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Creating Experiential Learning Environments

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Our communication systems are rooted in our perception of and interaction with our physical environment, but there are other factors that play a part in shaping our communication systems. Speed, cost, permanence, portability and accessibility are variables that have traditionally affected the way we communicate with each other. From athletes to molecular chemists, many agree that the ability to visualize an event, a process, a situation, and/or environment can significantly affect the chances of a successful outcome. Life changes rapidly and the ability to visualize, order, test, and make sense of it gives us a clear advantage.

Educational visualization is using an image or a model of an object or concept so that it can be taught. Educators use models and simulations to teach about things that might be too fast, slow, big, small, or fragile to be viewed with the naked eye. For instance, a sprouting of a seed is often visualized using time-lapse cinematography because of the seed's slow growth rate. In addition, some objects and environments may be extremely complex or have happened in the past, so our ability to create a model might be the only way we'll ever be able to visualize them. The ability to visualize or to simulate an event has a variety of educational benefits and has been actively embraced by teachers.

Technological advances in the twenty-first century provide teachers new opportunities to instruct with increased inventiveness and effectiveness. From the integration of televisions and supporting devices to artificial intelligence and virtual environments, technology is linked to education, and subsequently linked to learning.

Unfortunately, there are many cases when technology has been introduced into a classroom in a superficial or haphazard way. Many of these cases involve educators who bring in technology yet teach in the same ways they have historically taught, except with a television or computer sitting beside them. Worse yet are those cases where technology is brought in to replace a teacher altogether. David H. Jonassen co-author of *Learning to Solve Problems with Technology* believes that rather than acting as a virtual teacher, "technology should be used to engage and facilitate thinking and knowledge construction" (Jonassen, 2003, p. 12). In order to be an effective 21st century educator, one must have the ability to effectively combine technology with pedagogy to create an experiential learning environment. Technology is more than just hardware; it includes the design aesthetic and environment used to engage learners.

Technology itself cannot be used to assign meaning; instead it acts as a vessel for transporting experiences to the student who then assigns meaning. Virtual reality is a technology that can be used to visualize an object, create a virtual environment, and subsequently deliver an experience. Many people have written about how to integrate this technology into a classroom and use it as a means to disseminate knowledge. I believe that there is tremendous potential in using virtual reality, but how should we structure information in this medium so that it can be absorbed effectively? The goal of creating a model or a virtual environment shouldn't be to create a realistic visualization of an object or concept but to create patterns of learning and facilitate an experience for the learner.

An experience is generated by the engagement of our senses and leads to either understanding or the propagation of questions. If the experience leads to more questions, they are answered in turn by the continued engagement of the senses or [again] more questions. It is this process that our mind uses to create patterns of learning. It's important to think of these patterns as being fluid and dynamic rather than static. The mind continually re-orders, links and compares patterns that have been stored in our memory with new patterns that are generated by new experiences.

When we have an "Ah-ha!" moment, we are experiencing the sensation of creating a new pattern or have found similarities between a pattern that has been stored in our memory and a new experience. Every experience is affected by our previous experiences, and each in turn will also be affected by future experiences. Our mind sorts through our sensory data to find similarities and patterns, but it also has the ability to discard patterns in lieu of stronger ones.

Plasticity is the term used to describe our brain's ability to grow and change and is a byproduct of neuronal activity. When we repeatedly activate or stimulate a particular neuronal pattern over time those neurons become thicker, and the effect is referred to as strengthening the synapse. A physical change occurs, and subsequently a stronger pattern in the mind emerges. Alternatively, when a neuronal pattern is not being stimulated, it becomes impoverished and weakened. This means that patterns that are used often become dominant and patterns that are used less are more likely to be restructured or replaced. Learning at its most basic level is about connectivity, patterns, relationships and experiences.

