Technology in Education

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Many people warn of the possible harmful effects of using technology in the classroom. Will children lose their ability to relate to other human beings? Will they become dependent on technology to learn? Will they find inappropriate materials? The same was probably said with the invention of the printing press, radio, and television. All of these can be used inappropriately, but all of them have given humanity unbounded access to information which can be turned into knowledge. Appropriately used-- interactively and with guidance-- they have become tools for the development of higher order thinking skills.

Inappropriately used in the classroom, technology can be used to perpetuate old models of teaching and learning. Students can be "plugged into computers" to do drill and practice that is not so different from workbooks. Teachers can use multimedia technology to give more colorful, stimulating lectures. Both of these have their place, but such use does not begin to tap the power of these new tools.

In this area, you will find descriptions of how computers can be used to stimulate and develop writing skills, collaborate with peers in foreign countries, do authentic kinds of research that is valuable to the adult world, and do complex kinds of problem solving that would otherwise be impossible.

Articles

Technology and Academic Achievement   Les Foltos
New research provides substantial evidence connecting the use of technology to academic achievement.

Americans Need to Know More About Technology   The National Academy of Engineering

A 2002 report.

Take Back the Afternoon: Preserving the Landscape of Childhood In Spite of Computers   David Sobel
The Director of Teacher Certification Programs at Antioch New England and Co-Director of the Center for Place-Based Education describes the importance of hands-on learning and creative activities in helping children develop their fullest capacities.

Classroom Applications:

Implications of New Media for K-12 Education   Chris Dede
Virtual Reality researcher Chris Dede's testimony to Congress on the implications of introducing new technologies in the classroom. Link to an outline of important themes and policy issues surrounding the use of information technology to support innovative models of teaching and learning.

Nanoscale Science and Technology: Connections with K-12 Education   Ethan Allen
UW professor and researcher considers the implications of nanoscale science and technology for K-12 education.

The Web of Knowledge: Vision, Design, and Practice   Patrick McKercher, Judy Bonne and Andy Rogers
A description of James Burke's Knowledge Web project and its application in the classroom.

Intercultural Education and Virtual Reality   Judy Bonne and Patrick McKercher
Judy Bonne Kane, the Director of Curriculum and Instruction for the Crawford AuSable Schools and Educational Project Director for the K-Web, and Patrick McKercher, K-Web project manager, give us an update on this project developed by James Burke.

Advancement of Science Knowledge In Language Learning (ASKILL)   John Shaffer and V. A. Lindley-Brunn
Two educational researchers discuss a project that focuses on enhancing English language acquisition at the middle school level by English Language Learners through the study of science.

Learning with the Internet   S. L. Muthukumar
A Singaporean researcher shares how to effectively use technology as a positive student learning experience.

Changing the Face of Education in Missouri   Monica Beglau
A statewide education program that focuses on the use of technology

in the classroom.

Generation Y: Student Inclusion = Technology Infusion   Sylvia Martinez
A curriculum model that combines project based learning for students with professional development for teachers.

Technology and MI   Thomas Hoerr
How technology can be used to implement the Multiple Intelligences theory in the classroom.

Linking Students with Their World: A Good Day in French Class   Nancy A. Bacon
One practical and successful application of special technology in the classroom.

Technology in Environmental Education   Clancy J. Wolf
How technology not only enhances learning but also helps students to explore and understand the world around them.

Listen Up!: Using Audio Files in the Curriculum   Tuiren Bratina, Tom Bratina and Anthony Bratina
How to add audio files to online course content.

A New Generation Meets the Ancient Mariner   Raúl daSilva
Literature can come alive for students as a sensory experience by using new technologies. The text remains intact, but these technological enhancements can provide a context which connects the work to music, art, history and more.

Harnessing the Best of Technology for an Exceptional Information Literacy Library Program   Deborah Gallaher and Sue Roberts
A library program that combines student research, technology and learning to think critically.

Working Together: Students with Disabilities and Computer Technology   Sheryl Burgstahler, Ph.D.
Special needs students can particularly benefit from the use of new technology.

What's ONADIME?   Bruce Mitchell
Onadime Composer is a software tool kit for making multi-media, multi-sensory real time interactive computer programs for teaching, learning and entertainment.

The Internet:

Lessons on Teaching Writing from Website Design Jennifer C. Stone
University of Washington Professor showcases ways that students can transfer skills used to build a website to the writing process.

Mr. Coulter's Internet Tendency: to Infinity and Beyond Brad Coulter
Veteran elementary school teacher uses online publishing to motivate young writers.

Instant Messaging: Friend or Foe of Student Writing? Amanda O'Connor
Graduate student in Educational Technology discusses the impact of "internet speak" on student writing.

The Next Generation Internet and the Schools Louis Fox and Ron Johnson
The history of the internet and a glimpse of its near future.

