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From the editor ..

Welcome to the April 2000 issue of *Learning Technology*. First of all, a sincere apology from editorial team if you submitted an article for the newsletter and do not find it in this issue. There was a crash on Ms Hobbs computer before she could read her email after holidays and therefore a number of emails got lost without even knowing from whom they were and for what purpose. If you had sent an item for publication to her, kindly send it again to me at kinshuk@massey.ac.nz (copying to kinshuk@mailandnews.com for safety).

A number of activities have been initiated in IEEE Learning Technology Task Force (LTTF). The first event of LTTF has been planned as an International Workshop on Advanced Learning Technologies (http://lttf.ieee.org/iwalt2000/) to be held in New Zealand. You all are most welcome to participate.

On another front, East-European sub-group of IFETS (a sub-group of LTTF) is working hard to start activities in that region. Their website (http://ifets.ieee.org/russian/) gives an update on their activities.

I strongly encourage you to browse through LTTF website at http://lttf.ieee.org/ and take active part in various activities. To keep yourself aware with the happenings, please subscribe to LTTF participants list by sending an email to majordomo@majordomo.ieee.org with the following in the body of the message (no subject needed):

subscribe LTTF *email_address*

(Please replace 'email_address' with your actual email address.)

Besides, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter. For more details, please refer author guidelines at http://lttf.ieee.org/learn_tech/authors.html.

Kinshuk
Editor,
Learning Technology Newsletter
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International Workshop on Advanced Learning Technologies (IWALT 2000) (Call For Papers/Participation)

4-6 December 2000
Palmerston North, New Zealand
http://lttf.ieee.org/iwalt2000/

Sponsored by

IEEE Learning Technology Task Force
IEEE Computer Society (approval pending)

Supported by

Microsoft Research
IEEE Learning Technology Standard Committee
Distance Education Association of New Zealand

Background

The International Workshop on Advanced Learning Technologies (IWALT 2000) will bring together researchers academics and industry practitioners who are involved or interested in the design and development of advanced and emerging learning technologies. Understanding of the challenges faced in

providing technology tools to support learning process and ease the creation of instruction material will help building a direction for further research and implementation work.

Topics of Interest

The focus of the workshop is on the design and development issues of advanced learning technologies. The topics of interest for the workshop include but are not limited to:

- Architecture of learning technology systems
- Advanced uses of multimedia and hypermedia
- Integrated learning environments
- Application of artificial intelligence tools in learning technology
- Application of metadata
- Agents technology
- Practical uses of authoring tools
- Virtual reality
- Teaching/learning strategies
- Collaborative learning/groupware
- Adaptive and intelligent applications
- Internet based systems
- Application of instructional design theories
- Evaluation of learning technology systems

The workshop will focus on where the research in advance learning technology is heading and what are the implementation challenges in the real-world situations.

Important Deadlines

Friday 2 June 2000	Paper submission
Monday 3 July 2000	Paper acceptance notification
Saturday 8 July 2000	Panel proposals
Friday 28 July 2000	Panel acceptance notification
Friday 28 July 2000	Final paper submission

IWALT 2000 Committee Members

General Chair
Chris Jesshope, Massey University, New Zealand

Program Chair
Kinshuk, Massey University, New Zealand

Panel Chair
Toshio Okamoto, University of Electronics and Communications, Tokyo, Japan

Program Committee
Alfred Bork, University of California, USA
Rosa Maria Bottino, Consiglio Nazionale delle Ricerche, Genova, Italy
Radu Cotet, University of Namur, Belgium
Roger Hartley, University of Leeds, United Kingdom

Andrew Higgins, Distance Education Association of New Zealand
Chris Jesshope, Massey University, Palmerston North, New Zealand
Judy Kay, University of Sydney, Australia
Ray Kemp, Massey University, Palmerston North, New Zealand
Piet Kommers, University of Twente, The Netherlands
Robert Luke, University of Lethbridge, Alberta, Canada
Claire McLachlan-Smith, University of Auckland, New Zealand
David Merrill, Utah State University, Logan, USA
Tanja Mitrovic, University of Canterbury, New Zealand
Riichiro Mizoguchi, Osaka University, Japan
Ivonne Nicolescu, Freie Universitaet, Berlin, Germany
Ashok Patel, De Montfort University, Leicester, United Kingdom
Jim Schoening, IEEE Learning Technology Standards Committee Chair, USA
Alex Shafarenko, University of Surrey, United Kingdom
Katherine Sinitsa, Intl Res. and Trng Ctr of Info. Tech. and Systems, Kiev, Ukraine
Andrew Skrynnyk-Chambers, Massey University, Palmerston North, New Zealand
Terry Stewart, Massey University, Palmerston North, New Zealand
Daniel D. Suthers, University of Hawaii, USA
Philip Uys, Massey University, Palmerston North, New Zealand

Paper Submissions

Papers should be no longer than 5 pages including all tables, figures, and references but excluding a cover page. Over-length papers may be rejected without review. While preparing manuscripts, the authors are required to follow IEEE Computer Society Press guidelines, which are available at: http://www.computer.org/cspress/instruct.htm (or download guidelines in Word or PDF format)

All papers should be submitted electronically. PDF and Word formats are preferred (optionally zipped), but other formats may also be accepted at the discretion of the Program Chair. If you have any query for submission, please contact Program Chair.The cover page of the paper should contain following information:

- Title of the paper
- Author names with affiliation, postal and email addresses, phone and fax numbers
- Name and email of contact author
- Abstract of no more than 200 words

The papers should be submitted to: Program Chair: Kinshuk (kinshuk@massey.ac.nz)

Review

All submissions will be reviewed on the basis of relevance, originality, significance, soundness and clarity. Three referees will review each submission.

