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Designing Educational Computer Experiences That Are Positive, Meaningful and Engaging

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Introduction

Imagine a 13-year-old child who hates school. Many of you might know 13-year-olds. Some of you may currently have a 13-year-old boy or girl in your house. You might know a 13-year-old in your neighborhood. Many of these children may like school. Some of them may be indifferent to school, and when asked how they like it they might respond, "It's OK."

Don't think of those 13-year-olds right now. Imagine one who hates school.

Imagine the student who, when he chooses to attend school, shuffles with a great deal of effort to the back of the class, heaves his reluctant body into the desk, exhales a profoundly disinterested "huff" as the bell rings and then proceeds to do anything to pass the time until the class is over. Sometimes this involves pulling out a Walkman. Sometimes it's getting into a fight. Sometimes it's sleeping. Very often it's talking loudly despite being told to be quiet and pay attention. Sometimes it's telling the teacher to shut up and on occasion to go to hell. Sometimes it's telling the principal to go to hell. Many times it's, as you can well imagine by now, staring blankly at the peeling plaster of the dean's office in the basement of the school for hour after hour doing absolutely nothing at all except, of course, wishing he was anywhere but in school.

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If you can imagine this 13-year-old, then you have a picture in your head right now of the boy I tutored for four years. His name is Kevin, and the story I am about to tell you is about a particular evening we spent together at a tutoring program in Cabrini Green in Chicago some three years ago. This particular Tuesday night, Kevin taught me a great deal about learning. To be honest, I did not realize it at the time, but looking back I fully believe that just about everything that educators need to know about creating effective learning experiences—be they in a classroom or on a computer screen—was contained in the brief two hours that Kevin and I spent together that night.

The story I am going to tell you I believe has many important components about learning that our society needs to understand and learn from. But for the purposes of this paper, I am also using this story as a delivery mechanism. The purpose of my submission to this University of Chicago conference on computers and society is to relate to you my opinions about how to create effective learning environments.

The focus of this conference is on computers and their role in our society. Schools and other places of learning certainly play a vital role in our society. And in this paper I will outline what I believe to be the core design elements that make up effective learning environments—including those that are delivered on a computer. These core design elements are fundamental pieces that should also be present in any learning environment.

One of the many questions we are considering at this conference is whether or not games can help us learn. We have been wondering for years whether games—specifically those delivered on the computer—can serve as a viable way to instruct. Recently, the role of computers in schools has been called into serious question. Are they harming our children? Are they causing irreparable damage that we are not aware of? Should we keep computers away from children until

they reach a certain age? Are schools wasting their money on all of this hardware and software?

My opinion is that under the right circumstances computer games can serve as a viable way to deliver instruction. The emphasis I would place on this statement, however, is on the phrase "under the right circumstances". Placing a child—or a learner of any age for that matter—in front of a computer in no way insures that learning will take place. Similarly, merely placing a student in a classroom in no way insures that learning will take place. In either circumstance, great attention needs to be paid to what makes up the learning environment. Certain core essential elements must exist to best insure that learning can occur.

My beliefs are grounded in my experiences, not in the data derived from research. I have not conducted research on the topic of children using computer games as learning tools. My experience in education comes as a journalist, a tutor, a software designer and, at present, as a consultant. The opinions I express come as a result of my observations. For the purposes of this paper I will concentrate my observations on those I made during the single night I have mentioned at tutoring three years ago. The narrative, I hope, will tether my paper in experience and prevent it from floating away into strictly theory.

Positive, Meaningful and Engaging

A learning experience—be it on a computer screen or in a classroom—must be positive, it must be meaningful and it must be engaging. My belief in these three terms comes from the vision statement of my former employer, interactive software design company Jellyvision. The terms "positive, meaningful and engaging" are part of Jellyvision's mission statement and part of its vision for interactive design. Although I am no longer a member of Jellyvision's design team, I still fully believe that the core components of its vision for creating interactive experiences are both inspired and highly effective. The company

began its work in interactive design as an educational software company to deliver learning experiences for children in school. In this paper, however, the context in which I use these three terms goes beyond the scope of how we used them at Jellyvision. It is my intent to identify the fundamental characteristics of these three terms and answer the important questions of what is positive, what is meaningful and what is engaging in a learning experience.