How do we account for a student's past and future when we are designing a learning experience? We all have different backgrounds, experiences and abilities. Jorge Trindade, Carlos Fiohais and Leandro Almeida comment in their paper *Science Learning in Virtual Environments:* A Descriptive Study that "imagery experiments are likely to play a major role in strategies to discard previous misconception" (Trinidade, 2002, p. 473). Students were more accepting of departing from their preconceived models by being able to visualize a new model. Students experienced an event within a learning environment and subsequently became a part of the process. They did not have to hold on to old beliefs, stalling the learning process. They were able to move away and join in the experience thereby creating an atmosphere that facilitated learning and understanding through their experience. One of the students who participated in the experiment by Trinidade, Fiohais and Almeida commented, "When I work on a physics or chemistry problem for an hour, all I have to show for my efforts is a number, which doesn't always mean anything to me. This program gave me a chance to see water molecules behavior for the first time" (Trinidade, 2002, p. 486). It could be argued that the student better understands how water molecules behave having witnessed the simulation than by only knowing about the process empirically.

Of course, at some point a designer or teacher will have to limit or generalize an experience (just as our mind does) for several reasons. First, programming an experiential learning environment without establishing certain parameters would require programming for an infinite number of possibilities and would take an unlimited amount of time and financial resources. Secondly, the learning objectives might be lost if there are no inherent guidelines or limitations. Parameters for exploration not only set a scope for the design of a virtual environment but also keep students on task by giving them constraints in their exploration of this environment. Although it's hard to qualify, the best learning experiences are those that have not only accounted for the primary area of investigation but are also able to predict tertiary questions as well.

Learning theories have developed out of attempts to identify how we learn and our need to establish principles for the development of learning environments. Each theory identifies considerations for the teacher or designer to take into account when attempting to create a learning environment, or as stated in Sonny and Jamie Kirkley's article, *Creating Next Generation Blended Learning Environments Using Mixed Reality, Video Games and Simulations,* "Learning theories help designers determine what instructional methods, strategies and tactics are appropriate and how to situate them within the overall learning environment" (Kirkley, 2005, p. 43). While each learning theory has its own advantages and strengths, none are perfect and all have inherent limitations. As learning theories ebb and flow, teaching paradigms have shifted correspondingly. Aspects of behaviorism and cognitive theory are still evident in the classroom today.

In the past, teachers taught out of textbooks and spoke with an authoritative voice. They were the disseminators of knowledge, and in the eyes of the student, experts on the particular subject. Behind the scenes, instructors kept a teacher's edition of the textbook, which held the answers to the most commonly asked questions. The learning process was broken down into a series of small steps and then learned incrementally by the students making active responses at each step. The student's behavior was reinforced with either positive or negative conditioning. When behaviorist theory of learning was done well, the results indicated that it was an effective way to teach, but when it was done poorly, the material was often boring and ineffective. As researchers used behaviorist theory as their learning model, some felt that it provided a rather limited view of the learning process. According to Drew Tiene and Albert Ingram, in their book, *Exploring Current Issues in Educational Technology,* "Behaviorism was unable to effectively address a critical issue: How do people think? Critics noted that people are more than just the sum total of their behaviors that they engage in" (Tiene, 2001, p. 28). Behaviorist theory was unable to provide answers about how people think, and because the cognitive theory of learning focused on the human thought process, it seemed to be a progressive step in the right direction.

The catalyst in this change in thinking was the digital computer. Cognitive theorists wanted to understand the human thought process, and the computer seemed to provide a means for doing so. Many cognitive theorists felt that the human mind and a computer's central processing unit worked similarly. They proposed a "human information-processing model" and suggested that people, like computers, processed information through a series of systems. They claimed that 'human sensory systems' took in stimuli from the environment; 'attention and control systems' determined what information was processed and acted on; and 'memory systems' determined whether to store information in our long or short-term memory (Tiene, 2001).