Proceedings

Papers accepted for presentation at IWALT 2000 will appear in proceedings, published by IEEE Computer Society Press, which will be distributed during the workshop. Extended versions of some of the accepted papers will be invited for an special issue of Educational Technology & Society (ISSN 1436-4522) journal.

Panel Submissions

Proposals for panel discussions (preferably with the details of proposed panelists) in specific areas of advance learning technologies should be submitted to: Panel Chair: Toshio Okamoto (okamoto@ai.is.uec.ac.jp)

Exhibits

The workshop will provide a unique opportunity for software vendors, courseware developers, and commercial research projects to display products and technological solutions in the different areas of learning technologies. To discuss the options, please contact: General Chair: Chris Jesshope (C.R.Jesshope@Massey.ac.nz)

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A Web Site: A Primer for Web Site Design and Development

Like most of you, I have ventured into cyberspace only to encounter dozens if not hundreds of web sites. After all this surfing, I decided there are three things I hate most about some web sites. One, is getting lost in a hypertext maze. A hypertext design lends itself to confusion. Second, getting into a loop, clicking on links and ending up where you started, developed by the Alice in Wonderland school of web site design. Sometimes bookmarking doesn't even help. And lastly going to a web site and finding a piece of useful information after much hunting and searching, then only to NOT be able find that piece of information again on another visit to that web site. Have you ever encountered such design problems?

After considerable frustration, I sat down and designed and developed a Primer on Web Site Design and Development, please visit my web site. The URL of my primer is
http://members.aol.com/trynda/coco/demo/intro.htm

My primer for web site design and development contains sections on graphics, text, navigation (menu-based, hypertext-based, other), multimedia, special features (email, links), hypertext and an interactive quiz with feedback.

The graphics section discusses uses and types of files and demonstrates bit mapped and animated graphics.

The text section discusses and demonstrates different fonts, colors, sizes and attributes of text. The screen should be clean and not busy. Too many options will confuse your visitor.

The navigation section discusses and demonstrates the critical need for clear navigational directions for the visitor to your web site.

The multimedia section discusses and demonstrates the various aspects of multimedia and some file formats. Definitions of multimedia are provided. A discussion on the early beginnings of multimedia pioneered by software developers on the PLATO System of Computer-based Instruction. PLATO was designed and developed by engineers at the Computer-based Education and Research Laboratory (CERL) on the campus of the University of Illinois Champaign-Urbana. Demos of digital video and digital audio are also available. However, digital media is very dependent on the browser. The primer multimedia demo runs fine using Dreamweaver 2 on my PC, but not on AOL, my ISP. I have provided

an opportunity to send me email and to tell me if you hear audio and see video using your browser. Please tell me what browser you are using. I want to compile a list of browsers which are compatible with .WAV audio files and .MPG video files.

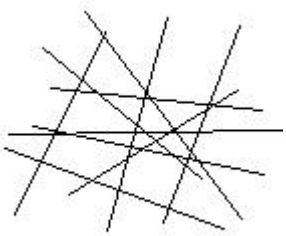
The special freatures section discusses and demonstrates the features of receiving email from the visitors to your web site for questions and comments, and links to other web sites.

There is also a short interactive quiz with feedback on the correctness of your answers. Interactive feedback in a web site. The mind boggles at what I may come up with next.

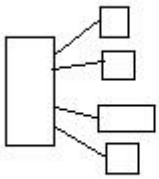
My reason for designing and developing this web site is to provide guidance to other web site designers and developers who do not have the 30 years of experience that I have in the design and development of computer-based education and training, multimedia and more recently web site development.

I have seen many poorly designed web sites. Particularly ones that I have gotten lost in. It's navigation, navigation, navigation. Never assume the visitor to your web site knows where the browser back button is on the screen. The visitor may have just purchased a home computer because of their children and may use it occasionally. NEVER underestimate the computer expertise on the part of the visitor to your web site. Even the experienced web site user will appreciate clear navigational directions in your web site. My primer discusses the differences between the two following formats:

Hypertext-based



Menu-based



I hope you will visit my web site, explore, learn and send me email with comments and suggestions so I can update my web site primer.

Richard S. Trynda, D.V.M, M.Ed.
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Project Pioneer: Promoting Science and Building an International Community
http://www.projectpioneer.com

Project Pioneer, being developed by Cristiana Assumpcao, Ed.M. in Instructional Design at Teachers College, Columbia University (cristiana@baggio.com), is a more global project that was created as a result of lessons learned from developing the Biotechnology Project at Colegio Bandeirantes, Brazil. What started out as one activity to expand the Biotechnology project, with the help of Fabio Souza, a High School student at Colegio Bandeirantes at the time, has grown to become a partnership with the Institute for Learning Technologies to expand its research and methodology to international levels. The project is developing a model to both research and develop emerging technologies tied in to education and curriculum, as well as provide accessible technology to underprivileged students in developing

countries, such as Brazil.

