The Role Technology Can Play In Preparing Our Children For The 21st Century

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Overview

Now, more than ever, "computer proficiency" needs to become a top priority among our nation's parents, teachers, students, businesses and government agencies. Just as literacy has received national attention through the work of the former First Lady, Barbara Bush, computer proficiency, or computer literacy, needs to be addressed with similar high level and grassroots efforts. In fact, the two campaigns share many common platforms and, in the end, achieve many of the same goals. Computer literacy -- a familiarity with the use and value that computers, software and related technologies can bring to our everyday lives -- can provide individuals of all ages with new opportunities and open new worlds to them. Just as learning to read prepares people to work and live in the "real world," learning to use a computer as a tool plays a similar role. Computers and software can also play a major role in improving the educational skills of our youth and in preparing them for the next century. Our work has just begun. With computers, software and people working together, the possibilities are infinite.

Computer literacy: A growing national concern

A number of national studies have been commissioned in recent years to address the issues surrounding computer literacy. The goal of these studies was to gain a clear idea of just how successful we have been to date in integrating technology into our schools and helping our kids leverage it's capabilities to the fullest.

In the much publicized 1983 study, A Nation At Risk, computer literacy joined the familiar "3R's" -- reading, writing and arithmetic -- as one of the fundamental skills our children need to master. Another more recent study called Power On! was commissioned by the U.S. Congress and released by the Office of Technology Assessment. Power On! provides insight into the effective integration of computer technology tools into the classroom as a catalyst for improved learning.

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Both of these government studies reflect a growing national concern about the progress made in providing our children with the most up-to-date skills.

Of equal importance, the studies address how unprepared today's young people are to compete in today's technology age. Future Forecasting of Menlo Park, California, predicts that by the year 2010 virtually every job in America will require some use of technology. This makes it imperative for our youth to become more familiar with technology. Computers represent a classroom and home learning tool for today, as well as a strategic business tool for tomorrow. In addition to technology being an important element for maintaining and strengthening the individual learning skills of our nation's students, technology can also play a role in addressing key national concerns. Effective use of technology as a classroom learning tool can help alleviate critical problems including the rising number of high school dropouts and the growing rate of illiteracy. Because learning with the assistance of a computer is very individualized (and often more fun), students tend to be more willing to run through routine drills and comprehension exercises. As a result, educators are finding that students are more eager to sit down and concentrate on lessons using a computer than ones using more traditional workbook and textbook materials.

Seeking ways to alleviate escalating illiteracy and dropout rates has become a key agenda item for a number of politicians in the country and should continue to remain top-of-mind until solutions are identified and implemented. Literacy is a concern that cannot be solved simply by pouring more money into programs (although additional funds earmarked for literacy programs are necessary). While computer technology alone cannot solve these national problems, it can play a powerful -- and measurable -- role in helping to raise both the quality of our country's education and the learning skills of our youth. At the same time, computers have been found to help bolster a child's self-esteem and self-confidence. A 1989 Business Week-commissioned study on education in American cites low self-esteem and a feeling of not being accepted by their peers as the number one reason for high school students dropping out of school before graduation. The facts about how our students are doing at school are staggering:

- A major percentage of our population does not read or even speak English. According to Nation's Business, more than 40 million adults -- or 30 percent of the American adult population -- cannot "read, write or reason well enough to compete in today's economy" and the number of functional illiterates are growing each year by an estimated 2.3 million.
- In a survey of youth skill levels conducted by the National Assessment of Education Progress (NAEP), American 13 year olds were found to have the lowest math and science scores of the six industrial countries surveyed.
- It will take 50 percent improvement by the year 2000 for the United States to match the Japanese and Europeans in functional literacy, general science and worker training, according to Business Week reports.
- High school dropout rates in the United States are climbing at exponential rates, and have reached as high as 700,000 in one year. In some inner city areas, as many as 30 percent of American youth drop out before completing high school.

