



TECHNO

THE BIG IDEAS THAT
ARE CHANGING EVERYTHING

TRENDS

X-BOX FOR BUSINESS & EDUCATION PART I

BY DANIEL BURRUS, CEO OF BURRUS RESEARCH



The recent launch of the Sony Play Station 3 video game player has generated a lot of buzz due to the fact that it has the computer processing power of a multi-million-dollar supercomputer from six short years ago. However, the year-old X-Box 360 video game player from Microsoft is not only a computing powerhouse, it is far better positioned than the Sony to be used to revolutionize training and education.

How can a kid's toy revolutionize education and be used by business? Think of it this way. The games our kids (as well as a relatively few adults) are playing take them into a highly immersive, interspatial, 3D world where they often play very intensive and sophisticated strategy games. They learn how a wide variety of tools operate, in many cases weapons, futuristic vehicles, and various machines, and they develop strategies and tactics they can use to win the game. And, they don't do it alone! You will often find them wearing a head set, collaborating with teammates from all over the world. In addition, they can now use a video conferencing feature to see the people they are collaborating with in real time. *Continued on page 2*

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X-BOX *(continued from page 1)*

A BACKWARDS TIME MACHINE

After spending hours of concentrated time playing in this advanced 3D learning environment, our kids go to school, stepping into what must seem like a backwards time machine. In China, India, and other countries with rapidly developing economies, millions of families are migrating from no-tech rural areas to the cities in search of opportunity. When their kids enter the classroom, they feel as if they are stepping into the future, and opportunity. Of the two groups – industrialized nations and developing nations – which group of students is more motivated to learn in school?

AUTOMATE AND HUMANIZE EDUCATION

In 1983, I predicted that shortly after the turn of the century, technology would allow us to automate education and humanize it for the first time in history. I went on to explain in my prediction that automation seems to be the opposite of humanization, but it doesn't have to be! The key in this case is to automate the parts of education that are not fit for a human to teach. For example, anyone who has ever tried to teach a kid how to multiply knows that that job isn't easy for a human. Teaching a kid what an adverb is can give you a twitch in your face. Teaching basic subjects like these would have been much more efficient, and effective, if the student would have used an interactive electronic game that was self-diagnostic, fun and competitive. They would learn how to multiply and all about adverbs, and the teacher would then have been freed to teach the higher levels of the cognitive domain, such as analysis, problem solving, and synthesis. That is what teachers went into education for in the first place, but they get bogged down teaching the lowest level of the cognitive domain and often burned out. My old predictions time has finally come.

FIVE KEYS TO AUTOMATING EDUCATION

Over the past twenty-three years of research and experimenting, I have found that there are five elements that can accelerate learning. If the experience is immersive, interactive, fun, game-like, and competitive, the learner stays at a high level of concentration and focus, and learning is dramatically enhanced. Microsoft already has an education division, and they have a division devoted to X-Box video game development. In addition, the hardware is low cost and many kids already own one at home. All they would need to do is create games for education that take advantage of X-Box capabilities.

TECHNOLOGY NEWS HIGHLIGHTS

ARTIFICIAL SUN

Researchers recently got one step closer to a safe, clean, and virtually endless source of energy. Nicknamed the "artificial sun," the Experimental Advanced Superconducting Tokamak (EAST) is a thermonuclear fusion reactor that replicates the process by which the sun generates energy. It is part of an international program dedicated to further developing thermonuclear fusion technology. In their first successful experiment, deuterium and tritium atoms, at a temperature of 100 million degrees Celsius, were forced to collide with each other to produce super-heated plasma that gave off its own energy. The reaction, which lasted about three seconds, generated 200 kiloamperes of current. The goal is to produce a reaction that can be sustained for 1,000 seconds. Scientists have projected that fusion technology could someday provide all the power mankind would need for 100 million years or more. Just one liter of seawater contains enough deuterium to produce the energy equivalent of burning 300 liters of gasoline. And unlike fission, which produces dangerous radioactive waste, fusion technology produces very little pollution.