Tuesday Night Tutoring with Kevin

My attempts to help Kevin with his homework were failing miserably. Looking back, I believe they were failing because I was replicating the dynamic he experienced every day in school. For a host of reasons that go beyond the scope of this paper, he had already rejected that place, its dynamic and the materials it placed in front of him.[1] Working on school lessons with Kevin made several things tremendously clear to me: For Kevin, a 13-year-old boy living on Chicago's Near West Side, the experience was overwhelmingly *negative*; the content of school was, in his mind, absolutely *meaningless*; and he was not in the slightest bit *engaged*.

My attempts to sit at our normal tutoring desk and work on his homework had for weeks been a complete waste of time. Each time I attempted to get him to focus on the ditto sheet he was required to complete for math homework, science homework or social studies homework, he resisted. Sometimes that resistance came in the form of anger. "I ain't doing that stupid crap!" he would shout. Sometimes he resisted by paying no attention to me whatsoever. He would just sit there, look around the room and act cool. Each time I tried to help him understand a science term or a math term, he would look at me from his slouched position in

[1] see Hackett, Terrence "Making the Student the Star," www.readingonline.org. May 2001

the chair, pull his eyebrows down in an expression of annoyance and say without barely moving his mouth, "….what?"

In an act—I will admit—of mild desperation, I walked Kevin over to a computer at the tutoring center this one night. I had brought a computer game with me in my backpack, and I wanted him to give it a try. Nothing else I tried was working. The game was called "The Lost Mind of Dr. Brain," and it contained about a dozen logic puzzles.

I was about to witness a metamorphosis. I don't use this word lightly because I tell you with a great deal of sincerity that the Kevin I saw for the next two hours that Tuesday night sitting in front of the computer screen was completely different that the Kevin I sat with at the tutoring desk. The transformation was remarkable, and it is the story I will now describe for you.

Positive

For an educational experience to be as effective as possible, it needs to have qualities that are overwhelmingly positive. By this, I specifically mean three things:

(1) It needs to provide a sense of responsibility.
(2) It must provide a learner a safe place to fail.
(3) It needs to offer the learner rewards.

(1) Provide a sense of responsibility

A learner needs to take on responsibility in a learning activity for it to be effective. Feeling a sense of ownership, feeling actively invested in the work at hand creates a positive environment as opposed to the often negative and unproductive environments of passive-listening-driven lessons.

Kevin took an ownership role in his own learning

When Kevin sat down in front of the computer, the difference was noticeable immediately. He sat up straight. Kevin never sat up straight. His passive slouch was gone, and he even leaned forward slightly, taking the mouse in his hand and studying the logic games.

The game involved directing a series of colored balls through a maze of interweaving train tracks. Kevin's job was to guide the four balls to their end destination—known in the game as the depot. This was to be done in line with the commands of an animated instructor. When the instructor—who was played by an endearing rat-like creature—requested the red ball be placed in the depot first, Kevin would have to manipulate the tracks to meet this request. If a green ball was positioned in front the red ball at the single-file starting point to the maze, Kevin would have to figure out a way to divert the green ball somehow—perhaps by placing it in a circular loop—so that he could guide the red ball to the depot first and thereby succeed.

Not only did Kevin's posture change in his seat, but his eyes became steady and fixed with concentration on the computer screen. This was a worthy task for him, his eyes seemed to say. He was in charge of the activity, and he showed a sense of responsibility that I had never seen him show before. As a learner, he was completely transformed.

(2) Provide a safe place to fail

A learner needs a place where failing is accepted and allowed. Being able to fail and use this failure as a way to deduce the correct path creates a positive learning experience for a learner.