If technology is to contribute to the solution, we need to increase the number of computers available in schools. But, that is only the start. An important element of the equation is to forge partnerships among government, businesses, teachers, parents and students in an effort to use computers more effectively in education and community centers. As a team, we need to concentrate on improving the way technology is used in the classroom and in homes. This move will help promote improved learning for children, and at the same time, make computers more accessible to all youth groups, from inner city kids to those growing up in suburban America. This is what the Computer Learning Foundation is all about. A national non-profit educational

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foundation based in Palo Alto, California, the Computer Learning Foundation sponsors Computer Learning Month each October to help thousands discover the benefits of computers and software. Through events, contests, community activities and a number of books and programs, as well as national publicity and advertising campaigns, the Foundation reaches millions of North Americans with the message that computer literacy counts.

**Computer power: What it means for our kids?**

Computers offer children highly individualized learning experiences. In addition, according to findings outlined in Power On!, these individual computer experiences have proven to be more comprehensive and motivating than traditional group classroom exercises. The study notes, "elementary students who received brief daily computer-aided instruction lessons as a supplement to instruction showed gains equivalent to one to eight months of instruction over their peers who received traditional instruction only. Increases in student attendance, motivation and attention span have also been reported." Computers can also be very accommodating -- they can reach students at different study levels, any time of the day or night. Additionally, the sense of independence and accomplishment a computer offers children helps fuel their self-confidence. Relying on a computer as a tool may be one of the most effective ways to build both a child's learning skills and self-esteem.

As our children enter the workforce in the coming decades, they will undoubtedly discover -- as many American workers have during the 1980’s -- that to continue to be effective in their jobs, they need to keep pace with the onslaught of new information. They will need to continue to learn and to take advantage of new technologies that allow them to learn and work more efficiently and productively. Learning does not end once school is over. Now, more than ever, people in the workforce are returning to school or taking courses that will help them learn to use computers and software to think and create in new ways and to access information that was once "out of reach." Around the country, computers are "on the job" -- from training courses using computers for thousands of Ford Motor Company employees, to aspiring artists creating masterpieces, to physicians fine-tuning their medical skills. Every effort should be made now to introduce children to computers because computers should be a learning, creativity and productivity tool for everyone.

**Computers can take you anywhere -- Just ask !**

For both children and adults, computer technology represents access to new worlds. Computers provide information -- text, audio and graphic-based -- about new areas of learning, new places, new shapes, new worlds. They stimulate new ways of thinking and analyzing problems. With computers, people are free to "play" with the information and look at facts and ideas in different ways. While computers shouldn't eliminate the need for children to memorize their multiplication tables, they can make memorizing the facts a lot more fun. Computers add a new, third dimension to data. It's almost as if personal computer software adds some personality to routine facts. And for kids, that added zest can be the key to more productive and focused study sessions.

Increased access to information is another benefit that can be realized when computers are integrated into our children's learning experiences. Just as more immediate access to information via personal computers has been instrumental in providing Fortune 500 and small companies with business advantages over their competitors, computers offer advantages for our kids.

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Today, computer users young and old can access information through hundreds of online information and database services. And with the increased storage capabilities offered by CD-ROM technology, the computer is able to take on even more critical roles as "information grabbers" and organizers for individuals, schools and businesses. It is clear that students who become computer literate today will be better prepared to take on future academic and professional challenges with the aid of computers and software.

**Computer literacy: What is holding us back?**

With all the potential they offer, why haven't computers been integrated into regular classroom instruction and become a key part of every child's classroom learning experiences? There are several reasons -- some economic and some social, some we have begun addressing, and many that need to be tackled in the coming years.

