

ROUND ONE

ROUND ONE

WHAT ARE WE DOING TO KID'S BRAINS WITH TECHNOLOGY?

Boxer 1: School teacher-wary of the effects of technology.

Boxer 2: Technological researcher University Level-wants school to be compelling, like a video game.

1- People like you are causing the problems kids have in school today. Normal brain development is not happening. Kids come to school unprepared to learn. Their attention spans seem to be shorter every year. It is obvious that their brains are changing and not for the better. Neuroscientists will tell you that environment plays a role in shaping brain structure. The area of the brain that is stimulated grows. I believe we are becoming unbalanced in this age of technology. Kids are getting too much visual stimulation and immediate gratification. Television is a major cause of this. No wonder they call it the boob tube. All of this new technology that you are pushing on kids is just as harmful.

2- Yes, children's brains are changing, but for the better. You are absolutely wrong when you equate television with other modern technology like computers. Television is passive. The person watching does not have to interact at all with what happens on screen. There are many studies that show negative effects on children from excessive television viewing. Computer technology is different. It is interactive. Most researchers agree that active interaction and interest is essential for real learning. That is where video games come in. Maybe we just need to design some really motivating video games and let kids play them anywhere anytime. No concern about their attention spans there! Have you seen kids at an arcade? They can go on for hours!

1 - Video games only teach mindless violence! How are kids going to learn to get along with each other? They don't know how to talk or to listen. They clearly do not listen to adults. Their ability to use and understand language is deteriorating. It's almost like they need to punch someone to be understood. We are the adults. It is up to us to guide children in appropriate ways of relating. We know that it will be important for the future of our planet and the human race to be able to communicate with each other. Video games will not help the next generation to do this!!!

2 - Video games may not encourage language development now, but we are just at the beginning of the development of really compelling software for students. New software will encourage collaboration and develop the global awareness kids need. Be-

sides that, language changes. It is only a tool to meet our needs. It is quite possible that the types of graphic communication we see now on the World Wide Web will be our future language. Many people think that the traditional definition of literacy should be changed to include Technological Literacy. If that happened people like you would be illiterate!

1 - That is nonsense. Pictures will never communicate as precisely as words can. Each viewer interprets them differently. The use of more graphics can lead to fuzzy thinking and poor communication. Vygotsky, a Russian neuroscientist, who was way ahead of his time wrote that the higher forms of thinking would be difficult, if not impossible with the absence of language.

2 - Vygotsky may have been ahead of his time, but he passed away in 1934. We cannot use his theories to talk about the technology of today. The use of e-mail and the World Wide Web are making dramatic changes in our ability to communicate easily over the globe. Students can learn about a country and then almost immediately write questions to someone there and receive a response. We can see pictures of events that occurred yesterday or even this morning on the World Wide Web. This is an astounding development in our ability to communicate and to teach.

1- The same thing was said about radio in 1941. Here is a quote: “We are living in a time of accelerated change...we must recognize radio as an avenue of communication; it can help students to be intelligent about important events...; it can buy them the good things of life; Radio will ultimately be used as a substitute for certain teacher instruction.” How many radios are used for instruction in classrooms today, or even 20 years ago? In our rush to get the newest thing we may be making mistakes that will cost us in the future.

2 - Are you crazy!?! We cannot even compare radio to the technology available today. Only with the help of technology will we ever be able to really understand how the brain learns. We may make mistakes, but we cannot afford to wait until we know everything. The great thing about humans is that our brains have plasticity. They can be remolded to function better in various situations. If we make some mistakes with this generation, it will be corrected in the future. That is why humans have survived so long as a species.

1 - Are you saying that it does not matter how we teach kids? We cannot afford to mess up even one generation. Neuroscientists teach us that there are 6 layers of neurons in the brain which develop as children grow. If the early structures are not built correctly, later layers will have no foundation to build on. I think that is why more

and more children are having difficulty with reading and comprehension as they get into the upper grades. The neural foundations they need for comprehension are not there.

2 - I still say that the brain is something we cannot fully understand. Only further development in the area of technology will allow us to really know how it works. In the meantime we cannot keep teaching students in outmoded ways. Schools were designed for an Agrarian/Industrial society. They resemble factories more than anything else. You put a kid in at one end, put in the appropriate facts during each year and at the 12th grade he/she is supposed to be educated. We are not living in an Industrial world anymore. This is the Information age. Kids brains may be changing, but it is not a bad thing. It is a process of evolution. Kids are actually adapting to changes in society. It's teachers and schools that are not adapting. Research does need to be done on the changes in learning that occur with interactive technologies, but only while systemic reform goes forward. Then tomorrow's schools really can profit from improved understanding of learning.