The cognitive theory of learning appeared impressive at first glance because computers were being "taught" to beat master chess players and a better, smarter new world seemed eminent, but cognitive theory soon hit an unexpected glass ceiling. Computers could be programmed to accomplish specific tasks but quickly ran into problems when asked to accomplish more generalized tasks. The failure of teaching computers to perform generalized tasks was due to the linear nature of programming, which was written in a series of if/then statements. When the computers were given a specific environment and a list of rules, they performed beautifully, but when put in a changing environment (like the environment you and I live in) and asked to perform a generalized task, the cognitive theory of learning began to reveal its flaws. Cognitive theorists realized quickly that the brain and computer analogy that spawned their theory was incomplete. The human brain acted like much more than a central processing unit and the limitations of computer programming supported this fact.

Despite the flaws in the brain and computer comparison, cognitive theory helped educators realize that there was a developmental readiness component to learning. Cognitive theories of learning emphasized a relationship between a student's prior knowledge and his or her ability to learn new material, or what many cognitive theorists call an "advanced organizer." Jean Piaget's research on cognitive structures in children had a significant impact on primary and elementary school educators. Piaget's research suggested that that there was an inherent developmental readiness that was linked to childhood development and age; therefore, certain concepts are unable to be understood until the learners reach a certain developmental maturity (Tiene 2001). Children need time to explore, play and interact with their environment to develop a context of the world. In short, children needed time to experience the world and begin to develop a foundation of patterns and experiences before being asked to learn and work with abstract concepts. Later, this principle would be used to develop another learning theory, constructivism.

Constructivism refers to the idea that students "construct" their own sense of the world based on their own perspectives, interests and identities. The constructivist theory of learning shifts the responsibility of 'teaching the material' from the teacher to 'learning the material' by initiatives on the part of the student. The process emphasizes self-discovery and independent thinking on the part of the student and deemphasizes the authoritative voice of the teacher, who acts as a co-pilot or guide in the learning process.

In her 1987 Presidential Address titled *Learning In School and Out,* educational researcher Lauren Resnick addressed the commonly held idea that "common sense outweighs school learning for getting along in the world—that there exists a practical intelligence, different from school intelligence, that matters more in real life" (13, Resnick 1987). Resnick pointed out several contrasts between the types of knowledge learned in school versus out of school. She noted that learning within a school environment is predominately an independent task, while learning outside the school environment takes place within a social system. Grades are usually an index of what individuals are able to accomplish alone, but often what is accomplished in real life is the byproduct of a group effort. In addition, schools often require students to work without external tools, for example working on a math problem without the aid of a calculator. While this isn't wrong in and of itself, Resnick notes that most mental activities that take place outside the classroom are "engaged intimately with tools" (Resnick, 1987, p. 13). Resnick observed that not only do tools aid people with limited education and experience, but they also help educated individuals accomplish tasks well beyond what they could accomplish independently.

Language is considered a tool and often success depends upon memorization and learning the meaning of symbols. For a child to do well in school he or she has to learn a symbol-based language rooted in abstract concepts that isn't always connected with objects and events outside the school learning environment. The disconnection between objects, events and concepts creates a division between school knowledge and real-life knowledge, and information becomes compartmentalized in the process. To widen this gap even further, in school knowledge aims to teach generalized skills and theories, while the real-life tasks require specialized, situation specific forms of knowledge.

Resnick's purpose wasn't to undermine efforts in education, but rather to run a diagnostic and record her observations in an effort to create a cohesive learning environment. From her article, one might conclude that there is room for improvements in the way educators teach and in the way students learn and apply knowledge. A shift in the role of teachers as 'knowledge dispensers' to guides in a learning environment creates an opportunity to bridge in-school learning experiences with real-world applications. If teachers can minimize the compartmentalization of knowledge then learning takes on a much more active form. Not only is it important to provide context when posing a problem, but it is also important to simultaneously activate the student's logical and creative mind.

When teaching a beginning Typography class I usually begin by outlining the history and evolution of typography. Then I assign a series of problems designed to incrementally explore specific typographic nuances. Concepts like form, counter form, letter spacing, typographic anatomy, typographic composition, and using type as an image are typically explored and critiqued in detail. By providing historical context and breaking subtleties of typography down into small parts, students are able to sufficiently demonstrate their understanding of basic typographic principles.

