TECHNO TRENDS
THE BIG IDEAS THAT ARE CHANGING EVERYTHING

An Education Revolution: Automate and Humanize!

By Daniel Burrus, CEO of Burrus Research

Kids these days … all the time they spend plugged in to all those video games. Isn't it terrible?

Or is it?

While many parents and teachers lament over what a waste of time video games are, they are walking past a historic opportunity. The only thing being wasted here is the true value and potential of these technological marvels. Instead of decrying them, we could be using these high-tech "toys" to create a revolution in education and training.

"Kids these days, they have no attention span…." Oh no? These games take our kids into a highly immersive, interspatial 3D world where they learn how to operate a breathtaking range of tools, including futuristic vehicles, complex weapons, and other machines. Take a few minutes to really watch them in one of these games. They pour hours into memorizing elaborate scenarios and developing the most sophisticated strategies and tactics to accomplish goals and win the game.

And they don't do all this alone. Often you'll find them wearing a headset, collaborating with teammates from all over the world, sometimes even using cordoned off sections of the screen to videoconference so they can collaborate face-to-face in complex real-time solutions.

How often do you do that with your colleagues?

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An Education Revolution *(continued from page 1)*

Blending Machines and People

In 1983 I forecasted that shortly after the year 2000 we would have the tools to automate education, and at the same time humanize education, for the first time in history. Automate and humanize? How can those two go together? Simple, automate those parts that aren't fit for humans to teach.

Anyone who has ever tried to teach a kid how to multiply knows how hard that job is. (Try teaching a child what an adverb is long enough and you'll develop a facial tic.) But set the student up with an interactive, electronic game that is fun, competitive, and self-diagnostic, and suddenly teaching these basic subjects becomes both efficient and effective. \

Does that make teachers obsolete? Quite the opposite: it frees them to teach the higher levels of the cognitive domain—analysis, problem solving, synthesis, and creative thinking. These are the parts teachers normally never get around to because they're too bogged down in the basics.

Let the Xbox teach kids about the parts of speech and free the teachers to help kids learn how to put those parts of speech together into something that has depth and meaning. Let technology teach our kids how to add and subtract and do basic algebra, and then pair them with some creative human teachers to sink their teeth into using that math to solve real problems—like how to balance our national budget.

This will free our teachers to do what it is they got into teaching to do in the first place, instead of beating their heads against the wall at the lower cognitive levels and losing their love of teaching, or even leaving the profession altogether. Even as we make education genuinely fun and engaging for our students, we can do the same for our teachers. In fact, we must.

Think Both/And

The fully-immersive, three-dimensional, fully-networked, advanced-simulation environments of gaming systems like Microsoft's Xbox 360 and Nintendo's Wii can create some amazingly powerful learning tools, not only for K–12 public education but for college-level academics and business, too. You may be thinking, "But we don't want our kids on games all day! That's not good for them." I agree. Variety is the spice of life—and learning.

So when you look to the future of education, don't think either/or. Think both/and. Either/or says either it's all humans teaching or all machines teaching. Both/and says we can have the kids using machines sometimes, and have teachers interacting with them and taking them to the next level at other times. We need both.

Step into the Future

What happens to our kids after they spend hours of such concentrated communication and sophisticated strategic collaboration in this advanced 3D learning environment? They unplug, shut down their machines … and head off to school. They must feel like they're stepping into a time machine—one that takes them backwards.

Meanwhile in India, China, and other countries with rapidly emerging economies, where millions of families are migrating from no-tech rural areas to the cities in search of opportunity, kids are taking exactly the opposite trip. When those kids enter the classroom they feel like they're stepping from the past into a future of rich potential.

Of the two groups of kids, which do you suppose is more motivated to learn in school? Do you see why we need a revolution in education? Too often adults see video games as a negative, but that's only because of our thinking. We tend to think that automation means no more human jobs, but that's not true either.

When you move past either/or and embrace a both/and mindset, you step into a future where games and education, automation and humanizing, go hand in hand and lead to real solutions to today's crisis in education and training. And that future could be happening right now.

TECHNOLOGY NEWS HIGHLIGHTS

Cyborg Rats

Scientists have taken an exciting step toward developing implants that could eventually be used to replace damaged brain tissue. While cochlear implants and prosthetic limbs are capable of one-way communication – either from the brain to the device or from the device to the brain – these latest advancements work both ways, receiving sensory inputs, interpreting them, and prompting motor neurons to respond appropriately. First, the researchers analyzed signals generated by the cerebellum of a rat in response to specific signals from its brainstem. This information was then programmed onto a chip that was wired into the brain with electrodes. They then trained the rat to blink in response to hearing a sound by combining the sound with a puff of air on its eye. Eventually, the animal learned to blink in response to the sound alone. Although the functionality that this circuit emulates is very basic, the goal is to model more complex sequences of movements. In the future, prosthetics based on these principles could be used to enhance motor function in stroke victims, restore lost memory or even speed up learning processes.

