



NCTI 2008 Innovators Conference

Session Title Future of Global Computing
Names of Presenters Gregg Downey, Gordon Freedman, T.V. Raman
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Summary Three panelists explored what the future holds for education, technology development, and around-the-corner solutions.

Gregg Downey, Editor and Publisher, *eSchool News* (Moderator)

The following game-changing trends in global computing give us the opportunity to affect our planet and ourselves in ways never before possible:

- **Parallel computing** – having several computers simultaneously work on a single problem to process vast amounts of data and come up with one unified outcome. The current challenge lies in developing the software programs and specialized computer chips necessary to do this work. The power of parallel computing should help us to do things like predict global weather patterns, understand how diseases spread, and see how students' brains react to specific instructional techniques.
- **Cloud computing** – a poetic way of referring to software that runs on remote servers accessible via the Internet or a similar network rather than local servers. Cloud computing not only will liberate corporations from the need for locally located servers and maybe even in-house IT departments, but it also will accelerate the development of massively parallel computing.
- **Brain mapping** - Using functional magnetic resonance imaging (or fMRI) to look at the different parts of the brain that are activated when exposed to different kinds of information. It now is possible to observe the relationship of sensory input such as instruction with brain activity and then correlate that observed activity to learning outcomes. The goal of this work is to identify practices effective with individual learners and thereby, eventually, increase the efficacy of instruction.
- **Global dis-assembly line** – the physical-world equivalent of parallel computing. Rather than bringing all the necessary parts needed to manufacture a good, such as a shirt, to one location and working on them in a coordinated sequence, the global dis-assembly line refers to the ability to have different steps of assembly accomplished all over the world and brought together into a final product to be sold. This requires using sophisticated technology to track the process and keep everything on schedule and within budget.

Nearly all the trends just describe and many others besides rely on technology and on persons who understand technology. That, in turn, requires effective education. Education is the only way the United States can hope to keep up in our interconnected world.



Gordon Freedman, Vice President, Education Strategy, Blackboard, Inc.

Taking a Look at Higher Education, K12, and “K-20” Globally

What are some of the impediments to global computing, and where are we going? In talking to leaders in education and government around the world, the trends around this that I’ve seen are both accessibility AND access to education, as well as K-20 connections, and the lack of universal concern in universities about k-12 education.

There are giant repercussions of globalization and none of them have been explored very deeply; interconnectedness is both good and extraordinarily challenging. Information technology has reshaped every aspect of the world except “schooling,” which was designed for the industrial society. We now live in the information society and operate in a global knowledge economy which shifts the burden of educating from institutions to individuals. Think about education in broader terms – it’s not a place; it’s a state of mind.

In the U.S., we have a hard time seeing ourselves as being a part of the rest of the world and, therefore, feeling the need to be competitive the way the rest of the world, including the U.K, does. Because we don’t have a ministry of education and the resulting policies for where we want to go like many other countries do, we also don’t have a policy for where we want to go like they do. We have some remarkably great examples, and we have some wildly horrible examples. The great examples, however, don’t necessarily scale very well. In education, failure travels like lightning but success is held very close. That’s a problem we need to solve.

We are unique in that we can measure what’s going on with our child – that is something that’s not happening in other countries.

In Mexico they are trying to put a state backbone in place that carries a student from youngness to college to the workplace. The world outside the U.S. is clearly moving to a model of investment – which is not a cost - in *human capital*, rather than focusing on *schools*. In the U.S., we have been investing in the wrong places.

No country takes human capital more importantly than China – they are beefing up education because they want to become the Human Resource department for the world. There are some barriers, but it’s very interesting where they’re going.

We’re talking about education innovation, not technology. The sooner we pull the T out of education, the sooner we can move forward. It has to be seen as moving from the “school” to “education.” We need to look to innovation, connection, and reach.

So where does the future lie? We have to individualize - moving from educating classes to educating individually, and generalize – utilizing a type of super-portal that provides easy access to all the programs and resources that have been approved for use.

Finally, accessibility is a global goal; providing the path of least resistance to the most knowledge for the most people - fusing access and accessibility - has to be the goal for all of us.



T.V. Raman, Computer Scientist, Google, Inc.

How does technology create possibilities and what does technology enable?

Accessibility is about recognizing that each one of us is different. The one size fits all solution doesn't really work *well* for anybody. If you think about accessibility as building interfaces that work really well for your particular needs, you often discover that you have to separate out the user interface from the actual piece of functionality that you're providing. It's important for all of us to understand how the www works – because the world wide web succeeded due to its simplicity of communication.

A lot of us think of the web as being synonymous with the browser, but a browser is simply a lens from which we view the web. Separating out the user interface from the underlying application is one of the biggest prerequisites in creating solutions that are innovative. Through the world of cloud computing, we have opened up this possibility to no longer be so hard and cost-prohibitive. The technology has become a bit messy as it's evolved, but it's incredibly empowering. The pace of innovation is very rapid.

The world wide web started as a place of global text documents. Over time we added interactivity and style sheets, which allowed us to sep. how things look to what they are – this used to be hard but now it's changing and is very easy.

We all come with different abilities to interact with the world and use different peripherals to aid us, which changes our level of interaction. True innovation, vs. invention, is when you step back and ask, what actually is the right thing for a blind person to actually be completely effective?