On the economic side, computer equipment and the myriad of software programs beneficial to a child's educational development cost real dollars. Remember, just fifteen years ago, there were no computers in the schools. Now, imagine if this year, every school in the country had to buy all new textbooks and all new desks and chairs for the more than 45 million students enrolled in elementary and secondary schools in the country. The cost of doing this would be astronomical -- literally, out of control. That's what schools are facing with purchasing computers and software. Slowly, schools are building an inventory of equipment and software and making sufficient quantities available to educators and students. This trend needs to continue if computer proficiency among our youth is to become a reality.

Today, the national average of computers to students is 1:15. According to different sources, there are over 3 million computers in U.S. public schools. Additionally, over 95 percent of all elementary and secondary schools now have at least one computer for instructional use, compared to 18 percent just ten years ago. Unfortunately, these statistics mask the fact that thousands of these computers are older models and do not provide children with the full benefits newer technology product offer. While we are making strides in addressing the critical shortage of computers and software, we still need more funding to ensure that all children gain good access to computers and that the equipment they have available are current, not yesterday's technology. Plus, we need to ensure that we have several current computers in every classroom, not just in the computer lab.

However, the critical issue really comes down to: what is the cost -- to individual growth and our nation's long-term stability -- of not making sufficient numbers of current models of computers and software available in schools? Although it is difficult to measure, anyone could argue that the cost of not properly preparing our youth by far exceeds the capital costs of the computer equipment and software needed by schools to allow as many students as possible to have good access to computer and software technology.

Beyond these bottom line economic considerations, what other challenges do we face in our efforts to prepare our youth for the 21st century? Training the nearly three million kindergarten, elementary and secondary school educators in the U.S. to learn how to more effectively integrate computers into their classroom lessons is a formidable challenge. To achieve computer literacy among the nation's youth, out teachers must first become computer literate.

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In the coming decade, teachers will continue to be the key to the success of a national computer literacy program. However, because the vast majority of teachers today did not grow up in the "computer generation," a low percentage of them are comfortable with or have had formal training on computers and other exciting new technology products. The Power On! study indicates that almost two-thirds of American teachers have had less than 10 hours of training on a computer. Imagine a teacher who was unable to read, educating our children on the fundamentals of reading and writing. That is the challenge we face as we attempt to make our kids computer literate.

Business, Government agencies and national non-profit foundations such as the Computer Learning Foundation, need to continue to provide educators with the resources and support needed to fuel their understanding of and effective classroom integration of computer technology. The Computer Learning Foundation, for example, supports educators' efforts by serving as a clearinghouse of information on teaching methods for integrating technology in the classroom. The Foundation offers numerous resource guides filled with lesson plans written by educators from throughout North America.

As more and more teachers realize the potential of computers as classroom learning tools, their enthusiasm and example will undoubtedly inspire children to discover how much they can achieve with a computer. To support educators' efforts, teacher training and graduate education programs need to provide young teachers with the proper resources and information on teaching with computers, not just teaching about computers. Teachers currently earning their credentials are generally exposed to computers through courses on computers. These courses instruct future educators on how a computer works -- from identifying the parts to describing the technology behind the system. Ideally, teacher training programs should provide educators with methods and skills for integrating computer technology into all subject areas. The value and effective use of computers and software should be integrated into all methods courses, not taught only as an isolated course. Power On! points out that less than 30 percent of all student teachers as recently as 1988 felt they were ready to teach with the aid of a computer, while more than 90 percent felt they were ready to teach with "proper" or more traditional methods such as workbooks and drills. These numbers indicate a need to re-evaluate the types of courses available to educators and to strengthen the focus towards courses that provide practical information for using computers more effectively in classroom instruction. These courses need to support teachers in their efforts to better leverage what is one of the most powerful teaching tools available to our kids in recent years.

Many community-based non-profit groups are addressing the needs of the nation's "at-risk" youths. Computers & You in San Francisco and Playing to Win in Harlem are examples of two after-school programs that are introducing at-risk children to computers to enhance self-esteem and promote a positive attitude toward learning. Through corporate-sponsored programs such as "The Hartford Early Learning Partnership" (run in conjunction with The Travelers Companies Foundation), businesses are also reaching out to address the needs of developmentally unprepared youngsters through the use of computers. By bringing computers into kindergarten classrooms in Hartford, Connecticut, the program helps develop problem-solving skills and build a sense of accomplishment and interest in school activities among children at an early age.