Failures became hints of how to succeed

Quite often during this game, Kevin made mistakes. Early on, he was adjusting to the rules and he would fail to guide the correct color ball into the depot in line with the instructions. This was often because he had not thought far enough ahead and made enough correct decisions about track crossings that would affect the flow of the four balls through the twisting maze. When he did fail to comply with the instructions, his reaction was one of disappointment. In his next attempt to complete the puzzle, however, he showed renewed determination. He would often successfully navigate the maze, correctly switch the tracks and guide all four balls to the end in the proper order.

This stunned me because I had not seen Kevin fail very often. When it happened during our work one-on-one in tutoring, he would become angry or, more likely, disinterested. He would demand that we stop working on homework. He was a master of stall techniques that he used skillfully to eat into the two-hour time slot we had together. But looking back on my time with him, his lack of failing was most often related to not wanting to try. His cool, laid back and un-caring persona was, I believe, masking his real fear of failing and looking stupid. The classroom he attended every day—with all of its social dynamics, its power dynamics and peer acceptance pressures—made his fear of failing very strong and very real to him. While some of this fear was absent when we worked together one-on-one—with no one else observing—the fear of failing was still very present.

In front of this computer game, it was different. The game treated failure in a brilliant way. The game made it vastly apparent that failure was OK and that this was a safe place for him. There were no laughs at mistakes, no rebukes, snickers or even disapproving looks. The animated character urged him, "You can get it the next time." And as a result of this encouragement, there *was a next time.* This technique is not difficult at all , but it worked wonderfully. Given the sense of responsibility that Kevin already felt, these encouraging words allowed failures to be transformed into learning opportunities. They were moments of self-confidence rather than instances of self-doubt. Failures were glimmers of the truth and markers toward success. They were, in fact, not failures at all.

(3) Provide rewards

A learning activity needs to provide the learner with rewards for succeeding. The types of reward, of course, can vary widely. But rewards create a positive learning environment, and they fuel a desire to continue learning, to continue succeeding and to continue reaching new discoveries.

Victories and rewards fuel determination

Over the course of 45 minutes, Kevin's concentration remained fixed on this game. The maze-like puzzles grew increasingly complex, and Kevin's determination grew more and more intense. He became increasingly adept at guiding the balls through the twisted mesh of tracks and safely into the depot. I stared over his shoulder with genuine awe as I watched the quick decisions he was making to solve these puzzles. I can honestly say that he was making faster, better decisions than I was making in my head about how to accomplish the goal of each puzzle. With each successful completion, he was told that he had done a great job. The audio comments from the animated character told him, "You're becoming an expert!" and "Well done! You're a regular genius!" This was a very straightforward and highly effective reward.

On the surface, these comments seemed to affect him very little. If you looked at his face, you would hardly notice a change. But I could see the slightest hint of a smile that would cross his usually stoic face. I watched as he sat back in his chair, raised his arms above his head in a stretching motion and looked to me and said in a subdued but confident voice, "Man, this is easy."

He enjoyed saying this a great deal. After long sessions of concentration, this was brief moment of reaction his celebration. It was positive sign of success. There was not a trace of anger, of boredom or disdain in his voice. It was a beautiful thing, and these rewards were making him a determined learner.

Meaningful

The second major area that I believe must be designed into educational experiences is making the content meaningful. By this, I mean three things:

(1) It must contain sound educational content.
(2) It must be accessible to the student—not only neurologically but also emotionally.
(3) It needs to be grounded in proper instructional design.

We often take for granted that lessons delivered in a classroom are, in fact, meaningful. There is a very good debate to be had over whether the material we teach our children is meaningful and effective for their intellectual development. I know that in my own education, I assumed that if a trained educator was delivering the lessons then, of course, the content was sound. I also took for granted that, yes, I had access to the learning on both a physical "I can recognize and understand the material" level and an emotional "I can in some way care about the material" level. I also assumed that the lessons I was exposed to were

done according to proper instructional design techniques, with individual actions and exercises linked securely to learning goals.