ROUND TWO

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HYPertext/HYPERMEDIA

Boxer 1-pro hypertext/media-anti-linear/paper

Boxer 2-pro linear/paper-anti hypertext/media

1. Books are on their way out. In a decade or so they will be obsolete. We shouldn't be asking IF we can do everything from a computer screen, but WHEN will we do it, HOW will we do it, and HOW can we make it great. Right now much of human literature has been digitized and can be accessed by computer. A lot of it is posted on the World Wide Web and can be accessed for free. Just think of the possibilities! Even now we can search all of Greek Literature and soon all of the worlds best literature will be available online! We will have the power to easily search, compare documents and draw conclusions.

2. It infuriates me when people talk like that. It is just idiotic to think that hypermedia is better than paper media. Educators today are struggling to teach kids who have a processing overload. Kid's brains just cannot deal with the amount of processing it takes to read classic literature anymore. The language is different, the context is different and then you want to add in making decisions about what order to read the text in? Hypermedia has been shown to add to that processing overload. Not only do students have to do all of the processing that is required by linear reading, but they also have to keep track of all of the jumps to different branches that they have done. Reading hypertext can be confusing.

1. Research has shown us that readers prefer to use hypertext. They like having control over the text and the order in which they get information. They can overcome the processing overload.

2. People like what is easy. Hypermedia seems easy because it is entertaining. Just because it is non-linear and supposedly more like the way we think, it has been hailed as the future, but books like cookbooks, encyclopedias, and dictionaries have always been non-linear and are very helpful. Does it make sense to read a Greek philosopher in a non-linear fashion? How can anyone follow a logical argument if they jump from here to there depending upon what seems interesting? Books serve a purpose that hypermedia cannot replace. They will be with us for a long time to come.

1. You are way behind the times. There is no way that books can keep up with the information geysers of this time. Every five years the amount of accessible information doubles. We must develop a powerful tool to help us manage this information.

Hypermedia is that tool. It is helping us to make huge advances in many areas. Take the Human Genome project as an example. "The U.S. Human Genome Project (HGP) is the national coordinated 15-year effort to characterize all the human genetic material--the genome--by improving existing human genetic maps, constructing physical maps of entire chromosomes, and ultimately determining the complete sequence of the deoxyribonucleic acid (DNA) subunits in the human genome." (http://www.ornl.gov/TechResources/Human_Genome/home.html) (current-November 30, 1996)

Hypermedia is one technological tool that allows such a huge and diverse database to work. Without powerful tools like hypermedia we are severely limited in our ability to use all of the information that is available to us now!

2. What about kids today!!!! Hypermedia is keeping them from really learning to think. In many schools Hyperstudio or some similar program is used as a way for kids to do projects. Kids spend so much time learning how to take digital pictures and incorporate them into reports that they have no time to really learn to read and think about the subject they are researching! Some hyper-reports I have seen are exhibits of poor thinking, but they are paraded proudly through classrooms and schools.

1. Wrong! Wrong! Wrong! Hypermedia is necessary to allow the next generation to manage all of the information that will be available to them and is already available. What is wrong with them learning to use a digital camera or to manipulate digital media? This is the only way they will learn to wisely evaluate the masses of information which will come their way during their lifetimes. Besides that, kids love to use hypermedia. Some kids who would never crack a book spend hours before school and after school working on a hypermedia project...And don't think that they aren't doing research and reading for these projects. It is amazing what kids are learning through this media. Hypermedia also lends itself to working with kids at many levels at the same time. Students who have an easy time with learning can take a project and run with it. Slower students are able to contribute at their own level without doing inferior work.

2. Our educational system is in crisis. Kids are not learning to read. They are not getting the basics. Hypermedia may be motivating, but it just allows for fuzzy thinking. There is great value in linear thinking. Would you like to listen to a hyper-version of one of Beethoven's Symphonies? What about picking and choosing in one of Shakespeare's works? Linear thinking is hard work, but it is truly valuable.

1. Hogwash! We are living in a different century and a different world. Of course Beethoven's Symphonies sound better when listened to in a linear way. But we don't all want to return to life in his time...it was horrible. We have to look to the future.

Kids are learning to think in a new way in response to the massive amounts of information available to them. They will be able to create magnificent works in linear and non-linear ways in the future. The argument you use is backward thinking; we need to be forward thinkers. As hypermedia develops we will find that it will have it's own grammar and narrative point of view. People of the future will be able to evaluate hypertext just as people today evaluate text. The junk will go the way of all junk, but the masterpieces will remain, just as Shakespeare has outlived his generation.

2. I, for one, will not allow myself to be mystified by new technologies. I am not going to waste precious classroom time with digital cameras and teaching technology. My students will learn to think and to express themselves in logical ways. Students need more structure. Without structure you cannot tell what is being learned!!