We need to encourage more community facilities, as well as our schools, to make technology more accessible to our youth. For example, increasing numbers of schools are setting up after-hours programs in which children can use the school's computers and related technology products to expand their learning and to help them complete their homework.

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Integrating computers into the classroom

In the early 1980’s, the country's education system approached computer literacy from a one-dimensional standpoint. Rather than viewing a computer as a learning tool, a computer was viewed primarily as a technical programming tool, as an end in itself. In the classroom, the concentration was on how to make the computer work, not on discovering how the computer could work with us and for us. While learning to write computer programs involves a great deal of analytical and systematic problem solving talent, it is not the computer literacy solution for the public at large. Just as with foreign languages, some children will be more proficient in learning a computer programming language, while others will find the logic unintelligible. But, when we examine how all children will be required to use technology in their futures, and how they can best benefit from technology today, learning a programming language is of little significance.

Parents, teachers and children all need to understand the value of using a computer for enhancing learning, creativity, productivity, communications, and more. Just as schools rely on pencils, dictionaries, workbooks and textbooks in more traditional classroom settings, they should come to rely on computers as modern-day learning tools. Unlike a workbook or textbook, however, computers and software are interactive and often more appealing to a child. In fact, some software programs even have digitized sound, which even allows the computer to "talk to" and coach" the student. Other types of classroom education tools -- from a pencil or pen to a dictionary or calculator -- are used freely and effectively to augment the learning process. A pencil, for example, can be used to simply write arithmetic problems, to trace over the pattern of a leaf, or to create intricate, detailed sketches. The pencil, like the computer, can be used in an infinite number of ways. Its "magic " is completely dependent on who is controlling it.

Steps toward achieving computer literacy

What is the best approach to achieving computer literacy among our nation's youth? All of us -- teachers, parents, students, government agencies, community groups and Corporate America -- need to focus our efforts on teaching children how to use computers and software as tools in their every day lives. The computer, in this sense, is a means to an end, a part of today's education and learning solution -- not an end in itself.

In the early 1980's, following the introduction of the personal computer, many primary and secondary school educators discovered how to use a computer. At that time, schools began introducing computer courses. These courses focused on teaching computers as ends in themselves (i.e., how they work and how to program them), not as means to an end (i.e., as tools to assist with other tasks). Once proficient with the hardware, these educators went on to discover how to use a variety of software programs. This led to numerous software courses -- word processing, databases, desktop publishing, and the like. While this is a step in the right direction away from courses on computers, this approach teaches software as an end in itself, not as a means to an end.

Now, we need to take the critical third step and ensure that all educators understand the value of computers and software as educational tools, as well as the importance of integrating children's experiences with computers and software into all areas of the curriculum. We need to expose all children to using computers and software as a means to an end, not ends in themselves. For example, in writing instruction, children might be shown how to use a word processing and desktop publishing program to produce written work more quickly and to enhance the appearance of the finished product. Clearly to reach this level, educators must first have a solid foundation in

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knowing how the hardware and software operate. The ultimate emphasis, however, must be placed on how these tools can be used to enhance a child's learning experiences, at school and at home, and eventually, in business.

To achieve this, "computers" should not be just a separate course taken in the computer lab every other Friday. And, when learning about computer software, courses should not only focus on programming languages and creating the programs, or on how to operate a software program. Instruction needs to focus on how the software programs can be used in areas of student's lives, for example, in preparing a research paper. When using computers, they should enhance and add to a child's learning experience, as well as an educator's teaching capabilities. Rather than replacing teachers, the computer can help the nearly 3 million educators in this country teach things they could not teach before. Computers can help educators improve upon methods previously available to them and take students to worlds they have never even imagined.