For information: Li Jiangang, Institute of Plasma Physics, Chinese Academy of Sciences; phone: +86-0551-5591617; fax: +86-0551-5591310; Web site: www.ipp.ac.cn

LIGHT-EMITTING TEXTILES

A new technology, ready for commercialization, is likely to make clothing and furniture the next advertising medium. At a recent exhibition, Lumalive fabrics illuminated jackets, shirts and chairs to demonstrate the flexibility and durability of this new innovation. Lumalive incorporates flexible arrays of light-emitting diodes (LEDs) right into the fabric. The LEDs

are powered by a battery and connected by superfine wires. The first generation garments feature panels that measure about 200 by 200 mm; however, they can be scaled up to cover an entire sofa if desired. The arrays can be programmed to display messages, patterns, logos, or full color animations. By simply disconnecting the batteries and control electronics, the fabrics can be cleaned, making them practical for everyday wear.

For information: Philips Research, Amstelplein 2, 1096 BC Amsterdam, The Netherlands; phone: +31-20-59-77777; Web site: www.research.philips.com

FUEL FROM FAST-GROWING TREES

Researchers at Purdue University are using genetic engineering to develop a poplar tree that could become a major alternative fuel source. The main focus of the project is to lower concentrations of lignin, a compound that prevents the release of cellulose, which is ultimately converted to ethanol in the production of biofuel. Altering the composition of lignin would also allow enzymes to more efficiently convert the cellulose to sugars, making the treatment process more environmentally friendly. A second concern of researchers is to produce trees that are genetically sterile to prevent accidental transfer of traits into wild trees. The hybrid poplars can grow up to 15 feet per year and, unlike corn, the trees can be grown in a wide variety of geographic locations year-round. The overall plans call for them to be planted in areas that are already designated as fallow, so as not to impact food production.

For information: Clint Chapple, Purdue University, Department of Biochemistry, B030 Whistler Hall, West Lafayette, IN 47907; phone: 765-494-0494; email: chapple@purdue.edu; Web site: www.purdue.edu

SMART PILL

The aim of a joint research project between Hiroshima University and a leading supplier of semiconductors will be to develop a "drinkable biosensor" for early detection of cancer, high cholesterol, and other illnesses. The system will be designed to collect data and transmit it wirelessly for interpretation and diagnosis. This new device will be made possible by the recent discovery of a peptide that can bind with silicon to integrate organic living molecules with inorganic electronics. Called the "silicon bio method," this revolutionary technology will enable the development of highly sensitive biosensors capable of detecting a wide range of molecules.

For information: Elpida Memory, Inc., Sumitomo Seimei Yaesu, Bldg. 3F, 2-1 Yaesu 2-chome, Chuo-ku, Tokyo 104-0028 Japan; phone: +81-3-3281-1500; fax: +81-3-3281-1571; Web site: www.elpida.com

THOUGHT-CONTROLLED WHEELCHAIR

A prototype system has been developed that can control an electric wheelchair by analyzing brain wave patterns. A cap, fitted with 13 sensors, is used to record the electro-encephalograph of the wearer as they think about moving left or right. These patterns are fed into a computer as a baseline for comparing the brain waves of the user when controlling the chair. The system has been found to regulate the direction in which the wheelchair moves with 80 percent accuracy. In addition to making it easier for wheelchair-bound patients to maneuver around, the technology could also be used to control televisions and other appliances. It may even find its way into video games.

For information: Kazuo Tanaka, University of Electro-Communications, Department of Mechanical Engineering and Intelligent Systems, Chofugaoka 1-5-1, Chofu, Tokyo 182-8585, Japan; Web site: www.uec.ac.jp/eng/

TURNING GARBAGE INTO BRICKS

Getting rid of waste in large metropolitan areas is a continuous headache for urban planners. But a new technology that can convert garbage into bricks, without polluting the environment, may soon be turning piles of trash into usable building materials. First, the waste is compressed and sterilized several times. Then a compound is added to solidify the material into bricks that can be used for sidewalks and pathways. The process utilizes 100 percent of the raw materials, and developers estimate that 3.5 million tons of garbage will yield about 1.4 million tons of bricks.