This project is an initiative to create an online collaborative distance environment backed up by the most innovative and sound pedagogies, as well as a testing ground for new collaboration tools for students and project developers. In designing this project, our goals are to:

- Research innovative uses of new technologies applied to education
- Build a rich collaborative environment for research and simulation
- Develop a model for building a project through distance collaboration
- Use technology to promote new pedagogies (such as constructivism)
- Build a bridge between Higher Education researchers/ scientists and K-12 teachers
- Develop and provide curriculum to elevate the quality of Science being taught at all levels
- Create an environment that supports student performance by providing social support (interactions in virtual reality and streaming technologies); easy access to reliable stored information (web); attain competence in high level thinking skills and problem solving; good affordance and task support (Self/R – open source through concrete interface – students work with objects).

The approach is global, where the first students involved are located in Brazil, and do all of their work and collaboration online. The site was designed for guidance through information and references, adopting initially a Webquest format, as well as a tool for collaboration, through listserves and a forum. We will be incorporating streaming technology as well to bridge the distance and also provide a closer support for students. Pioneer will always be integrating emerging technologies as a way of developing curriculum that makes best use of these new tools, and will keep students in Brazil prepared to enter the global market.

As the project grows, students have access to more and more materials published in the site, and new partners are joining us to contribute to the cultural exchange and enrich the ideas. US students are already becoming a part of the team, as Beacon School integrated the project as a curriculum unit in one of the computer classes, taught by Keith Miller. We also are working with Kelly Corder at the Institute for Learning Technologies to develop both a project with North Hudson and Lamont/Doherty Earth Observatory, bringing professional development to 5-12 Science Teachers both in New York/New Jersey and North Hudson, by giving them access to research scientists at Lamont, as well as curriculum materials and samples of Regents exams questions by the specialist Earth Science teacher Dr. Michael J. Passow. Pioneer will play an important role in making the distance-learning component possible. You can read more about the Earth Science program being developed at http://www.earth2class.org. Another project being incorporated is the Arsenic project, where Columbia University graduate students are developing a complete study to be used by policy makers in Bangladesh, as well as educate the people through teacher training and curriculum materials. This effort is being spearheaded also by Kelly Corder using the technology Pioneer has been developing for online collaboration for material development and group discussion. Other projects are in the process of being negotiated, as more schools are demonstrating interest in participating with us.

Project Pioneer will be a test bed for new technologies as well, using the Merlin computer as an educational tool, giving students access to an open source operating system - OS (Self/R) that allows them to take ownership of their learning process, not being limited to closed OS's. We will be researching ways of building an online collaborative environment that will allow students to express more non-verbal cues as well as verbal (text or audio). It has been our observation that there are a series

of Gardner's (1993) intelligences that cannot be tapped into by the constraints of the collaboration environment. It is our aim to try to bridge that gap, allowing for more realistic interaction amongst students and distant colleagues or teachers, experts, scientists, etc. That research is still in its very initial stages, but we hope that our work through the partnership with Jecel Mattos de Assumpcao Jr., specialist in programming languages and computer technology (amongst other things) will allow us to build such an environment.

Initially working with private school students, we have expanded to work with public school students, parents and teachers, working toward bridging the Digital Divide in developing countries as well as in the USA. As the first students become well trained in using the technology and developing significant projects, we will encourage them to become mentors for public school students, thus learning to become more involved and responsible citizens.

This is very much a work in progress. Initial results have been promising. Of all the things we have learned so far, the importance of building a network of partnerships and working collaboratively has been prominent. As our global community is becoming smaller, the best thing to learn is how to get along and work together.

References

Gardner, H. (1993). *Multiple Intelligences: The Theory in Practice* . Basic Books.

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A Report on the Impact of Advanced Media and Emerging Technology on Schools and Society

Part 3 of 3

John Brishcar, an 8th grade science teacher in a public school in New Jersey, USA challenges us all in the use of advanced media and its acceptance in several areas of school and society. In his article, he looks at that new medium of information – the printed book! Several different viewpoints are represented that are directly affected by this new means of inexpensively publishing new thought and distributing this information in mere weeks!

Intrinsic Paradigm Shift

Many report that the intimacies of the teaching exchange, (the interaction of student and teacher) is lost when the student does not rely solely on the guidance of the teacher. The student may get sidetracked and go off in many other directions to investigate other things.

This will cause havoc in the traditional classroom.

There is an effort afoot to write specifically for the medium, which flies in the face of traditional 'old style' methodology. Prior to the mass dissemination of information, most, if not all, written material was crafted to be read to others. This style of writing is now shifting to the point that some books are written specifically to be read silently, by one person at a time. This 'propaganda' style writing, crafted for the printing press is most dangerous. There is no check and balance in place to curb the radical ramblings, or those questioning the Government.

Delivery of information

With so much information available today, and available so inexpensively, even commoners have access to information only previously available to the few. This information is readily accessible if you know how to get it out of the vehicle. You need to know how to use the medium - you need to know how to work the advanced media, you need to have been taught how to read.

Having the information at your fingertips, however, is only the start. The real issue now is what is done with that information. The acquisition of information is not knowledge, but is only the first step in the process of learning.

It will always come back to the skilled teacher to provide the tools and framework for learning.

Supportive infrastructure

Empowering students, parents and the community to use this new technology should be the goal of all concerned. We as a society need to pull our heads out of the sand and come to grips with the fact that the world is rapidly changing. Yes, it has always been changing, but today the difference is the rate of this change.