Nobody says use the same interface you use on your desktop with your mobile phone, because it just wouldn't work. You would throw it away, because you have what I call a very high level of indignation. My goal in accessibility is to also raise the threshold of indignation for blind users, because currently, our level of indignation has been pushed down to be remarkably low: "Deal with it – before you didn't have anything at all, and now you have something, so deal with it."

As a blind person, you would rather use the power of a computer to be put towards powering the functions you can actually use, not creating colorful windows that slide across the screen. Cloud computing has allowed this to be possible. We have separated out software applications. The head is the interface, and the body is the application, and you have enabled peripherals with different abilities to manipulate the same data. This is very empowering, and allows you to look at it very differently. Now using cloud computing, we are not just collaborating with our peers, but collaborating by manipulating the same piece of data using the modalities, peripherals, and abilities that best suit each of our needs at any given time. This is one of the biggest wins and attractions of cloud computing.

The rest of the world has moved all the data to the cloud and left only the interface with the client. The web used to be thought of as a place of documents but it is now thought of as a place of applications – this is the evolution of accessibility.



What does Web 2.0 and cloud computing mean for accessibility? In the past, accessibility has been very challenging because we've been struggling with software from the previous generation that was installed on the PC. With the new technology, in the next ten years, we will be able to use this technology to deliver the augmentation that a blind or deaf user needs *over the web*, rather than needing to install those applications on the devices being used. Now, every piece of content to which you add any interactivity becomes an application.

Applying the technology in the way that has become empowering for mainstream users can also become empowering for user with special needs – using the web to deliver and consume accessibility.

Discussion

John Williams: When the US. wanted to put a man on the moon, it assembled the best of the best minds from a diverse variety of fields. Is that type of program needed to refocus on our educational priorities to compete in a global economy?

Gordon Freedman: It is not only necessary to compete, but it's going to be necessary to survive - it's the grounding of our entire society at this point. The competition is much more diffuse now, and it's harder to say what it is. The first issue should be survival and growing and maintaining our lives and hoping we're competitive as individuals.

Gregg Downey: I agree. We have not invested in the appropriate way in our education for a very long time. I'm optimistic that the new administration has a better understanding that our education is a national asset that we need to finance the way we finance the military and other issues.

Dale Brown - Has there been any research on how people with cognitive disabilities deal with search?

T. V. Raman: That is a difficult question to address given privacy concerns but very interesting at two levels. The first level is, how do you phrase a query, and the second level is, how do you present results? The typical phrasing and the presentation of results might not be most appropriate for someone with a cognitive impairment or even without. If you go to www.google.com/experimental, you can see experimental presentation designs for results (organized by timeline, geography, etc.). I would welcome people in the field to come up with ideas for better ways of doing these things for individuals with cognitive disabilities. I'm convinced there is a lot that can be improved upon, but I'm personally not sure specifically what that would be.

Ge Vue - What can we do to make the path to accessibility ubiquitous - can you elaborate on moving accessibility to the cloud?

T. V. Raman: Two levels. Firstly, we've been able to learn from rules from the last generation that still apply. Secondly, with cloud computing, it's no longer prohibitively expensive to build the right thing for any given user. With the variety of different devices, such as mobile phones, etc., used now by mainstream users to view applications, having just one particular pre-determined presentation just won't work anymore. So we have the



opportunity and motivation now to design applications that are configured *on the fly* to work well for a diversity of modalities - because doing so now would meet a need felt by a much larger percentage of the world's population.

Mike Stinson: Ninety-five percent of media on the Internet is not captioned. Could cloud computing affect this problem?

T. V. Raman: Cloud computing definitely helps. The model I think that would be most effective over time is a combination of automated recognition (not perfect, but an 80/20 solution that also helps with indexing and searchability) and a Wikipedia-like creation for captioning (which would have to be driven bottom-up from the Web community). It is too hard to be able to force all people to include captions when they create video, but if you get the content on the cloud and make it easy for people to go in and proactively caption, I believe they would be excited to help others. It all goes back to collaboration.

Gregg Downey: Also, Adobe is doing good work with this. If you send your video to them they can help you get it captioned. A government requirement around captioning documented on a website (the requirement exists, but it is not actually implemented) would also push this issue forward.

Larry Goldberg: In addition to videos that are not captioned, there is a also tremendous amount of other learning objects that Blackboard supports that could be tagged with metadata for search for students who are looking for specific types of modalities.

Gordon Freedman: My hope is that this time we can do it with this new government; not just Blackboard but in general. It shouldn't be a big problem – and it would be a great thing to get a definition around in project through a body like this, at this conference, that is working at education success.

T. V. Raman: The real contribution of having the government requirement is not as a stick that makes people do it, but respective awareness.

What those of us that work in the space have to do is to identify technologies that will *automate away* the problems that we currently need individuals to help us with and are trying to regulate; relying on individuals is never going to efficiently scale to the pace of growth on the web.

Rebecca Ronstadt: You mentioned the concept of a “super portal” and the concept of giving individuals the opportunity to manage our own education. In the healthcare industry, we haven't really been able to achieve that. Would it really work for education?

.Gordon Freedman: Individuals are frustrated with the services in both of those arenas. There are many barriers but there is also a lot of pent up demand in both arenas – and part of the task will be tapping that. I think we can do it but we need a bigger voice.