

Visual Media  
Spring, 2015  
Professor – Brad Yarhouse  
Donna F. St. John

The Extraordinary and Inevitable Synthesis of Visual Media,  
Education and Neurological Transformations in 21<sup>st</sup> Century Pedagogy

This paper is intended as a structural investigation of 21<sup>st</sup> century pedagogy, weighing the advantages and disadvantages of STEM (Science, Technology, Engineering, Math) and STEAM (Science, Technology, Engineering ART and Math), the obligation to honor all students' abilities and the consideration of balancing visual media and technology's impact on our educational system. This inquiry will probe our past and current educational theories considering the explosive positive and negative ramifications that visual media and technology are refining for all of us, especially the Y Generation and Z Generations. This paper will also explore the possibilities of an evenhanded synthesis of three systems: education, technology and neurology; I will be exploring how all three components are cultivating advantages, opportunities and the adverse effects both intrinsically and culturally.

#### WHAT IS VISUAL MEDIA?

Types of visual media would include a plethora of media forms such as: film, movies, video games and computer screens, digital and printed images, graphic design and fine art. Visual media is ubiquitous in contemporary culture. The effects of this phenomenon on the educational system and our current generations of students are undeniable; they are both fascinating and challenging. Visual media can be seen on billboards, smartphones, newspapers, screen projectors, posters, televisions, computers and various other devices. It is defined as any image that can be seen by the human eye as opposed to aural, tactile or auditory stimuli. Technology

and the use of visual media are often used as a learning aid and are now considered a mandatory aspect in quality classroom teaching.

The utilization of visual media in the classroom is becoming increasingly important due to the fact that technology has become an indisputable aspect of the Y and Z generations' social and educational values and expectations. The Y and Z generations are identified as people who were born between approximately 1980 and beyond our current year of 2015. The Y and Z generations (the Z generation is also referred to as the Millennium generation) have different goals for their learning and work environments. Their information processing systems are different from the Traditionalists (born between 1922-1943) and the Baby Boomers (born between 1944-1964). The Traditionalists and Baby Boomers classroom involved neatly placed rows of chairs with a podium for the teacher to ration out valuable information while the students passively sat at their desks and memorized the curriculum. Traditionalist and Baby Boomers were expected to be good at a passive auditory learning method. They were part of the "sit and get" educational system. Our contemporary students are changing. The Y and Z generations of students are more visual, more kinesthetic and because they are digital natives, they expect accommodations and the use of technology in the classrooms. Based on these differences in values and expectations, instructors need to identify attributes in the learning process in order to be successful in contemporary times. One of the first researchers to identify a theory of accommodation and cognition was Dr. Howard Gardner. Dr. Gardner developed the Multiple Intelligence Theory.

The question of the optimal definition of intelligence looms large in our inquiry. Indeed, it is at the level of this definition that the theory of multiple intelligences diverges from traditional points of view. In a traditional view intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques that compare responses of subjects at different ages; the apparent correlation of these test scores across ages and across different tests corroborates the notion that the

general faculty of intelligence does not change much with age or with training or experience. It is an inborn attribute of the individual. Multiple intelligences theory, on the other hand, pluralizes the traditional concept. Intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. (Gardner, 15)

Dr. Gardner theory includes eight Multiple Intelligences, different ways of being smart. The Multiple Intelligences theory states the following:

According to MI Theory, identifying each student's intelligences has strong ramifications in the classroom. If a child's intelligence can be identified, then teachers can accommodate different children more successfully according to their orientation to learning. Teachers in traditional classrooms primarily teach to the verbal/linguistic and mathematical/logical intelligences. The table of the nine intelligences is:

**VISUAL/SPATIAL** - children who learn best visually and organizing things spatially. They like to see what you are talking about in order to understand. They enjoy charts, graphs, maps, tables, illustrations, art, puzzles, costumes - anything eye catching.

**VERBAL/LINGUISTIC** - children who demonstrate strength in the language arts: speaking, writing, reading, listening. These students have always been successful in traditional classrooms because their intelligence lends itself to traditional teaching.

**MATHEMATICAL/LOGICAL** - children who display an aptitude for numbers, reasoning and problem solving. This is the other half of the children who typically do well in traditional classrooms where teaching is logically sequenced and students are asked to conform.

**BODILY/KINESTHETIC** - children who experience learning best through activity: games, movement, hands-on tasks, building. These children were often labeled "overly active" in traditional classrooms where they were told to sit and be still!

**MUSICAL/RHYTHMIC** - children who learn well through songs, patterns, rhythms, instruments and musical expression. It is easy to overlook children with this intelligence in traditional education.

**NATURALIST** - children who love the outdoors, animals, field trips. More than this, though, these students love to pick up on subtle differences in meanings. The traditional classroom has not been accommodating to these children.