The advent of educational experiences on the computer makes attending to these three factors equally crucial if a lesson is to have a chance of succeeding.

(1) Offer sound educational content

A learning environment must be grounded in sound educational content to be effective. At a base level, this helps insure that the lesson is meaningful.

Games as a delivery of solid learning

Games represent an opportunity to be particularly clever about content. As I sat and watched Kevin solve these logic puzzles, I saw his eyes flicker across the computer screen, rapidly identifying track crossing to switch back and forth so that an elaborate series of future events could produce a desired result. I was astounded. What a clever interface, I thought. While I cannot vouch for the actual educational content that the game designers used to provide the foundation for these games, I found the principles that were operating to be quite solid. The game taught logical ordering, sequencing, and reasoning skills. It required that Kevin show a strong command of cause and effect to produce the proper results in the game.

For Kevin, any attempt to convey these raw logic concepts either in text or in a spoken lecture format would have proven futile. If I were to have read this material to him from a chapter in a textbook, his eyes would have rolled back in his head with boredom. His slouch would have resumed, and he would have mentally disengaged in a matter of seconds. The fact that he was demonstrating his obvious command of the content in an active, positive and engaged fashion was a total victory.

The game was succeeding so completely because it played to Kevin's strength at logically ordering events. I knew that he had an extremely good memory for details, such as lengthy song lyrics, street names, people's names, and details of movies or books that he liked to read. I had also listened to him describe for me detailed bicycle repair procedures and heard how easily he ordered the repair steps. I had also heard him provide clear and flawless directions for taking buses across the city. This game was allowing him to demonstrate his ability and to improve his skills with practice, challenge and feedback. These are the very same skills that we test so vigorously in students on exams like the SATs and other standardized tests.

Kevin, in my opinion, is an outstanding logical thinker. He certainly lacks in fundamental reading and math skills. That is without question. But he is quite intelligent, and this game provided me a unique opportunity to see his intelligence in action.

(2) Be accessible to the student

Learning environments must allow individuals of all learning styles and abilities to access the material. The environments must allow learners to understand the material through their senses, make sense of it logically and also care about it emotionally.

Lessons need to meet individual learning styles

In working with Kevin, I had noticed that he struggled with text a great deal. He read out loud with difficulty, often transposing words in a sentence and individual sounds within a word. He would sometimes lose his place within the paragraph and stop and start often like a child who is just learning to read. This naturally frustrated him, and he showed his frustration with impatience, occasional angry

outbursts and disinterest. In marked contrast, however, when text was absent from a lesson and he could become physically engaged, manipulate objects and control the flow of events he became a decidedly interested learner. He locked onto the material with a remarkable enthusiasm. The contrast was sharp. After we worked on the computer together that Tuesday night, I saw these qualities again many times when we built things, repaired things and conducted experiments.

To Kevin, learning experiences with text were often inaccessible. But visual, hands-on learning experiences—including those on the computer—were highly accessible and fit his learning style. Kevin's brain more successfully recognized images better than text. Perhaps he had one of the better-known learning challenges like dyslexia. I don't know for sure. His brain's logical and ordering capabilities—which are typically associated with the brain's frontal cortex—were part of his strength as a learner.

These two "systems" of the brain—the recognition system and the strategic system—are two of the three that are described by Harvard University Professor David Rose. [2] The third system—the brain's affective system—associates emotional elements to particular events, sounds and sights. This system tells us how we feel, for example, about a loud crashing sound as we are sitting in a quiet room reading a book. The affective system also tells us how we feel about a learning experience, like reading aloud in front of other students, listening to a lecture on microbiology watching a video on cheetahs. Our affective response plays a key role in how receptive we are to learning.