ROUND THREE

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WHO WILL MAKE DECISIONS ABOUT DESIGN OF EDUCATIONAL TECHNOLOGY?

Boxer 1 - A researcher for the R&D department of a prominent Video Game company

Boxer 2 - An educated parent who has opted out of our technological world and does home schooling.

1. Our company has a great deal of experience in developing video games. We know what it takes to keep kid's attention for hours on end. If we just integrate some educational content into our games we can improve education. In fact, we dream of reinforcing the entire curriculum with appropriate learning aids.

2. Horrors! That is just what I am trying to avoid. I think that video games foster values diametrically opposed to the ones that are important for our children. If we are going to infuse our classrooms with technology someone needs to be researching what effect it will really have on learning.

1. The problem is that no one really knows how to do that research. We can observe what kids do when they are given an opportunity to use computers, but the scientific quantitative approach of research cannot be effectively used with the application of technology. You cannot possibly quantify all of the things that happen when good educational technology is introduced into a classroom. It is impossible and undesirable to control all of the variables that can occur. If you do try to make only one area measurable, you actually change what happens and ruin the effectiveness of the introduction of software. Research is also very expensive. That's why our R&D department is able to make such progress. Our company puts a great deal of money into finding out what kids like.

2. That is what scares me. If we ask ourselves who has money to fund research in this area we can come up with two major sources: the government and commercial interests. So far the government has made the most progress in technology when it has to do with defense and creating new war machines. Commercial interests obviously have their profit margin at the top of their list of priorities. Can either of these funding sources adequately serve children?

1. You should not be so cynical about either source of research. Our company has the interests of children in mind. It would hurt our profit in the long run if we didn't.

Anyway, it doesn't really matter why research is done in the first place. The results will eventually filter down to the correct places. Take Semour Papert for example. One of his goals in life is to "steal technology from the technologically privileged and give it to the children". Research is just like technology, amoral in itself. How the research is used is what matters.

2. I don't believe that commercial interests are really altruistic. It does matter who is framing the questions that get asked. We need to be thinking as a society about who forms the questions and the answers when it comes to technology.

ROUND FOUR

ROUND FOUR

THE QUESTIONS NO ONE WANTS TO TALK ABOUT

Boxer 1 - Rapid fire questions regarding the effects of computers on the environment, inequality...etc...

Boxer 2 - Trying to avoid the confrontation.

1. No one seems to want to talk about the negative impact of technology on the environment. The Silicone Valley in California where most computer factories are is having serious problems with toxic waste.

2. Can we change the subject?

1. And what about the short useful life time of all of this computer equipment. We've learned to recycle glass and paper, but what about metal cases, wires and outdated computer chips?

2. I prefer not to talk about that.

1. What about the energy impact of becoming more and more dependent on this equipment? Many schools have had to double the number of electrical outlets in order to run the equipment and the air conditioners to protect the equipment. We haven't yet solved the energy crisis. Fossil fuels are a limited resource and damage our atmosphere, yet we don't seem to be concerned about a more permanent solution.

2. This is hardly the time to discuss this.

1. Many societies in the developed world will not allow the pollution caused by computer factories to invade their territory. Yet they want the benefits of technology. Who suffers...the poor third world. There are horror stories of pollution and underpaid workers in factories in other countries where technology is a far off dream for the people themselves.

2. The poor we will always have with us.

1. The gap between the haves and have nots of the world is increasing partly because of technology. This problem exists between schools in rich and poor areas in our country and also at a global level.

2. There are other more important matters

1. No one seems to want to talk about some of the hard questions. The excitement about all of the possibilities offered by new technology seem to keep us from dealing with the unpleasant side of the issues. I end with a quote from an advertisement “New technology is exciting...it can also be expensive, inefficient and exactly what you don’t need.”

2. I’d rather talk about that at a later time.

ROUND FIVE

ROUND FIVE

TECHNOLOGY AND SCHOOL REFORM

Boxer 1 - A proponent of school reform and restructuring of the curriculum.

Boxer 2 - A proponent of changing schools by looking back to what was successful in the past.

1. We are not here to agree, but I want to start out with one point we agree on. Schools today are in trouble. Our educational system must change radically in order to be more successful at educating children. I believe that technology is the key to restructuring the curriculum and changing what happens in our schools. Study after study has shown that the things that change in a classroom when technology is used effectively are the same things that researchers of educational reform are calling for. Those things are: increased collaboration between students, teachers becoming facilitators and coaches of learning rather than sources of knowledge, students in charge of their own learning and motivated, more authentic subject matter and deeper levels of interaction with the material (not just memorizing facts).