While teaching Typography at Virginia Commonwealth University in Qatar in 2005, I designed a final project that required students to culminate all of their fundamental typographic knowledge, in a way that did not allow them to simply recontextualize the information I had given them throughout the semester. In other words, I wanted to create a learning experience and give the students an opportunity to explore typography.

The assignment was called "Typographic Magic" and students physically created typography that performed a particular magic trick. The final product was a three-dimensional composition that was shot photographically with a stereoscopic camera and displayed using two polarized LCD projectors that were projected on a lenticular screen, where viewers could watch the magic show wearing inexpensive polarized glasses.

Upon announcing the project in class and teaching students the principles of stereoscopic projection, they eagerly embraced the project. They were excited to build, carve and decorate their typography and actively looked for ways to tighten their concepts. They took deliberate and careful measures to kern and compose their three-dimensional scene in a flurry of unprecedented activity. To encourage their enthusiasm, I hired a professional photographer for the photo shoot, and students began sketching how they wanted their composition framed and shot.

Minutes before the photo shoot, students helped each other set up their three-dimensional scenes by hanging their typography from a suspended wooden frame that was placed just out of the camera's view. Some of the student's concepts involved typography that jumped out of a hat, or appeared to levitate in mid-air, or looked like it was being smashed into pieces. I noticed that the students were enjoying role-playing and many came dressed up like magicians, fortunetellers and strongmen. Playtime aside, the students remained focused on their assignment and tasks.

After the shoot concluded and photographic proofs were available to view, everyone actively participated in choosing the best shots. Slides were scanned in digitally and then threads, supporting devices, and shadows were retouched and/or removed. These final slides were then loaded onto two computers and projected stereoscopically during the exam week, with much positive feedback from both the participants and observers.

On exam day, the class met and we discussed the project and what they had learned. Students commented on how much they enjoyed the non-traditional and experimental aspects of the project, but also how it helped them link the historical context of typography to the present day. I asked them to explain further and one student stated, "It helped me realize that type was a physical thing. If you drop it, it gets dented or breaks. I've always thought of typography as being purely digital." In addition, several students commented that the project made them think about typography as a sculptural form. The students were used to dealing with type in a two-dimensional form and only after carving their words out of Styrofoam blocks did they begin to consider that a component of typography is rooted in three-dimensional forms.

Not only did students learn about typography, but they actively participated in a project that allowed them to experience typography in a new context. By having them physically build type and display the solution in a stereoscopic format, they were able to engage multiple senses and establish a link between their experience and the typographic history I provided earlier in the semester. This activation of the senses stimulated patterns of thought in their minds and engaged both the left and right hemispheres of the brain.

While teachers don't normally design projects to activate the left and right sides of the brain, I believe the Typographic Magic project did exactly that. It's common knowledge that our brains are divided into a left and right hemisphere. The left hemisphere processes speech, analysis, time and sequences while the right hemisphere processes creativity, patterns, spatial awareness, and context.

Although both hemispheres perform different functions, most people have a dominant side of the brain that goes into effect when thinking becomes more complex. This explains why some people tend to be artistic or better at math—they are using the dominant side of their brain. Despite the different tendencies in right-brain versus left-brain thinkers, we all have a left and right hemisphere. No one thinks in a completely logical or creative way and that is why both left and right brain functions should be considered when creating a learning environment.

How do we construct learning environments that are able to integrate technology, create an experience, provide context for the problem being explored, promote active exploration, minimize the compartmentalization of information and stimulate both left and right brain functions? Perhaps the place to begin is with our five senses; after all they are the only tools with which we're born. Diane Ackerman in her book, *A Natural History of the Senses* states, "The senses don't just make sense of life in bold or subtle acts of clarity; they tear reality apart into vibrant morsels and reassemble them into a meaningful pattern. They take contingency samples…the senses feed shards of information to the brain like microscopic pieces of a jigsaw puzzle" (Ackerman, 1990, p. xvii).