We are discovering new things all the time. In the new world, tomatoes are eaten as fruits, we can now smoke that wonderful plant tobacco, the amazing instrument, the violin, was just perfected, and the Italian physician Girolamo Fracastoro is showing the world that diseases may be caused by germs (animals too small to see). The French surgeon Ambroise Pare writes about tying off arteries to prevent hemorrhaging during surgery and has even devised artificial limbs!

"We cannot vote on whether or not to accept this new technology, because the technology is here. We need to have the courage to move from tolerance of this new vehicle for the transmission of knowledge, through acceptance, and right into embracing it as the only true way to freedom," was quoted by a forward thinking student prior to being shouted down on the floor of the meeting room.

Soon, everyone will want to be able to read, to access this information. Somehow, the masses need not only access to this information, but the means to use it effectively. Having the information and understanding what it is are two different things.

Should we decide that as a society we are dedicated to educating the masses, we must embrace this vehicle for information. We must provide the means of educating the children, the teachers, and also the community at large lest there be an information 'elite' few, holding the others at bay in the darkness if ignorance.

This schism of information 'haves' and 'have-nots' must never be allowed. This recent breakthrough in technology, the publishing of books, has torn away the elitism of the few and cast all into the light of intellectual thought. We can never allow ourselves to restrict the adaptation of new technologies because they allow for the infusion of new ideas - yes, even dangerous ideas.

The most dangerous idea is that one man, one society, or one government can decide what is allowed to be thought, read, sung, or dreamed.

This is a fundamental part of being human and breathing.

Except for the year and city of the opening dateline, the exact same principals are in question today - not with books, but with a different form of books, a form based on electrons, not dead trees - the interconnected computers of the Internet.

Our students are being challenged, not only for specific content in the various disciplines, but also on presentation and research skills. The core content curriculum standards demand a competency in informational research done on the Internet. There are now standards for presenting word processor and multimedia presentations. This is what industry is demanding. PowerPoint presentations, Web pages

interlaced with database information, Intranets and Java script are on the forefront of industrial computer backbones for everyone in companies, from the CEO to the dockworker.

In education, however, we teach very similar to the way we've been taught. The problem today is not only that the world has changed, but the pace of that change.

Take an accountant of 50 years ago and place her in an accounting office of today and he would be lost. Take a medical doctor of 75 years ago and place him in a modern operating theater of today and she would be dumbfounded. But, take a teacher of 100 years ago and place him in a classroom of today, and the major change, aside from some of the books, would be the names of the students.

With he schism between the technological "haves" and "have-not" widening, how can we be equipping our children of today to be competitive in a world that is so rapidly changing? That is only half of the question.

The other half of the question is breaking through the denial that business is "as usual". Yes, you may admit, things are changing. They have always been. The difference is not that things are changing, but in the RATE OF CHANGE.

In MIT's Media Lab guru Negropointe's book "Being Digital", he gives a very accurate picture of this rate of change.

Remember the story of the farmer that saves the kingdom and the king grants the wish of a single grain of wheat for the first day of the month? Each day that followed, the previous amount was to be doubled-2 then 4 Etc. This went on for several weeks and after the 28th day, the stores were emptied on the 29 th day the granaries were empty and on the 30th day the kingdom went bankrupt. We don't even know what happened on the 31st day!

In the present pace of technological advancement, we are firmly in the last 3 days.

With few exceptions, schools are 10 to 15 years behind mainline industry and woefully behind in computer power, compared to what some of the students are using at home. I lived through the "should we let them use calculators or slide rulers" years when I entered Newark College of Engineering in 1973. Many of the old timers felt that if they could send a man to the moon with only a slide ruler, it was good enough for this generation of engineers. We were using integrated circuits on our calculators to solve equations for amplifiers made from tubes! High schools and the elementary schools fall into the same trap if not worse due to the cost of updating curricular resources such as books, and instructional technology, and the lack of vision of those in charge.

It used to be that 10 to 15 years was not a large gap in the areas of instruction. Movies and filmstrip projectors are used today in many classrooms. It would not be a problem today if not for the fact that we are in this rapidly changing environment-the last 3 days.

Business is forced to infuse technology, not just for the sake of using it, but because it is appropriate and cost saving. Not so in education.

Profit maximization is not an issue. Schools sometimes find themselves on the tail end of the dog, accepting donations of underpowered computers that have outlived their usefulness in the "real world". Schools fail to remain up to date with software, creating incompatibility problems when students wish to bring in work from home and it will not translate downward.

Teachers are both the solution and the problem. I have a class of 24 8th graders. An informal pole I took showed that all 24 have computers at home, and 20 have access to E-Mail and the Internet. I challenge any school staff to match those percentages. In my Middle School, about half of the teaching staff has E-Mail and Internet access at home, and none at school.

Out of 63 teaching professionals, this is dismal. We are the blind teaching the sighted how to sketch with 3 point perspective.

How are we going to meet the technological needs of our students when they are beyond most teachers?

I wonder what our kids think when they can access into the Library of Congress from home? What do they think when they can get information directly from NASA, and not an 11-year-old book containing information that has been revised several times since it was printed?

We stand poised at the brink of truly a new age. It is no longer the information age - that was the first of the last 3 days, it is the age of access. We need to rethink the "most important" things to be taught. We need leaders and innovators, not denial and pacifists.

When Gutenberg produced movable type, an information explosion happened that changes the society in a way that was unprecedented.

Information was now portable, cheap, and available to the masses. Now the masses could read a variety of sources, published by a more diverse group. The same type of event is happening again, this time without killing any trees in the process.