To Kevin, the classroom was linked to a chain of negative feelings. This was his affective response. However, it was clear sitting with him as he played the computer game that his affective response to the learning experience was

[2] Rose and his team at the Center of Applied Special Technology advocate building learning experiences that are accessible to all learners. They see computers and digital media as playing a key role in making learning activities more accessible through Universal Design for Learning. See www.cast.org.

overwhelmingly positive. That response allowed him to concentrate. It allowed him to feel good, letting small setbacks become challenges. He was having fun, and his brain was telling him, "I get this. I can do this! I enjoy this stuff!"

(3) Provide proper instructional design

Educational experiences need to be properly planned and designed to allow for effective learning. The use of proper instructional design methodology helps insure that the lesson is meaningful.

Instructional design forms the foundation for quality lessons

As Kevin began the puzzles on the computer, there was no delay in getting started. The instructions related in spoken word from the host of the program were immediately clear to him. They clicked. The visual layout of the interwoven tracks, the audio and text descriptions as well as the navigation scheme of the layout were all crystal clear to him. I sat back and did not say a word.

As he began, the game offered feedback at various points. If he made an error, he got feedback. If he did something well, he received feedback. If he had a question, he could pause and click a button. Feedback was in good supply. The game also allowed plenty of time for practicing the logic games. This allowed him time and the space to sharpen his skills. And the built-in rewards offered him more than ample motivation to keep moving forward through the lesson.

The educational experience of this game followed a very simple, but very effective instructional design methodology. David Perkins, also a Harvard Graduate School of Education professor, describes this design framework as "Theory One." The components of Theory One are (1) Provide clear information, (2) Offer opportunities for reflective practice, (3) Give informative feedback and (4) Allow for intrinsic or extrinsic motivation. There are other more complex

instructional design methodologies that deal with setting up goals, sub-goals and linking them to activities and then assessments, but I like the simplicity of Perkins's Theory One. Game designers and all educators need to become intimately familiar with instructional design.

Engaging

Making educational experiences engaging is bit of the holy grail. Any one who has taught knows that this can be extremely challenging, especially when you have a room full of students who have different interests, different attention spans and different learning styles. But game designers have been thinking about these issues for a long time. They are, after all, competing with other forms of entertainment for a single user's attention.

The designer of any computer game—educational or purely entertainment—has a fundamental challenge of keeping the user in the seat and focused on the screen. We as a society marvel at the number of consecutive hours that children—and gamers of all ages—spend fixated on a game. How can this happen? How can children who can't pay attention in school, sit in front of a computer for hour after hour? Well, this is no accident. It is both amazing and also somewhat simple. The fact is that successful games are the product of a great deal of forethought, intensive design work and quite a bit of production. What is it that grabs people's attention and engages them?

I believe that the three components that must be present in a learning experience to engage the learner are:

(1) The experience must involve the learner on a personal level.
(2) The experience must pay attention to the pace of the program and utilize synchronized picture and sound.
(3) The experience should tell a story.

(1) Involve the learner on a personal level

Learning experiences can engage learners by offering them personally relevant information and maintaining personal interaction. Responding to a learner's actions and inactions and keeping track of those events allows for the establishing and maintaining of personal interaction.

Teaching involves back and forth between instructor and student

Briefly flashing a user's name up on the screen is nice, but it's not providing a personalized experience. Think about your typical shoot 'em up game for moment. When you start to master the game, what happens? If it's designed well, the game gets harder. It dynamically adjusts to your level. That is personalization. The game, in a sense, listens to you and reacts to you.

This is important in learning because you learn best when your brain is in a state midway between being bored by a familiar task and overwhelmed by a completely new and unfamiliar task. Russian cognitive psychologist Lev Vygotsky (1896-1934) identified what he called the "zone of proximal development." This is the zone in which your brain is engaged and capable of learning. He maintained that if a task is too familiar, we don't pay attention. If a task is too unfamiliar and difficult, we are confused and we disengage. The middle area—between the mundane and the out-of-reach, is the special "zone" in which we learn.