If Ackerman is correct, then we are led to the question, "Which pieces of the puzzle should we keep and which should we discard?" I believe the answer is to include all of the five senses when creating a learning environment, but restrain from activating them all at once. Creating a hypersensitive extension of any particular sense heightens a level of engagement but does not necessarily foster learning.

In fact, there might come a time when we consider designing our learning environments to temporarily neutralize a particular sense in order to heighten a particular aspect of an experience and create a more indelible pattern in the learner's mind. In his book, *On Intelligence,* Jeff Hawkins comments,

> If you look at a dog, for example, a set of patterns will flow through the fibers of your optic nerve into the visual part of your cortex [brain]. If you listen to a dog bark, a different set of patterns will flow along your auditory nerve and into the hearing parts of your brain. If you pet the dog, a set of touch-sensation patterns will flow from your hand, through fibers in your spine, and into the parts of your brain that deal with touch…your perceptions and knowledge about the world are built from these patterns (Hawkins, 2004, p. 56).

If our senses are the only tools with which we're born, then the creation of a learning environment is a matter of picking the right tools to deliver the intended content in a way that is gives meaning to the learner.

Although most virtual reality environments are primarily a visual experience, they can also include additional sensory information. A medium like virtual reality has the ability to activate both hemispheres of the brain because it can be used to incorporate sound, time and sequence as well as the ability to facilitate creativity, patterns, and spatial awareness.

Sound can be built into a virtual experience through speakers or headphones, and as Paul Doornbusch and Sarah Kenderdine state in their paper, *Presence and Sound; Identifying Sonic Means to Be There,* "sound is indispensable for creating complete engagement with virtual environments of almost all kinds" (Doornbusch, 2004, p. 1). Interestingly, it is both sense of sound and vision that humans use to orient themselves within a three-dimensional environment. If the goal of a particular learning environment were to give the student a sense of immersion, an environment that uses visual and audible components would be a good place to begin.

Unfortunately, sight and sound are the only senses that we are currently able to replicate almost flawlessly. Despite the recent improvements in haptic systems, or systems that let us feel virtual objects, we are unable to generate all the various touch sensations found in our physical world. While haptic systems allow us to feel rudimentary shapes, they cannot accurately reproduce touch sensations such as the touching of fur, the granular feeling of sand, or more delicate sensations like the tickle of a feather. In the future, when this technology has been improved, the sense of touch can be incorporated into learning environments because it creates a tactile sensation with an experience and aids in creating a rich experience for the user.

Prior to our invention of the computer almost all human tasks involved the use of sensory-motor skills, or the sense of touch. The computer has found its way into almost every facet of our lives, but for the most part we don't take advantage of the human capacity of touch as a mode of interaction between human and computer interfaces. In his book, *Eye and Brain,* author Richard L. Gregory comments, "The brain's task is not to see retinal images, but to relate signals from the eyes to objects of the external world, as essentially known by touch. Exploratory touch is very important for vision" (Gregory, 1990, p. 6). Our sense of touch allows us to have an intimate experience with objects and reinforces the notion that we exist within a three-dimensional world. For some learners, the ability to hold an object in their hand and examine it is a necessary step to establishing a link between an object and a symbol, concept or idea.

Like the sense of touch, the senses of smell and taste are also currently unable to be effectively reproduced in a virtual environment. We have the ability to artificially reproduce a small sample of smells, but lack the technology to produce a wide range of smells in real-time.

In 2005 the Sony Corporation revealed it had filed for and received a patent for a machine that will beam patterns of ultrasonic waves into the brain to recreate the five senses. According to a *Forbes Online* article, Sony says its aim is "to create sensory experiences ranging from moving images to tastes and sounds." Sadly, we will have to wait for technology to develop further before we can incorporate the senses of taste and smell into a virtual learning environment.