One step toward computer proficiency is to be able to use the computer as a learning, creativity and skill development tool. With different software programs, computer users can extend computer technology in totally new and unique directions. When a student wants to really understand -- to both see and to hear -- how musical notes sound in different compositions, the computer can assist. Or, when a youngster needs to create a map of the world, the computer can assist. And, when a teenage boy needs to gather information and write a term paper on what it is like to grow up in Moscow, the computer can assist.

Making computer literacy happen

How can parents and teachers encourage children to become computer literate and prepare them for the 21st century? What activities, at home and at school, should be included in a child's program to increase computer literacy among our youth? Simply encouraging children to work on the school computers, and if possible, making computers available at home as well, will start the ball rolling. The key is to provide children with the opportunity to experience using computers and software as tools for learning and other areas of their lives. The enthusiasm and intrigue expressed by children using a computer for the first time is an amazing sensation that continues to build as the child becomes more proficient with the computer and different software programs.

The Computer Learning Foundation has identified six key areas that all children should be exposed to in using computers and software as tools -- tools for learning, creativity, productivity, research, communications and entertainment. As a learning tool, computers can help develop memory skills, offer after-school study or tutoring sessions, allow children to experiment and investigate abstract science and math concepts through simulations. As a creativity tool, computers provide access to an infinite color palette and fine-tuned keyboard which keeps children busy creating art and music. As a research tool, computers offer children access to information that wasn't available at their school or local library. As a communications tool, computers and software can enable children to share experiences with their next door neighbor or with other children as far away as Europe or China, all electronically. As a productivity tool, computers and software programs such as word processing, databases and spreadsheets can also help children work more efficiently. And, as an entertainment tool, computers and various game software keep kids involved for hours; and just like Monopoly, many entertainment programs help children develop important skills.

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The following discussion provides a more detailed look at the different ways that parents and teachers can encourage children of all ages to explore new ways of learning, creating, communicating and playing with the help of a computer as a tool.

Computers as learning tools

Memory Practice: Regardless of whether it is multiplication exercises or spelling, there are certain facts that children must learn through memorization in their early educations. And the key to learning these is memorization. Computer software is available to provide children with memory recall exercises -- from math facts to science definitions to English vocabulary words. Using a computer to practice facts is fun, which for most children means spending more time with the exercises. Computers are also infinitely patient, and (unlike many of us) will work with a child even if it takes 100 tries before they provide the correct response. Plus, children receive instant feedback -- no more waiting until the next day to see the results -- so children do not practice mistakes.

Tutoring: There are times when a student needs extra tutoring help and possibly a different approach from the way that a teacher has presented the material during class. Computer tutorials offer students a new approach to the subject, as well as one-on-one assistance. Many educational computer software programs are designed to present information in a step-by-step manner and allow a child to catch up on the steps and concepts they were not able to understand in the formal classroom setting. With computer tutorials, children are free to work at their own pace.

Experimenting: While no teacher or parent can allow children to experiment with dangerous chemicals unsupervised or to cut up cadavers to see just how human body parts fit into place, computers can. Science and math simulation software programs make these and other worlds come alive, safely, right on the screen. The programs encourage children to learn through discovery and experimentation. Even medical students rely on experimental interactive learning tools to help guide them through their courses of study. With the help of a computer, for example, medical students can run through a series of exercises that challenge them to diagnose and treat "computer" patients.

Experimenting with computers goes well beyond the science and math lab. Asking "what if" questions about historical facts can help children draw their own conclusions -- and increase their memory and understanding of the results. At the same time, simulations allow children to pretend that they were there during different periods of history. Simulations help children develop decision-making skills, which are critical for children's futures. In social studies simulations, for example, children learning about American history can actually make decisions and, from within their computers, change the course of history for a minute and see what would have happened.

