problems that we currently teach students to solve using by-hand (such as paper and pencil) techniques. Because it takes so much time and effort to learn the by-hand methods, and they are so slow when used, it means that students do not learn to attack problems that make effective use of the problem-solving strengths of computers.

And secondly, computational thinking has been a big deal since 2006, and ideas underlying it go back many many years. In essence, it involves computer modeling of problems and problem situations and drawing on the power of both computer brains and human brains in working to solve the problem.

In each area of human intellectual endeavor, ICT is making a significant contribution to problem solving. In some areas the contribution is much larger than in others. For the most part, ICT at the precollege level has not moved beyond using computers to do things that can also be done without computers—that is, it has not moved beyond the amplification stage.

This is not because PK–12 students are incapable of such progress. It is because our overall educational system, its leadership (educators, politicians, business leaders, etc.), teachers, and many other stakeholders are not functioning at the "beyond amplification" level and do not have the knowledge, skills, and insights to strongly and rapidly move our educational system in that direction.

L&L: What are your thoughts on distance education and on computer-assisted learning?

DM: Over the years, in my mind I have merged distance education (DE) and computer-assisted learning (CAL). I have watched with considerable interest the steady improvements and greater use of both DE and CAL. I have been particularly impressed by progress in developing highly interactive, intelligent, computer-assisted learning (HIICAL) materials that are delivered over the Internet. (See "Staff Development via Distance Education" in the Recommended Reading.)

Progress in HIICAL has reached the stage where we have good research on the effectiveness of such materials. President Obama is pushing legislation that would create several hundred open-source courses of this sort to be used at the community college and high school levels and freely shared throughout the world. I believe that if this plan is fully funded, it will prove to be a tipping point in our overall approach to education.

Moreover, keep in mind the words of philosopher Marshall McLuhan: "The medium is the message." Good HIICAL thoroughly integrates ICT as an aid to representing and solving the types of problems and accomplishing the types of tasks that are studied through these course materials.

L&L: What advice do you have for ISTE members and other advocates for continuing to integrate technology into schools?

DM: If an ICT system can solve or greatly help in solving a type of problem or accomplishing a type of task we currently have students learn about in school, then we should change this aspect of our education system to fully integrate use of ICT in this area of the curriculum. Time spent doing by hand things that computers are quite good at should instead be spent learning to address more novel and challenging problems that require higher-order, creative human thinking. Curriculum content, instructional processes, and assessment should all be much more authentic—that is, more closely approximate how people use their informal and formal education and tools (such as ICT) to represent and solve the types of problems they encounter.

If an ICT system (for example, a HIICAL system) is more effective in helping students learn than a traditional teacher working in a classroom with a large number of students, then this learning opportunity should be available to all students. ISTE and its members should be pushing hard for this by supporting such environments that fully integrate the capabilities of ICT as an aid to learning and an aid to solving problems in the disciplines students are studying.

Recommended Reading

Since retiring from ISTE, Dave Moursund has continued the discussion of technology in education at his website: http://iae-pedia.org. To subscribe to a free newsletter, go to http://i-a-e.org/iae-newsletter.html. To read more about some of the topics discussed in this article, see Moursund's articles listed below:

"Beyond Amplification": http://iae-pedia.org/downloads/doc_download/147-may-1996-97.htm

"Computational Thinking": http://iae-pedia.org/Computational Thinking

"Empowering Students and Their Teachers": http://iae-pedia.org/Empowering_Learners_and_Teachers

"Helping Students Gain Increased Expertise": http://iae-pedia.org/Education_for_Increasing_Expertise.

"Math Education": http://iae-pedia.org/Good_Math_Lesson_Plans

"Project-Based Learning": http://iae-pedia.org/Good_PBL_Lesson_Plans

"Staff Development via Distance Education": http://iae-pedia.org/Staff_Development_via_Distance_Education

"Two Brains are Better than One": http://iae-pedia.org/Two_Brains_Are_Better_Than_One

ISTE celebrated 30 years of ed tech excellence in 2009. In honor of this milestone, L&L published articles throughout the year acknowledging how far we've come and where we're headed on the path to effective technology integration. This article concludes our anniversary coverage.