The senses of smell and taste are inextricably linked. When stimulated, they are strong triggers for memory. These two senses are described as 'social senses,' or senses used create a communal connection. Whether it is the taste of a cultural delicacy or the familiar smell of a particular place, these senses are designed to give us context within a community. As mentioned earlier, learning often takes place within a social setting. It could be argued that the sense of smell and taste might play a part in identifying these social settings and subsequently aid in the learning process.

When learners are put into a learning environment that engages their senses, allowing for individual exploration and facilitating active participation, it creates a pattern of experiences that transcends the capabilities of our current learning models. In addition, learning in this type of environment creates a shift in the education process from the teacher being responsible for the delivery of information to acting as a guide within a learning environment. As a result, the responsibility for learning transfers from the teacher to the student, giving students a much stronger voice in an educational context.

Is it acceptable to use our experiences and perspectives as sources of information? This question was answered in my mind by a paper presented by Elaine Kuo and Marc Levis titled, *A New Roman World: Using Virtual Reality Technology as a Critical Teaching Tool.* This paper presented a case study of an architectural history class that used four computer-generated models of the Temple of Saturn, the Roman Forum, the Roman Colosseum, and the Bascilica of Santa Maria Maggiore, which were viewed in a virtual reality environment. Throughout the semester the instructor commented that she found herself thinking differently about architectural history. The professor states, "I realized I was speaking more about the experiential aspect in lectures, even when (traditional) slides were used. Part of the value of virtual reality is that it can push you to think outside the box—to think more experientially" (Kuo, 2002, p. 16). In addition to her comments about working with virtual reality, I believe the professor was either unconsciously or intuitively responding to a shift in her teaching paradigm—she was learning along with her students rather than lecturing them didactically.

Throughout the semester the professor encouraged her students to spend time within the virtual reality environment and explore. Kuo and Levis state, "There was no single fixed perspective that could be accepted as fact. As part of the class lectures, the professor mentioned that one's experience of history was heavily dependent on one's status in society and one's unique perspective would ultimately affect what information gets recorded as fact" (Kuo, 2002, p. 19). Students were later asked to consider how the different seating assignments might have led to different experiences and memories about the Colosseum and to present their ideas in the form of a written paper.

Students were able to virtually sit in the seats that were historically reserved for privileged members of society, and alternatively sit in the seats that were used by people of more common stature to use their first-person experiences as a source of information. When reviewing the student's writing assignments, it was noted that several students "wrote essays that were very geared towards the portal experience, and they were clearly reliving it as they were writing" (Kuo, 2002, p. 18). It is significant that these students were exposed to architectural history through a virtual learning environment. Their learning experience went beyond memorizing information that was covered by the instructor, by making connections in their minds, drawing their own conclusions and activating their preferred learning style. Students interacted with the virtual Colosseum, and from that experience, combined with other similar experiences from their past, they were able to synthesize an intelligent hypothesis about how social status effected the perception of the building.

When we think about intelligence as a product of the condition and quality of people's minds, we often feel the need to compare everyone with the same mental ruler. After all, we want to be even-handed with our assessment, and consequently label a person's mental capabilities. In Howard Gardner's book, *Multiple Intelligences: The Theory in Practice,* he discusses Alfred Binet's development a test designed to predict which children would succeed and which would fail in primary school. Binet's test would subsequently be known as the "IQ" test and is still used as a barometer for intelligence to this day (Gardner, 1993, p. 5). Critics of the intelligence test and other standardized tests argue that intelligence is not one-dimensional and therefore cannot be measured by a standardized format. Consider how Vincent Van Gogh, Helen Keller, and Albert Einstein might score on a standardized test, and then weigh that against their contributions to society and their historical significance.

Gardner believes that mankind possesses multiple intelligences and diverges from traditional points of view. "Multiple intelligences theory pluralizes the traditional concept. An intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community" (Gardner, 1993, p. 15). Rather than ascribing to one particular means of accessing intelligence, Gardner looks at intelligence through a series of seven filters. These seven intelligences are: musical, bodily-kinesthetic, logical-mathematical, linguistic, spatial, interpersonal and intrapersonal. Gardner believes that Binet's IQ test gives a good indication of the logical-mathematical mind, but fails to account for other aspects of intelligence.