This is the fertile ground that designers of learning experiences must exploit. Using techniques that foster personalization help the game know where that "zone" is for each individual learner. This, I believe, is the crux of true interactive design for learning. Good teachers do this all the time in class. They scaffold exercises, pushing the children inch-by-inch forward into new, undiscovered

territory. With reward, encouragement and proper feedback, the journey into the new learning can be incredibly exciting. Without the proper support and feedback, however, this can be scary process for the learner and ultimately undermine future learning experiences.

For Kevin, he stayed focused and challenged within his logic games because the game was designed well enough to push him forward into new territory. Had the puzzles not gotten more difficult, I am certain that Kevin's slouch would have returned and he would have disengaged like I had seen him do so many times at the tutoring desk. But the game's attempts to stay at his personal level and to use his performance as feedback to the future direction of the game prevented that from happening.

This is one example of involving the user on a personal level. Other games store history files for users. The reality is we pay more attention to experiences that are personally relevant to us. The Internet is full of these tactics as sites track our visits, profiling us so that return trips are more personally relevant to us.

(2) Pay attention to pace, picture and sound

When a learning experience has pace, then it designed with attention paid to the timing of events. Timing events properly in learning is critical. In addition, the elements of picture and sound when presented in a synchronized fashion are strongly appealing to two of our dominant sensory input organs—our eyes and our ears. When learning experiences utilize pace and synchronized picture and sound, they are more likely to engage the learners.

Pace

If you take your hands off the keyboard in a computer game and stare at the screen for a given duration, what happens? The time runs out. Something

explodes. You get decapitated. Your opponent gets the question right and wins the points. Consequences vary, of course, but the idea is that SOMETHING HAPPENS.

This is pace—which simply put is paying attention to the timing of events. Film and television directors understand pace. They know the power of weaving together images and pulsating music to create an emotionally charged chase scene. Game developers understand pace as well. They build consequences into their games for *inactivity* as well as for activity.

Learning is a little trickier. But good teachers get it. They realize that inactivity in a learning activity is as important to notice as activity. When learners are stalled, it means they are either confused or bored. Both hamper learning, so they need to be addressed. Designing learning experiences that pay better attention to how the learner is moving through the lesson is critical. Computer games never just let you sit around and stare at the screen. The experience has momentum. Users move *through* the experience and the journey is filled with consequences.

In an educational game we developed at Jellyvision, we built in rules for how to handle long delays after a user was asked to do something. If they did nothing, then we asked them what was wrong and offered them a way to indicate they were confused. This is important if you are trying to have an engaging experience. You need to build in a dialogue of some sort. Humans need this dialogue in some shape or form. Imagine turning to the person next to you, for example, asking this person a question and having them not respond. How long would it be before you walked away? Not long, I would guess. We liked to be listened to.

True teaching is a dialogue between the teacher and the student. There is a great deal of back and forth. I agree that teaching is at its best between two humans, however in our society we have to cope with the imperfect reality that not all eager learners have equally eager and available teachers at their disposal.

Computer learning experiences, if done correctly, can provide learners with a paced, back and forth experience that engages them.

Synchronized picture and sound

Synchronized picture and sound are the magic behind television. As Harry Gottlieb, my former partner at Jellyvision, states: "If there is a television show on in the room and you are trying to read a book, which one wins your attention?" TV wins hands down.

By carefully blending picture and sound, game designers focus your attention on particular events. They know that if you are looking and listening, you are engaged. Engagement opens the door to learning. Teachers harp on this when they say, "Give me your undivided attention…" This means give me your eyes and your ears, I am about to tell you something that's important.

For Kevin, his life was filled with music and video games. He bragged about his skill at playing Nintendo and Sega games. He beat me at every game we played together, which was really no great accomplishment. As I watched his intense gaze at the colorful computer screen that Tuesday night at tutoring, it reminded me of his look while destroying me at a Sega basketball game. As Kevin's eyes followed the colored balls of the logic game in looping patterns around the maze, I could sense his excitement. The sound was subtle, but the mixture of voices, music and sound effects created a backdrop that was inviting for him. This was a place he wanted to be. The picture and sound came together in this learning experience to create a fun and exciting place for him.