How we meet these challenges will shape our minds, our children and our world in the months and years to come.

Whenever something is said about the Internet, substitute the word 'book', simply a different delivery mechanism, and see if the statements still holds true.

- Using books in school a privilege that may be revoked.
- Information found in books cannot be trusted.
- Information found in books is dangerous.
- Not everyone will have access to books.
- Not everyone knows how to use a book.
- Who will teach children how to use books?
- Some books are not "safe" to read and must be censored.
- Unless everyone has access to books, no one should.
- We must wait until everyone has a book, before we figure out how to teach them how to use it.
- How will we know if the report is the student's own work or was something that they read in a

book?

It becomes painfully obvious that we are still thinking about dead trees.

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How a 70-Year-Old Toy is Helping to Ensure the Future of America's Technology Industry

(Visionary School Principal Says More Local Companies Have a Responsibility to Get Involved)

Many adults probably can remember wondering at some point during their school years—maybe as they struggled to solve a seemingly pointless algebra equation or worked to memorize the periodic table of elements—"How will I ever use this in the 'real world'?"

Of course, in today's society—particularly in the Silicon Valley—we know that solid math and science skills are part of the key to landing a job in the often lucrative technology market. The potential financial benefits of securing employment in a hot technology company are lost on few—even some high school students have been known to request payment for a summer job in stock rather than cash. Times certainly have changed. We are moving quickly from an industrial era to an information era. A child entering elementary school today will be making a living 20 years down the road at a job that likely does not even exist today.

But how well are we preparing our children for that technology-based future? Is there a way to get kids more interested in math and science? According to Devin Blizzard, principal of Los Alamitos Elementary School in San Jose Unified School District, we are doing a lot of things right. "We're more sophisticated in what we understand about learning and teaching today," said Blizzard. "For instance, rather than forcing kids to learn math only from a book, we use 'tangible manipulatives,' such as blocks, sticks and cubes, to teach quantitative reasoning skills. And, instead of assigning traditional, abstract word problems, we give real-world problems. Students might be asked to imagine constructing a building and have five different vendors from whom they must buy the necessary supplies while staying in budget," he explained.

However, while Blizzard is confident that things are moving in the right direction in his school, he concedes that he is concerned with reports that claim the United States is far behind its global peers in terms of math and science skills. One National Assessment of Education Progress survey found that American 13-year-olds had the lowest math and science scores of six industrialized countries. And, a *BusinessWeek* report indicates that it will require an overwhelming 50 percent improvement by the year 2000 for the United States to match Japanese and European levels of functional literacy, general science and worker training.

Despite the alarming statistics, Blizzard sees the issue as a problem of quantity rather than quality. "It's my understanding that our top engineers compare favorably worldwide, but there just are not enough of them."

Apparently, the technology industry agrees wholeheartedly. According to the American Electronics Association, continued strong growth in the technology sector has led to increasing shortages in the

supply of highly skilled workers. At the same time, the number of graduates from American universities with degrees in computer science and engineering has continued to decline since 1986.

Desperate for talent, the technology industry persuaded the U.S. Congress to raise the H1-B visa limit from 65,000 per year to 115,000 per year for 1999 and 2000, so that companies could do more recruiting outside the United States. The U.S. Immigration and Naturalization Service issues H1-B visas for professional workers from abroad who have the equivalent of a college degree or higher. But the 115,000-visa limit was reached in mid-June, and the thirst for international recruits continues unabated. Even if the limit is raised again, it would be only a short-term solution. The U.S. educational system clearly is not keeping pace with the industries that need workers in the near future and beyond.

How did we get into such bad shape? Today's children have been brought up surrounded by interactive technology. They don't know a world without television, remote controls, VCRs, computers and video games. Portrayed 20 years ago as a mere fantasy in the cartoon TV show *The Jetsons*, it really is possible now to order dinner at the push of a button—via the Internet. And the day when domestic robots, such as the Jetson family's "Rosie," are standard in most homes probably is not that far off.

Unfortunately, the technological advances that have swept through our society have not had as dramatic an impact on our educational system. A large number of classrooms do have computers and Internet access. And, as Blizzard emphasizes, we have made a lot of progress in the way we teach our students. However, there still is a great deal of passive learning. Teachers often present facts that students are expected to memorize for a test. Such a structure is not necessarily conducive to long-term knowledge retention. Numerous studies have confirmed that active, hands-on learning is far more effective than passive learning. Therein lies part of the problem with our educational system. In contrast with the vivid images and self-directed flow of the interactive technology with which kids are familiar, the school environment can seem rigid and uninteresting. There are not enough hands-on opportunities for kids today.

Creatively Addressing the Problem

Fortunately, not everyone is just sitting back and shaking their heads about the current state of affairs. Right here in Silicon Valley, companies and schools are teaming up to do something about it. For learning to be of real value, it must have some connection to the real world. In fact, the age-old apprenticeship model makes a lot of sense. It allowed the apprentice to be actively engaged in the task being learned. Along those lines, the non-profit FIRST Foundation has partnered with the world's largest toy manufacturer, Denmark-based Lego Corp., to form the FIRST Lego League, a new program designed to introduce children aged nine through 14 to science, math and technology in a fun and engaging way. The FIRST Foundation's mission is to generate an interest in science and engineering among young students.