2. Schools surely are in trouble, but it is precisely because of this quest for new technology. Kids in the past learned well how to read, do math, spell and write. The need for those basic skills has not changed. Teaching those things is affordable for a school. Technology is not affordable. Keeping up to date with technology can cost a school district 7-10% of their budget in a year. Where does this money come from? Not only that...technology is constantly changing. There is one school system I heard about that has 1600 computers and a network for their 3500 students. Unfortunately,

learn the same thing? Modern science museums like the Exploratorium in San Francisco have a lot to teach us about how to teach students in interactive ways. In our society there are institutions that can keep up with technology. Maybe our goal should be to place students as apprentices in these places rather than keeping all children in a school building from ages 5-18.

2. You are forgetting one of the most important ingredients to a good education: Teachers. Studies in the past have tested all of the variables in helping students to learn. Out of all of the things that researchers were able to change and manipulate the only thing that made a consistent difference in education was good teachers. Whatever happens it must be teacher-centered. Teachers were bypassed during the early introduction of technology. The applications that schools bought were all student oriented. A teacher was viewed with suspicion if he/she were using the computer too much for personal productivity. We have to change this mind set and allow teachers to have a role in designing these reforms. They are the experts on the practical aspects of how kids really learn.

1. Allowing teachers to make these decisions is dangerous. Teachers' use of technology has not made many real changes. We can look back to past attempts at integrating technology and see that it never really changed the way things happened in the schools. Technology just became an add-on to what was already happening. Teachers have a stake in keeping things as they are. They want security and comfort. For true reform the challenge is not to use technology to do an old job better, but to do something new.

2. Teachers are tired of being told to keep up and not being trusted. There are teachers who have been working to be current with technology in their classrooms for many years. They have struggled to use Commodore computers, Apple IIs, early 286 PCs, and the MacPlus. They have been told to teach Basic, then Logo, then to forget programming and use the computer as a tool, then to connect to the world and to integrate multi-media. All of these changes meant writing grants to get new equipment, going to training classes, purchasing new software, and learning how to implement the software in the classroom. Things keep changing. It is impossible for educators to keep up.

1. If teachers are fed up they should quit. The ones who have tried are at least moving into the Information Age with the rest of the world. Some thinkers say that we have already moved from the Information Age to the Communication Age. Students need different skills now than they did in the past. It is not good enough to know how to read or spell. In fact, many of the skills we thought were so important for schools

to teach are just not that important. Kids now need to know how to ask the right questions and how to search for answers. They need to be able to evaluate information and how to apply it. These are abstract skills and will have to be taught and assessed in different ways than we used in the past. We can no longer teach all of the knowledge that students need in the future. We have to teach them to learn. In order to do that we have to be learners ourselves. Howard Gardner said, "If we have no trouble in gaining access to limitless amounts of information it will only make it more difficult to decide what is worth paying attention to and how to use it productively."

2. The bottom line is that American students' test scores are dropping at an alarming rate. Kids are dropping out of school. They are not learning how to read, so how can they reason about what is important?

1. Assessment itself needs reform. The tests we are using today were created to measure things that we no longer teach. New forms of assessment need to be created which more adequately measure the real learning taking place in the classroom. New technology is also needed to make this a reality. In the past students took a few numbers with them from standardized tests from school to school. In the future we need to use technology to allow students to create a more well-rounded picture of all that they know. It should be able to take in audio and video samples as well as text.

2. Test scores are test scores. You cannot explain them away in this way. Changing forms of assessment will not change the fact that too many high school students are not ready for a job or college when they graduate, if they haven't already dropped out. It is impractical to talk about kids taking audio, video, and text samples with them from place to place. We have been brought up on the myth that almost any problem can be solved with a technological solution. In education this assumption is dangerous and in terms of technology it can be disastrous.

1. You cannot deny that technology is changing our society and culture. We do not only use the tools that we have in society. They also form us. Recent world events like the breaking down of the Berlin Wall, or the revolution in Tianamin Square in China would not have occurred without the availability of information through telecommunications and fax machines. Students need to be empowered by technology because our world is a different place than it was when we were kids. Education today needs to be based on our information driven society. We need to prepare students for a future of unforeseeable and rapid change.

2. You are trying to rush reform. It takes time. As computers permeate our lives the changes outside the school will cause the schools to change. If we rush things schools

will spend lots of money for very small results. Real change will happen at the level of the people who work with kids. When they drive reform there will be success.

1. Lack of money and will to change can slow the revolution, but will not stop it. American culture is increasingly influenced by Information Age Technology. It would be good if educators who care for kids could keep ahead of the wave and help design how it influences education. The exclusion of computer technology from the process of planning, managing and implementing curriculum maintains the old instructional models and makes change very slow.

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Environmental Effects

These web pages are only interesting in the fact that the problems I am exploring are not even mentioned. In all of the searching I have done very little has been said about these issues. It makes me wonder if I am crazy in bringing them up!

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