Gardner isn't the only person that believes standardized testing doesn't give an accurate indication of future successes. Yale professor, Robert Sternberg has developed an alternative test called the Rainbow Project. In his book, A Whole New Mind: Why Right-Brainers will Rule the Future, Daniel Pink describes Sternberg's Rainbow Project test:

> Students are given five blank New Yorker cartoons and must craft captions for each on. They must also write or narrate a story, using as their guide only a title supplied by the test givers like, "The Octopus's Sneakers". Students are presented with various real-life challenges like arriving at a party where they don't know anybody, or trying to convince friends to help move furniture and how they'd respond. (Pink, 2005, p. 59)

Although the test is still in its experimental stages, Pink reports "the Rainbow Project has been twice as successful as the SAT in predicting how well students perform in college…what's more, the gap in performance between white students and racial minorities evident on the SAT narrows considerably" (Pink, 2005, p. 59). Evaluating a student's abilities is a necessary task, and one that is delicate and important enough to take the time to design into a learning environment. Educators strive to improve not only their content delivery, but also how they evaluate their students, constantly looking for ways to improve both. Educators are responsible for fairly evaluating student progress, but the rubric used to gauge a student's efforts should adapt with changes in content.

If learning environments are designed to give students flexibility then I believe the learning criteria on which the student is judged needs to adapt as well. As the Rainbow Project suggests, there may be other ways to evaluate student learning and many of these methods could be built into a learning environment. Technology can assist in this endeavor if it is designed with the teacher's pedagogy in mind. The goal of engaging a student mind is to facilitate active involvement and establish patterns of learning so that he or she will retain the experience in memory and apply subsequent experiences they might have to it. Simulations provide a means for students to take advantage of these experiences and provide an opportunity for them to depart from models that are incomplete or misconceived. Being able to depart from one model and visualize another allows students to join in an experience and become and active participants.

Active learning environments help students minimize the compartmentalization of information and apply the knowledge they acquire in school with the real world. These types of active learning environments also shift the responsibilities of learning from the teacher to the student and allow for individual growth and identification of areas of interest. Active learning environments must connect content with the student's senses in a controlled and meaningful way. This goes beyond simply activating the senses, to purposefully designing an environment that triggers senses in a specific way to create memories and establish patterns for learning. These types of sensorial experiences could be used as first-hand knowledge sources, which would allow students to contribute to the educational process and give their experiences validity.

While resources might initially prevent active learning environments from being integrated into public education, the costs associated with this type of technology continue to drop as manufacturing processes become streamlined and the capitalist competition for education dollars increase. Creating an experience that engages the five senses is a difficult but not impossible task. Such an endeavor would require the cooperation and collaboration of educators, designers, computer programmers and the like, but the rewards would be significant.

Our education models need to be updated and teachers need to be able to compete with the "distractions" that capture the attention of their students. Video games are immersive environments where children can place themselves in the form of avatars and explore wonderful interactive environments. Should education distance itself from fun and entertainment? Of course not! I believe that education should be an enjoyable experience that isn't viewed as a chore, but rather an opportunity to engage with the world. Teachers and parents shouldn't be responsible for making a student learn, instead they should guide students toward making good choices, taking advantage of opportunities, and identifying themselves within a social context. We have the technology and knowledge to create active learning environments, but it's naïve to think that money is the only thing that is keeping up from implementing them. I believe that we need to re-think how we teach now that we find ourselves at a point in time with so many technological advances at our disposal.

Ignorance never settled a question, and I believe that an informed society will always make better choices about its future than an uninformed society. I believe education is the key to improving our world, and that it's our responsibility to actively pursue any means possible to create a better society. Our five senses need to be incorporated into learning environments. If we don't incorporate them, we won't be able to take advantage of their ability to aid us in understanding, remembering, and structuring the world around us.

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