For information: Tiannan Environmental Protection Technology Co., Ltd., Shanghai, China; Web site: <http://english.gov.cn>

JUMPING ROBOTS!

Today's robots are capable of maneuvering reliably on flat, level surfaces at relatively slow, steady speeds, but if our humanoid helpers are to address a wide range of practical applications, they will need to be more nimble, versatile, and quick. That's why Toyota has been working on a robot that can get around obstacles in its path by jumping over them. The current prototype is a one-legged design, about one meter in length, with a knee and toe joints similar to a human leg. It calculates stable-jumping motions based on factors like center of gravity and direction of movement, and can attain a height of four cm off the ground (which is about the height that a person attains when running) by flexing and extending the knee. The company plans to develop a two-legged version that will be able to maneuver around stones, holes and other obstacles, potentially broadening the range of applications for humanoid robots.

For information: Toyota Motor Corp., 4-18, Koraku 1-chome, Bunkyo-ku, Tokyo, Japan; phone: +81-3-3817-7111; Web site: www.toyota.co.jp

"SMARTER" RFID TAGS

Radio frequency identification (RFID) has revolutionized supply chain management, safety, and security at many levels, but most smart tags are only readable from a distance of about ten feet because they derive their power from the scanning device. A new generation of signal generating smart tags may soon be available that can be read from up to 100 feet away. A built-in battery and antenna enables them to transmit their own signals so that readers can not only distinguish information from multiple sources, but can accurately determine the location of each tag. The new tags measure less than an inch on each side, and are expected to cost under \$50.

For information: YRP Ubiquitous Computing Laboratory, No. 28 Kowa Building, 2-20-11 Nishigotanda, Shinagawa-ku, Tokyo 141-0031, Japan; Web site: www.ubin.jp

TERABYTE HARD DRIVES

Expect to see the first terabyte (TB) or 1,000 Gigabyte (GB), hard drives become available this year. This is equivalent to the amount of data that could be stored on 1,498 CD ROMs. Using technology called perpendicular recording, Hitachi expects to achieve storage densities of 230 GB per square inch, which is equivalent to over 1 TB on a 3.5-inch hard drive. The information collected by the robots is analyzed to predict future ocean conditions using a process called Adaptive Sampling and Prediction (ASAP). As forecasts are updated, the investigative team can guide the robots toward features of interest. The program is expected to greatly enhance our understanding of the ocean and its chaotic behavior.

For information: Hitachi Global Storage Technologies, 5600 Cottle Road, San Jose, CA 95193; Web site: www.hitachigst.com

PRINTING FLEXIBLE CIRCUITS WITH NANOTUBES

Carbon nanotubes have long been hailed for their flexibility, strength, and useful electronic properties, but arranging them into useful patterns with practical applications has proven to be difficult. Now, scientists in Finland have come up with a simple way to manipulate these tiny miracles of science by suspending them in water and using the solution as "ink" in a commercial desktop inkjet printer. Since carbon nanotubes normally repel water, the researchers added carboxyl groups, which are attracted to water. This allowed the nanotubes to disperse evenly in the solution. They then printed designs, with lines as narrow as 70 micrometers, and illustrated that the patterns were capable of conducting electricity after multiple runs through the printer. The new method could be used to mass-produce flexible circuits for displays, RFID tags, and keyboards. In addition, the developers noted that the conductivity of the patterns changed when exposed to vapors of water, ammonia, and methanol, making them useful as gas detectors.

For information: Robert Vajtai, Rensselaer Polytechnic Institute, Nanotechnology Center, 110 8th Street, Troy, NY 12180; phone: 518-276-2296; fax: 518-276-6540; email: vajtar@rpi.edu; Web site: www.rpi.edu

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