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Telescoping Wind Turbines

Traditional wind turbine design is typically a compromise between maximizing blade length to capture more wind and keeping them short enough to prevent damage when operating at high wind speeds. But a new blade has been developed that can extend and retract to adapt to changing conditions. Prototypes have been tested using a 1.5-kilowatt generator, and results indicate that the new turbine design may increase power production by 100 percent. So although they cost more to manufacture, they more than make up for it by increasing efficiency. A real plus is that the blades could be retrofitted for existing wind generators. In addition, the new design will make it more cost-effective to build turbines in areas that were previously not well-suited to wind power.

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True 3D

The 3-D displays that are available today rely on a principle called binocular disparity to "trick" the viewer's eye. By projecting pseudo-3-D images on 2-D screens, they basically generate an illusion of three dimensions. But an emerging technology called Aerial 3D generates "true" 3-dimensional displays by producing arrays of bright dots in mid-air. A system of lasers projects light from the base, exciting atoms of oxygen and nitrogen in the air above. The resulting image appears to float in space with a full 360-degree viewing angle. The device can currently generate 50,000 individual points of light every second – equivalent to about 10-15 frames per second (fps). However, the developer is already working on a system that will be comparable to basic video with a frame rate of 24-30 fps.

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Apple iCloud

When Apple originally introduced the iPhone in 2007, the company limited its use to their own apps. A year later, they enabled third party developers to build applications resulting in more than 500,000 apps and 10 billion downloads. With the recent release of the iPhone 4S and its new iOS5, they are now opening up a whole new set of application programming interfaces (APIs) that will allow developers to store and process information in a virtual cloud-computing environment. Thousands of apps have already been created, and this is expected to be the next "big thing" in mobile computing. Apple's iCloud includes not only software but hardware as well. They have invested more than $1 billion in data center servers and networks that will support the development of new apps to provide cloud-based services to their users.

For information: Apple, 1 Infinite Loop, Cupertino, CA 95014; phone: 408-996-1010; Web site: www.apple.com

Smart Traffic Management

GPS navigation units are now being used to provide up-to-the-minute information on traffic, enabling a whole new level of smart transportation services that will improve traffic management. Most large urban areas employ smart signage to alert drivers of potential problem areas, provide them with alternative routes, and advise them of expected travel times. The problem with these systems is that their sensor network is limited so the information is often incomplete or simply not current enough to be useful. Now the makers of a popular GPS unit are working with industrial and government users in 18 countries – expanding their network of location sensors to include every dash-mounted system on the road and greatly enhancing their smart sign capabilities. Algorithms on their real-time servers analyze the data from millions of navigation units and iPhone app users to provide faster response to changing traffic conditions.

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Improved Rice – for Food and Fuel

Researchers recently unveiled a genome-scale model for rice, which is expected to improve the quality and yield of this important food staple. The fact that there are more than 41,000 identifiable rice genes has complicated the task of creating hardier strains that are less susceptible to environmental changes and invasive pests. RiceNet, a Web site that is available to researchers all around the world, allows them to predict how entire networks of genes will function and interact, and is expected to speed up development of new crops. In addition, the knowledge gained from this modeling platform will improve feedstock for renewable fuels. The model will be used to study cell wall synthesis and identify ways in which fermentable sugars can be more easily extracted from plants used in the production of biofuels.

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Lab-Grown Blood

For the first time ever, lab-grown blood has been successfully transfused into a human, a breakthrough that may signal the beginning of the end of blood shortages worldwide. Unlike past attempts at creating synthetic blood substitutes, this study involved extracting stem cells from bone marrow and placing them in a "cocktail" of growth factors to encourage production of red blood cells. The cultured cells were labeled so that they could be tracked, and then injected back into the original donor. In addition to functioning as normal blood cells – effectively transporting oxygen throughout the body – the cells appeared to survive normally in the body with up to 63 percent remaining after 26 days. The advantage of this approach over artificial substitutes is that there is less concern over toxicity and safety. However, because it is natural blood it does require refrigeration, making it less desirable for use in remote areas.

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Plastic Roads

A municipality in India has found a creative use for confiscated plastic bags, since their use was banned a few months ago. Instead of littering roadways they will be used to make them more durable, especially in extreme weather conditions.The project will begin with a four kilometer stretch of road in the northeastern region that is frequently damaged by heavy rains. It will be surfaced with a combination of asphalt and the recycled plastic using a patented coating process. Cost is about the same as a conventional asphalt road.

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