The Future of Learning in a New Free World and how to Build a World Wide Learning Web Gordon Dryden
New Zealand author of the *New Learning Revolution* notes that millions of teachers and billions of students continue to work mainly in isolation, yet in today's world of instant communication, collaboration is essential in order to make the most effective changes.

The Learning Space: A Unique Online Community of Teachers Bretta Beveridge
A grassroots organization uniting teachers on the internet.

Releasing the Isolated Warrior Marlene A. K. Goss, Ph.D.
What teachers need in order to make use of new technologies in the classroom.

e-Quality Dr. Miriam Masullo and Dr. Antonio Ruiz
When the internet was born, educational leaders had high hopes that access to information would make education better for everyone, everywhere in the world. Now, in the year 2000, we see that these hopes have been dashed. Too few have access to the technologies. Schools do not have the equipment necessary to make use of the information superhighway, many do not even have access to telephones, much less the internet. Dr. Masullo and Dr. Ruiz propose a new way to renew the promise of equity access to education.

People Are the Only Thing that Matter Dr. Miriam Masullo and Dr. Antonio Ruiz
The Internet and the World Wide Web are formidable forces in the business and educational environments of today. Developed countries are adopting these technologies at a very rapid pace exposing the K-12

educational environments to them. Access is not at hand for those most in need of access to education. According to our Department of Education, in the US only 14% of poor and minority classrooms are wired. Thus, even for developed countries, diminished resources, lack of educators, and safety in the schools are higher priority issues than figuring out how to make the Internet and the Web new vehicles for improved learning.

The Guilds: A New Curriculum for Education and Internet Reform
George Gorman
Could the internet become the forum for a lifelong learning program for all?

Virtual and Augmented Reality:

Virtual Reality In Education   John Shaffer
A science teacher shares ideas on virtual reality and how it could potentially enhance a multiple intelligences teaching strategy.

Learning Through Virtual Reality   Bill Winn
How virtual reality can help students learn and what kinds of virtual reality models are available now to be used in the classroom.

Augmented Reality in Education   Mark Billinghurst
A pioneer in the field of AR explains its practical uses.

Augmented Reality and Education: Current Projects and the Potential for Classroom Learning   Brett E. Shelton
More on the future of augmented reality.

Multimedia:

Multimedia Technology and Children's Development   Dee Dickinson
Implications of the technology revolution.

Technology As the Catalyst   Linda A. Tsantis, Ph.D.
The author suggests that multimedia technology (a marriage of technology and the arts) can be utilized in ways that enhance the unique characteristics of each learner.

Learning by Design: Integrating Technology into the Curriculum Through Student Multimedia Design Projects   Ted M. Kahn, Ph.D. and Linda K. Taber Ullah, M. Ed.
In order for technology to be effective in today's education system, it needs to be intelligently integrated into a rich, meaning-centered curriculum.

Multimedia Encourages New Learning Styles   David Thornburg, Ph.D.
Modern technological tools let us work with information in ways that honor the unique learning modalities of each student.

Beyond the classroom:

Using New Educational Technologies to Empower Youth: The Power of Youth-Adult Partnerships in e-Learning   Gary Goldman and Barbara L. McCombs
Tapping the resource of young peoples' technological skills can benefit the whole community.

Inventing Workshops: Hands on Technology   Ed Sobey
Project based learning outside the classroom.

Giant Campus: Experience Based Technology Learning   Maura Whalen
Teaching young people to use technology benefits students at every point of the achievement spectrum.

Technology Access Foundation (TAF)   Trish Millines Dziko
This foundation brings free computer and technology access to those who have been traditionally underrepresented in the field of technology.

WildTech Learning   Eric Christianson
What can happen when a school gets involved with the Wilderness Technology Alliance? A win-win situation results for school, students and community.

Learning to Do: Students Develop IT Projects that Deliver Service
In British Columbia, Canada, students in grades 10-12 in an Information Technology Management (ITM) course take a project-driven approach to studying information technology. Students learn to manage technology and in the process about taking responsibility for getting the job done. The teacher-student collaboration is empowering for both.

A Call to Action: A Global Youth Empowerment Society (YES)   Gary Goldman and Allen Schmieder
The authors call for young persons in America to make significant contributions to their community, thereby energizing their lives and spearheading the revitalization of schools and neighborhoods.

Campaign Against American E-Partheid   Timothy Jenkins
Timothy Jenkins believes there is a need for radically different educational interventions, and a redirecting of education dollars from

anti-crime and drug prevention programs to positive skill-building and access opportunities for all children.