Computers as creativity tools

Some students shy away from art and music because they are not immediately proficient using traditional tools. And, even though they have a wealth of creative ideas, they fail to express them because others in the class seem to be better painters or composers. With computers, all students have access to a new array of creativity tools -- from computer painting and drawing tools to musical composition and desktop publishing programs -- making it easier for them to express and explore their creativity.

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Computers as productivity tools

With computers, productivity is always on the rise. Word processing and database management programs help students, young and old, organize their thoughts and information. For example, if a high school student uses a computer and a word processing program to prepare a term paper, there is no problem revising the first page. Before computers, the student would have been forced to recopy the entire document, but with a computer, they simply key in the changes and reprint. By making written communications easier, computers can't help but boost our children's productivity and communications skills.

Computers as research tools

Here's another area that students can explore with the help of a computer and a database program. Now, pulling together background information on a topic takes on new meaning. Besides the traditional resource materials -- encyclopedias, books, etc. -- there are software and computer tools that provide students with access to online database information and research reports. In addition, there are a number of research analysis and organizational tools available.

Computers as communication tools

Like the telephone, computers have the power to bring people closer together. Through networking technology, computers across the room or across the world can be connected to allow people to communicate, share thoughts and information. Children in the United States and Russia, for example, have recently established electronic "pen-pal" relationships. Through an electronic mail program and modems, students in each country can tell each other about their activities. Through these types of electronic communication links, children can strengthen their ability to express themselves in writing and prepare themselves for the increased use of electronic communications in the workplace.

Computers as entertainment tools

Computers can be a lot of fun. In addition to fund educational software programs, there are a number of entertainment software titles available that can keep children "working" on the computer for hours. Besides just being fun to play, many games are educational in nature and many others develop eye-hand coordination and strategy skills. Played alone, with a friend or parent, these games can also help to bring people closer together, even if it is in the spirit of computer competition.

Computer manufacturers and software developers are doing their part to produce some state-of-the-art products that will help our children learn more, and just as importantly, to enjoy learning. The key for parents and educators is to increase a child's access to computer technology and encourage them to explore the possibilities. We invite you to participate in Computer Learning Month each October. Experience the benefits of computers for yourself, and share these experiences with your children. Together, you will discover the magic of computers and software as tools -- for learning, creativity, productivity, research, communications and entertainment.

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Here are some ideas to help you get started. Attend or host a Computer Learning Month activity in October at a nearby school, library or community center. Take a more active part at school and community meetings where budget decisions influencing local school systems are made. Be supportive of teacher training programs that will increase the level of computer expertise of the educators at your children's schools and will provide teachers with hands-on ways of integrating computers into the curriculum. If a teacher is excited and comfortable about using a computer, that energy will naturally be passed on to students. Help your school beat the economic realities that may be preventing more computers from being purchased -- help your school apply for grants or organize fund raisers. Do all that you can to support efforts to bring computers into the classroom, into your own home and into your child's learning experience. As you help your kids key into computing, You Won't Believe What You'll Achieve!

The computer learning foundation is here to help

Taking on technology for the first time can be somewhat intimidating. That's why the Computer Learning Foundation is here to help. We are a non-profit educational foundation dedicated to advancing computer literacy in North America. To achieve our goal, we sponsor Computer Learning Month each October which is the focus of thousands of computer learning events at schools, community centers, computer stores and businesses across the country.

To encourage people to explore new ways of using computers and software as tools, the Foundation sponsors contests for students, educators and adults and awards winners with computers and software prizes. The Foundation offers several publications to answer parents' questions about using computers at home with their children. To help educators in their efforts to integrate computers into the classroom, the Foundation offers numerous resource guides.

Located in Palo Alto, California, the Computer Learning Foundation is available to help you and your children catch on to computers. Together, we can help our kids prepare for the future -- and have fun doing it -- with computers. You Won't Believe What You'll Achieve!

About the Author:

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