Since 1992, FIRST ("For Inspiration and Recognition of Science and Technology") has held annual high school-level robot competitions. Teaming up with engineers from businesses and universities, high school students have gotten a hands-on, inside look at the engineering profession as they worked together to brainstorm, design and build a working robot to participate in a challenge against other teams. Due to its popularity, these robotics competitions have garnered a lot of attention. In fact, the 1998 national championship, held at Walt Disney World's Epcot Center in Orlando, Fla., was even broadcast on ESPN.

Blizzard, who previously helped bring robotics and the FIRST competition to Broadway Continuation High School in San Jose and, subsequently, watched that team become a national champion, was thrilled when FIRST developed a robotics competition for the younger set. He enthusiastically got his school involved in this, the program's first season. Blizzard said there are six FIRST Lego League (FLL) teams at his elementary school, half of which are being sponsored by Silicon Valley-based Adept

Technology, Inc., the nation's largest manufacturer of industrial robots. In addition, three engineers from Adept are taking the time to act as mentors for teams at the elementary school. The company is sponsoring an additional FLL team out of its Cincinnati office, where a fourth engineering mentor is lending his time as well.

According to Chris Hogan, a parent volunteer for one of the Los Alamitos teams, Adept's contribution is valuable and will hopefully serve as a model for other technology companies. "I wrote to several robotics companies to secure support for the FIRST Lego League," said Hogan. "We needed both funds and mentors. Adept was the only company that responded, and we are grateful."

How the FLL Challenge Works

Each FLL team receives an academic challenge, a sports-like playing field, and a Lego Mindstorms™ Robotics Invention Challenge Kit, a product that enables children to design, build and program autonomous robotics inventions that move, act and "think" on their own. Each team is responsible for designing, constructing, programming and testing a robot to compete in the statewide challenge. The Mindstorms kit includes more than 700 Lego pieces, motors, light and touch sensors, gears, a CD-ROM including a programming environment, and an infrared transmission tower to download the program from a Windows-based PC directly into the robot.

According to Hogan, the FLL is time-consuming and challenging for everyone involved—students, parents, teachers and mentors alike. "We have been meeting twice per week for several hours at a time, and this will increase as we get closer to the statewide competition in December." The championship, which will be held in Carlsbad, Calif., involves designing, building and programming a robot to move through a course and complete several "missions" within a three-minute timeframe.

"These kids are learning a lot more than just math and science as they prepare for the competition," said Hogan. ""When our team meets, we run it like a business meeting. The kids are learning classic team and time management skills."

Dave Bloom, an Adept engineer and mentor to a team of fourth-grade girls, added, "My team's parent leader is a machine shop manager at work, so he takes the mechanical end. I offer project management and programming skills to the team. We meet in front of a white board and scope out the tasks and then divide the team into two groups, I work with my team on programming skills, while our parent works on mechanisms."

Bloom, who has taught third grade as well as high school chemistry and physics, said he loves the enthusiasm and openness of the kids. "These fourth-grade girls get downright giddy at times over making a little program change and watching the robot act it out. They have a way of brightening even the worst day. To see them charging into robotics is very rewarding for me. I have been in robotics for more than 20 years—this is my life. It is fun to pass it on," Bloom said.

While adult volunteers are having fun, most admit it is a lot of work as well. "Even the average adult would need to spend quite a bit of time to understand the programming language, learn the challenge and develop a robot that can accomplish the challenge," said Blizzard. "So, I'd say the mentors and team leaders are learning a lot too. The kids think they're playing, but this is a lot more. I overheard one mentor say that coaching Little League was a lot easier than this."

Because of the time and attention involved, Blizzard said his school is lucky to have the Adept mentors. "We know it's tough for them to get out here for the meetings after a full day at the office, and we appreciate that they're taking the time to do that," he said. "In fact, the most valuable contribution a company can make is giving employees release time to exchange in a relationship with a partner school such as ours," he said. "The financial support is secondary to the time spent mentoring."

Blizzard explained that because of the ages involved, it made sense to divide up his school's six teams based on gender as well as age. But he was quick to comment on the general misconception that female students tend to be less interested than boys are in science. "Initially, we did have more boys sign up for teams," said Blizzard. "I had to go around and recruit some more girls. But I'm finding that the girls are surpassing the boys in their industriousness and their systematic approach to meeting the challenge. The Lego League gives them an arena to test their math and science skills, and they feel validated. They're running with it."

Blizzard added that Los Alamitos does have a female mentor from the Society of Professional Women Engineers, Carlyn Sainio, an engineer at Intel. "Carlyn is a great role model for our young girls," he said. Blizzard believes that some of the students who may not have considered it—particularly the girls—may go on to a career in engineering.

A case in point is Sarah Thornhill, a senior at Broadway Continuation High School, who participated in the high school competition last year and is now a mentor for FLL at Los Alamitos. Her involvement in the FIRST robotics competition even landed her a paid internship at NASA Ames Research Center, where she works two days per week as a technical intern and receives school credit.

"I had a hidden interest in science before getting involved in the robot competition, but there was never a program or course at school that interested me. A teacher suggested I join the FIRST team, and I'm glad I did," said Thornhill. "I had some preconceived ideas that science was all about books, but I learned that science is a vast field with many different occupations. I learned that someone with interests like mine could be involved in science and technology. Now I definitely am planning a career in the sciences.

"We don't hear as much about successful females in science and technology," Thornhill continued, "but I was mentored by great engineers. Although all of them were male, they still showed me that my ideas and abilities were very important and useful. I consider myself to be a success story in the program."