Recommended Reading

Bibliography: Books for Young Inventors and Problem Solvers

The Knowledge Web   James Burke

The New Basics: Education and the Future of Work in the Telematic Age   David Thornburg

Teaching Every Student in the Digital Age: Universal Design for Learning   David H. Rose and Anne Meyer

The Internet and the Law: What Educators Need to Know   Kathleen Conn

Using the Internet to Strengthen Curriculum   Larry Lewin

Project-Based Learning Using Information Technology, second ed. David Moursund

Gene Genie   Thomas Bass

Making Technology Standards Work for You--A Guide for School Administrators   Susan Brooks-Young

Telecosm: How Infinite Bandwidth Will Revolutionize Our World George Gilder

NETS•S Curriculum Series—Multidisciplinary Units for Grades 3–5 ISTE

National Educational Technology Standards for Teachers: Preparing Teachers to Use Technology M. G. Kelly, ed.

Visual Literacy: Learn to See, See to Learn   Lynell Burmark

Related links

The Technology Source
A free, refereed, e-journal published as a public service by the Michigan Virtual University.

Internet2: Putting New Technologies to Work in the Schools   Louis Fox

The I-Generation—From Toddlers to Teenagers: A Conversation with Jane M. Healy
How technology impacts teaching and learning today.

Hoffer Elementary School and the University of California at Riverside Museum of Photography have collaborated on a creative, high-tech, multimedia website. A wonderful demonstration of the potential of the World Wide Web for showcasing student work and cooperative demonstrations (Hoffer students are also collaborating with other schools on projects including E-Mail Books.)

Long Island Consortium for Interconnected Learning in Quantitative Disciplines
Presents physics problems, calculus projects, problem sets for precalculus, multiple choice and essay questions for Calculus I- III, business/math problems using spreadsheets and calculators, and 23 math research projects.

New Jersey Center for Advanced Technological Education
This site provides two instructional modules that integrate mechanical, computer, and electronics technology: a golf course module and a fairground rides module. The Center also offers a curriculum model for engineering and science technology disciplines, professional development for teachers, competitions for students, and course descriptions.

South Carolina Advanced Technological Education
Resources for students considering engineering technology as a career: frequently asked questions, facts on engineering technology, salaries and job openings, information on creating a resume and cover letter, interview tips, and a streaming video featuring women engineers.

The Electronic School
In print format, the *Electronic School* is published as a supplement to The *American School Board Journal* and the *Executive Educator* in cooperation with the Institute for the Transfer of Technology to Education. Current and back issues contain interesting articles on using technology in schools.

Technology and Education Reform
A terrific website produced by OERI detailing the results of a nine school research project in which the effects of introducing technology were documented for students, teachers, and schools. The case studies are particularly interesting.

Virtual Reality and "At Risk" Students Chris Byrne, Catherine Holland, Deborah Moffit, Steven Hodas, Thomas A. Furness, III
As part of the educational mission of the University of Washington's HIT Lab (Human Interface Technology), students with little or no computing experience were invited to create virtual worlds using sophisticated technology. Researchers report that even novice users were able to learn to use the technology quickly enough to make classroom implementation feasible.

Journal of Special Education Technology
A refereed professional journal that presents up-to-date information and opinions about issues, research, policy, and practice related to the use of technology in the field of special education.

Learning in the Real World
Learning in the Real World makes research grants to university investigators to develop, analyze and distribute information which will allow parents and planners to make rational decisions about when and where education technology is a positive tool for children and when it detracts from their development. Go to Further Reading for a great collection of articles about technology in schools.

Support for Using Web Technologies

NCREL: Learning Through Technology: A Planning and Implementation Guide
Use the tools assembled at this site for planning, implementation, and evaluation of technology programs. Topics include: Perspectives about Education, Planning to Plan, Building a Knowledge Base, Establishing General Directions, Implementing Priorities and Strategies, Evaluating Progress, Institutionalizing. Materials are exhaustive and research based, site database is searchable.

Co-NECT Schools
Co-NECT helps schools and districts use technology for whole-school change and improved academic results. They work with schools around the United States to revitalize teaching and learning using sustained professional development. (from their introduction.)

Critical Questions

How can technology help you personalize learning?

How can technology engage multiple intelligences?

How can technology bridge the digital divide in K-12 settings?

How can technology assist the unique learner?

How can technology be used to simultaneously deepen student understanding and accelerate student achievement standards?

Possible Actions

Encourage students to use the web as a research tool on a topic of great personal interest. Give parameters for the expected product, but let the student emerge as chief designer.

Review your favorite on-line educational game or activity. List the intelligences a student would have to tap to do well. Create a multiple intelligence rubric for the piece.

Create an extended learning program which focuses on on-line learning activities that could be used to "reteach" skills which students missed in class.

Identify software/on-line learning activities which can be used to accommodate a learner with unique learning capacities.

Choose one state standard relevant to your teaching and have each student create a problem which requires the performance of that standard. Use the web to find the resources to solve the problem.

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