(3) Tell a story

Stories are part of the fabric of our lives. They use drama, humor, suspense, plot and dialogue to captivate an audience. Given the appealing qualities that good stories offer, they can be used to foster engagement in learning experiences.

The story in "The Lost Mind of Dr. Brain" was not necessarily the game's best feature. But it was good enough. As I recall, a professor of some sort gets caught up in a lab experiment gone wrong. In an attempt to sync up his brain with a lab mouse, the professor's brain becomes lost. The task at hand for the learner is to probe into each area of the professor's lost brain and recover it. Each brain section is represented by a logic game. So, the plot was not exactly gripping, but it did the trick quite well. In this case, Kevin's interest in the game was probably not particularly influenced by the story. But stories, in my experience, can play a huge role in learning activities.

One children's software game that I find particularly wonderful is "The Logical Journey of the Zoombinis. " The game features tiny blob-like Zoombini creatures that are on a quest to traverse their fictional island. Learners join them on their quest to cross their island, and along the way they encounter challenges in the form of very well designed logic games. The design team that crafted this wonderful game understood very well that if you tell a good story, people listen intently and want to know more. The game lures you in because you begin to care about these cute little blobs. Caring is good. You want to help them out on their journey and this becomes the hook for keeping the learners interested, engaged and pushing the boundaries of their knowledge.

Stories engage our emotions and they make us care. In the case of the Zoombinis, wrapping a fun, suspenseful narrative around challenging and academically sound logic games keeps children coming back for more.

Conclusion

This paper has followed two paths. One has been the story of a night that I spent at tutoring years ago watching a 13-year-old boy become engrossed in a computer game. The second, parallel path of this paper has been my attempt to describe for you my thoughts on how learning experiences can be designed to be positive, meaningful and engaging.

I have described how Kevin reacted to learning both in school and at our tutoring desk. He was often a slouching, passive, disinterested, disengaged boy filled with anger and resentment. Yet in front of the computer game that one Tuesday night, he was different. Kevin was an active, eager, enthusiastic and determined learner. He was happy, and he was having fun. The difference was astounding to observe, and I feel it is something that is worth noting here as we discuss at this conference the role of computers in our society and in the learning process.

Critics are quick to warn that we are being fooled by slick-talking proponents of computer hardware and software. They promise much, critics say, and they deliver little to our children and to our schools. I believe that we should always be wary of easy solutions, especially when it comes to learning. We should also be continually critical and discerning about what we put in front of our children. But we should be equally concerned about *all of the learning experiences* we subject our children to. Are their classroom experiences positive? Are they meaningful? Are they engaging?

I think perhaps we are willing to overlook these important questions more often when computers are not part of the learning environment. It's perhaps easier to take a shot at the new thing—the new costly technology—and suggest that we are being fooled and misled. I invite our critical eye to be cast on all of the ways in

which we attempt to instruct our children. How can we make their learning environments—at school, at home, at tutoring—strong, constructive, positive environments? I invite us to look at all aspects of the learning process instead of focusing so much, for example, on how well children score on standardized examinations. I feel that exams tend to accomplish little more than allow short-sighted educators and elected officials at the town, state and federal level feel better about themselves and their self-described roles as advocates of better, higher quality schools. Children, however, are more complicated and their needs are more intricate than simple test scores. Children deserve more thought from us, more planning, more creativity and more of our intelligence as educators.

As far as Kevin goes, I wish I had a better ending for this story I have told you. The ending is, in fact, quite sad. Kevin never completed 8th grade at Von Humboldt Elementary School on Chicago's Near West Side. He did not pass his basic skills exams and that, combined with his absenteeism record, kept him from graduating. Faced with the school's mandatory repeating of 8th grade, Kevin dropped out and never returned. This very moment Kevin is sitting in Cook County Jail. He is 17 years old and he has been charged with armed robbery and aggravated battery in a hold up of an electronics store near his neighborhood. He faces 15 years in prison if convicted.