Blizzard said the challenge faced by educators today is to create an academic environment that addresses the need for students to achieve state standards and benchmarks, while at the same time aggressively encouraging innovation, creative thinking, collaboration and imagination. "In fact, a lot of the skills that are helping me to be successful as an adult are the skills that we repress in our kids. Kids often are kept in a very structured learning environment. We must instill in students all the necessary content knowledge, but we need to do it in a fashion that doesn't crush their creative spirit," he said.

According to Blizzard, kids today are very sophisticated. They have a strong comfort level with electronics and video games, and as a result, they have dexterity and a non-linear learning ability. He says traditional classroom settings often do not leverage the learning capabilities of today's children.

"The goal of the Lego league is to have the students learn new skills—such as programming and fundamental physics—and apply these to a competitive challenge situation. To the kids, it is like playing a big game. It is a very social process that requires ingenuity, critical thinking and sharing ideas. This is good, because employers today are looking for technology workers that have the math and science skills, yes, but they also need to be creative problem-solvers and team players," Blizzard said. "The Lego League helps kids develop such skills while also learning physics, engineering and programming—it is ideal."

Blizzard commented that it is not rare to hear something like, "Gee, I bet we've been here for a full hour," from a child who already has been working hard on an engineering challenge for well over two hours. "That they can lose track of time shows it's a powerful learning experience" he said. Blizzard also has seen incredible changes in some of the kids as a result of the competition. "One typically quiet child really has blossomed and come out of his shell," Blizzard said as he described how this shy

student had jumped out of his chair to perform an "end zone-style" victory dance after figuring out a way to program the robot to make a left turn. Hogan agreed as he related a story in which one child participant asked if he could cut back on Cub Scouts and soccer to focus more on the FLL challenge.

Blizzard, a confessed "former Lego maniac," added, "People have strong emotional and memory ties to Legos—this is what captures the attention of mentors and students."

Legos, which have been around since the 1930s, are indeed a part of many of our fondest childhood memories. So, it is not surprising that Legos offer a great opportunity for stimulating kids. And the popularity of these toys is still going strong today. The Lego Group employs roughly 10,000 people in 30 countries.

According to the Lego web site, the name Lego was formed from a contraction of the Danish words "leg godt," meaning "play well." It was later learned that Lego in Latin means "I put together" or "I assemble." This is not without significance today, as the FLL helps children both play and learn about mechanical engineering.

An Appeal to Silicon Valley Companies

Blizzard has lofty goals for next year. "I'd like to publicly invite many more teams in the Silicon Valley and California to participate next year. Perhaps via a web site, we could get more kids involved internationally as well. But we'll definitely need more support from companies—both in terms of funding and time," he said.

Blizzard explained, "The Silicon Valley has seen a lot of success in recent years, and companies should take an active role in ensuring that the educational institutions that will supply them with workers can create our future engineers. Giving money or equipment is helpful. But actually, just having another computer isn't as useful without the human interaction. The exchange that happens between the students and mentors is valuable. They learn from each other—that's the priceless piece."

Thornhill agrees. "Without the involvement of these caring people, I would probably not have the self-confidence to even consider science and technology as a career choice. To raise the level of interest and awareness of both male and female students, adults need to give their time, guidance and encouragement."

Menlo Park, Calif.-based Future Forecasting predicts that by the year 2010, every job in America will require some use of technology. This makes it imperative for our children to become comfortable with it. With programs like the FIRST Lego League—and with companies to support it with both funds and time off for mentors—there just might be hope for the future.

Bloom, a father of five, said his time spent mentoring gave him reason to be optimistic about the future of our kids in technology. He remarked, "I think they will do well. I'm especially excited that it is becoming more common for young girls to be interested in technology. This is good both for them and for our society. These kids certainly are sharp, and to not have them use their abilities for the important work in the world of technology would a loss for us all."

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TLC : Teachers' and Learners' Collaborascope - a platform for evaluating Technology Based Education

Technology-based education requires management tools, which the TLC project aims to provide. Consider the comparison of commercial and educational practice below and you will understand our motivation.

The majority of large commercial enterprises today monitor the fine detail of their business, e.g. breweries and retailers collect every item of their till transactions, from all the country (or world in the case of multi-nationals) into databases. They then perform "data mining" to measure their performance, detect anomalies and react quickly. For example, a brewery tested the value of a television commercial by its impact on sales and detected that it had not had the impact expected, and pulled the commercial immediately. A retailer detected a fall in demand in September for a products line popular in previous years in the run up to Christmas and cancelled its orders. In both cases they saved millions of pounds.

Education is spending millions of pounds installing networks, installing computers, teacher training, assembling distance learning material and ICT (Information and Communications Technology) software. This is not only a huge investment of resources; it is also critical for the future of our knowledge-based economy that it be effective. Yet the network technology is not being used to assemble databases which decision makers, such as: teachers, researchers, managers and politicians can use to guide the investment.

In the TLC project we are pioneering techniques for assembling and querying educational data. Our goal is to initiate research into the best methods of rapidly assessing the effectiveness of sources deployed and then interpreting the data to improve our educational performance.

TLC will provide a platform and infrastructure carrying out continuous, unobtrusive *student* observation and evaluation, which will be highly beneficial in managing both the development and use of a technology-based educational systems. However we do not want to reinvent yet another wheel therefore wherever possible we hope to work collaboratively to make use of existing on-line learning environments and components such as WebCT, Lotus Learning Space and Ariadne to design and deliver the content material. Additionally, we will make use of the emerging standards for on-line learning environments such as the Instructional Management System Project (IMS) and the IEEE Learning Technology Standards Committee. This platform will provide detailed mechanisms for the evaluation of the technology-based education, a research area that has often been overlooked in previous educational delivery systems. This platform and resulting infrastructure could also be utilised by schools, communities and industry alike.

In order for distance education to be delivered effectively, computing scientists are required to build systems from the requirements gathered from educationalists. The development of TLC will bring together experts from computing science and education. The computing scientists will call upon their knowledge of distributed systems, data mining, interaction techniques and data storage technologies.

The educationalists will bring knowledge of teacher's requirements from such an online delivery system. The fusion of these experts will help identify the research questions to be answered by the TLC project.

The focus of the TLC research platform is to further develop an *effective* means for learning. The UK Government has recognised the benefits to making continuous learning available to every citizen throughout their lifetime, through such initiatives as the National Grid for Learning to support lifelong learning. Traditional approaches to learning rely on resources being available at restrictive times and locations. It is necessary to find an alternative medium, which affords greater access and flexibility. Technology-based education has been proposed as a suitable medium however presently it is difficult to measure its effectiveness. The TLC offers a platform to measure the effectiveness of technology-based learning. The TLC platform will provide student progress tracking, logging every interaction with the system, this will permit analysis of trends and learning patterns. The TLC platform will log long-term users' interactions with an online system; this will provide educational researchers with large data sets to explore educational research areas such as student learning styles.

Through the use of TLC and the subsequent educational research it will allow, learning systems will be made more effective. Teachers will be able to quickly identify students having problems no matter whether the student is working in a classroom or remotely at home. Teachers' time will be directed to the students who need help giving the student a much more supportive learning environment.

We are actively seeking collaborators for future research proposals, particularly fellow European collaborators.

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A Web-based Unified Learning Support System

Liverpool Hope University College has developed and implemented a unified learning support system based on web-technology.

The philosophy behind the development is to provide an attractive, intuitive interface with a gentle learning curve. The elements of this system are:

- A student 'portal' called HopeLIVE, which is publicly available. This portal is designed to be the route to all learning resources. HopeLIVE sets out to unify what used to be a large number of different information sources, each of which required a student to know of its existence and to find out how to get more detailed information. In addition to learning resources students can access subject information, on-site services, and different type of study resources. HopeLIVE is intended as an ever-growing resource and staff in the Learning & Teaching Development Centre at Liverpool Hope will keep it updated.

- A module-centric virtual learning environment, the Module Communication Centre, (MCC) which allows students to get at the information relating to a module, join in discussions, on-line seminars and communicate to staff and other module members. Included in this is a suite of utilities for staff to enable them to manage the content of their MCC and to create learning resources. The MCC is focused on the unit of course delivery, a module, which has high salience for both staff and students. When an academic requests an MCC they get an interface with links to a module handbook, module resources, group messages, interactive seminars, a notice board, real-time chat area and a members area. Also in development for the MCC are Web Genies. A genie allows the MCC owner to create and publish a sophisticated web resource by filling in information on web pages. The Bibliography Genie, for example, builds a database of bibliographic references so that chosen items can be selected to create booklist pages and downloadable pages suitable for word-processing.

HopeLIVE is available for public access at http://hopelive.hope.ac.uk

If you would like access to a demonstration Module Communication Centre please email me at stewars@hope.ac.uk and I will supply you with a temporary password.

If you require further information about our developments please don't hesitate to contact me.

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Third Institute for Leadership in Distance Education Conference

Third Institute for Leadership in Distance Education July 23-26, 2000
The Penn State Conference Center Hotel State College, Pennsylvania

an outreach program of the American Center for the Study of Distance Education of the College of Education

For leaders with new responsibilities in distance education, including:

- Deans
- Directors
- Department Heads
- Distance Education Program Coordinators
- Interested Corporate Partners

The Institute will provide participants with the opportunity to:

- Develop leadership and management skills
- Gain an understanding of working models of distance education

- Discover and apply options in the changing technological environment
- Explore organizational and policy issues
- Create strategies to ensure the delivery of quality education at a distance
- Build an ongoing support network of peers and colleagues

Topics:

- Pedagogy and Technology
- Organizational Development
- Design and Development
- Policy Issues
- Strategic Issues

Topics will be presented by a distinguished faculty of leaders in the field of distance education.

For more information, visit: http://www.outreach.psu.edu/C&I/LeadershipinDistanceEducation/

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MEd in Networked Collaborative Learning

The MEd in Networked Collaborative Learning (Learning and Teaching via the Internet) is a two year part time, professional development course which is run entirely via the Internet, offering the possibility of study anywhere in the world. It is designed to provide participants with a comprehensive grounding in the theory and application of networked learning.

The MEd is suitable for a wide variety of professional people who wish to develop their understanding of, and expertise in, this new form of learning. Current participants include:

- professional trainers and developers, self employed or in public and private sector organisations
- teachers and lecturers in Further, Higher and Open Education
- adult continuing educators
- people working in libraries and resource centres
- open and distance learning educators and developers

Further details: http://www.shef.ac.uk/uni/projects/csnl/ or email: cpd@sheffield.ac.uk

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