**INTRAPERSONAL** - children who are especially in touch with their own feelings, values and ideas. They may tend to be more reserved, but they are actually quite intuitive about what they learn and how it relates to themselves.

**INTERPERSONAL** - children who are noticeably people oriented and outgoing, and do their learning cooperatively in groups or with a partner. These children may have typically been identified as “talkative” or “too concerned about being social” in a traditional setting.

**EXISTENTIALIST** - children who learn in the context of where humankind stands in the “big picture” of existence. They ask “Why are we here?” and “What is our role in the world?” This intelligence is seen in the discipline of philosophy. (Cortland University)

Although Gardner has not completely committed to the ninth Multiple Intelligence, many pedagogy experts include Existential Intelligence in their curriculum design. Neural research has shown that there is an imperative educational obligation for empathy training in the 21<sup>st</sup> century, therefore the inclusion of Existentialism as a perspicuous consideration in classroom engagement is quite appropriate. Harvard University’s Graduate Education Program has initiated the *Making Caring Common Project*. This project reinforces existential ideas by cultivating empathy and global ethical behaviors. In Harvard’s article *The Children We Mean To Raise*, the need for cultivating connective cognition is promulgated.

Children and youth need ongoing opportunities to practice caring and helpfulness, sometimes with guidance from adults. Children are not simply born good or bad and we should never give up on them. A good person is something one can always become; throughout life we can develop our capacities for caring and fairness as well as many other social, emotional, and ethical capacities. Learning to be caring and to lead an ethical life is like learning to play an instrument or hone a craft. Daily repetition—whether it’s helping a friend with homework, pitching in around the house, having a classroom job, or working on a project on homelessness—and increasing challenge make caring second nature and develop and hone youth’s caregiving capacities. With guidance from adults and practice, young people can also develop the skills and courage to know when and how to intervene in situations when they and others are imperiled. They can become effective “up standers” or “first responders.” (Harvard, Web)

An ethical ethos can and should be addressed through existential education.

Each learner has a unique composition of the nine intelligences that work in union in varying degrees. The learners' environment will either nurture or weaken each of them. Our past educational system has nurtured primarily the auditory mode of learning. Our current environment of technology and visual media is cultivating a higher level of both visual and kinesthetic learners. This is due to the fact that visual media is not just visual by its nature; it may also include several senses beyond the visual. It may include Kinesthetic (movement), Auditory (sound), Interpersonal (social networking), Intrapersonal (selfies, tweets, etc.), or Musical. The explosion of technology and visual media is changing the speed at which we process information; it is also changing the mindset of *where* valid information can be obtained and *how* valid information should be presented in the educational setting. The perceived requirement to have technology and visual media as an essential factor in processing educational materials has become a reality. Our neurons are adapting to the technology bombardment in which we live. In the book *Mind Change*, Susan Greenfield states, "Humans adapt. It is what we do better than any other species. Accordingly, our predecessors have always had to embrace a changing world where new inventions and technologies have, in turn, driven lifestyles, insights, taste, and priorities. So, why should this digital age be any different?" (Greenfield. 14) Greenfield doesn't believe that it is technology in itself that is changing our culture any more than any other invention. What is different is the ubiquitous nature of this new media that is altering how we process information and prioritize our lives.

Nothing could have been further from the 21<sup>st</sup> century scenario of a family member rushing in from work or school to sit for hours in voluntary solitary confinement in front of the screen. One of the big differences between the earlier technologies and the current digital counterparts is quantitative, the *amount* of time the screen monopolizes our active and exclusive attention in a way that the book, the cinema, the radio, and even the TV never have. The futurologist Richard Watson certainly thinks that the degree to which digital technologies are dominating our lives makes the crucial difference: "We've always invented new things. We've always worried about new things and we've always moaned about younger

generations. Surely, most of this is conjecture mashed up with middle-aged technology angst? I think the answer to this is that it's a little different this time. Screens are becoming ubiquitous. They are becoming addictive. They are becoming prescribed." (Greenfield17)

It is clear that technology is leaving a mark on our neural networks; it will also leave a mark on our educational policies.

## HOW IS TECHNOLOGY AND VISUAL MEDIA BEING USED AS A PRESCRIPTION TO SOLVE THE PROBLEMS IN EDUCATIONS?

A study of a successful educational environment must recognize where we came from and where we are going. We must be willing to transform our bias and routine to embrace and harness the power of technology while at the same time aware of the presage it provides. Fifty years ago, the educational focus was simple and three fold, "Reading, Riting and Rithmatic". This transparent, three-part focus provided no integration of subject matter and no consideration of student engagement or individual intelligences. All desk rows and subject areas were neatly placed in the classroom's pedagogical system. Our culture is changing exponentially and the educational system is racing to catch up. One of the latest trends in this educational catch-up is the mandatory prescription to utilize and teach technology in all classrooms. This pedagogical proposal refers to itself with the acronym STEM (Science, Technology, Engineering and Mathematics). The educational mindset is to steer the curriculum to include the much-needed aspect of technology. Technology becomes one of four heroes to save our education system. No one would argue the need for our future generations to be technologically savvy, but does this system seem to honor the multiple intelligences? A brief summary of STEM is below:

STEM is a curriculum based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — in an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. Though the United States has historically been a leader in these fields, fewer students

have been focusing on these topics recently. According to the U.S. Department of Education, only 16 percent of high school students are interested in a STEM career and have proven a proficiency in mathematics. Currently, nearly 28 percent of high school freshmen declare an interest in a STEM-related field, a department website says, but 57 percent of these students will lose interest by the time they graduate from high school. As a result, the Obama administration announced the 2009 “Educate to Innovate” campaign to motivate and inspire students to excel in STEM subjects. This campaign also addresses the inadequate number of teachers skilled to educate in these subjects. The goal is to get American students from the middle of the pack in science and math to the top of the pack in the international arena. (Hom. Web)

STEM answers some of the educational necessities for our students but creates other new demands that are just as strapping. One positive aspect of STEM is the integration of the different subject areas. I applaud the syntheses of disciplines; no subject area should ever be taught in a bubble. The inter-contextual aspects of all subjects are critically important to the depth of understanding for our students and this integration is vital for the ability of our students to apply their new knowledge in real world applications. A second positive aspect of STEM is the move to incorporate technology in the classroom to better utilize visual media as a means of student engagement and information application outside of the classroom. As we have discussed, our Y and Z generation see technology as a natural aspect of the learning environment.

Although STEM is a step in a positive direction in pedagogy in regards to discipline integration and technology diversification and study, one can't help but notice that the STEM educational prospect is not balanced in the consideration and honoring the variety of ways to be considered intelligent nor does it recognize the value of creativity. Consider what Dr. Gardner constitutes as intelligence:

The question of the optimal definition of intelligence looms large in our inquiry. Indeed, it is at the level of this definition that the theory of multiple intelligences diverges from the traditional points of view. In a traditional view, intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques that compare responses of subjects at different ages; the apparent correlation of these test scores across ages and across different tests corroborates the notion

that the general faculty of intelligence does not change much with age or with training or experience. It is an inborn attribute or faculty of the individual. Multiple intelligences theory, on the other hand, pluralizes the traditional concept. Intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. (Gardner 15)

The second looming negative feature of STEM relates to the fact that it does not effectively cultivate 21<sup>st</sup> century skills. The National Education Association has published a table of the 21<sup>st</sup> century skills:

21<sup>st</sup> century skills are based on four C's, which include Critical Thinking and Problem Solving, Communication, Collaboration and Creativity.

**Critical Thinking and Problem Solving would include:**

- Reason, both inductively and deductively
- Analyze information and determine how parts of a complex unit interact with each other
- Evaluate evidence and alternate points of view
- Make Judgments and Decisions
- Synthesize and make connections between information and arguments
- Interpret information and draw conclusions based on the best analysis
- Reflect critically on learning experiences and processes - Solve Problems
- Solve different kinds of unfamiliar problems in both conventional and innovative ways
- Identify and ask significant questions that clarify various points of view and lead to better solutions

**Communication would include:**

- Articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts, this includes visual media
- Listen effectively to decipher meaning, including knowledge, values, attitudes, and intentions. Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade)
- Use multiple media and technologies, and know how to assess their effectiveness. Communicate effectively in diverse environments (including multilingual and multicultural)

**Collaboration would include:**

- Demonstrate ability to work effectively and respectfully with diverse teams
- Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

**Creativity would include:**

- Use a wide range of idea creation techniques (such as brainstorming)
- Create new and worthwhile ideas (both incremental and radical concepts)
- Elaborate, refine, analyze, and evaluate original ideas to improve and maximize creative efforts

- Work creatively with others
- Develop, implement, and communicate new ideas to others effectively
- Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
- View failure as an opportunity to learn; understand that creativity and innovation are part of a long-term, cyclical process of small successes and frequent mistakes - Implement Innovation
- Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur (NEA)

No one would argue that America should go back to the teaching of the three R's, or that we should neglect the different forms of intelligences. It is also clear that technology and new media offer tremendous advantages in our future; we should not digress in that arena. STEM, offers a glimmer of hope due to its rigor, inclusion of technology and integration of subject areas. STEM leaves two important educational aspects out of the educational ring, Multiple Intelligence consideration and the 21<sup>st</sup> century skills (creativity). We can conclude that STEM does not adequately cultivate or honor our students' creativity levels.

There is another solution on the horizon. This proposal has rigor, is more inclusive of the multiple intelligences and values creativity as an important aspect in the 21<sup>st</sup> century. This more comprehensive and contemporary approach to education is called STEAM. The acronym STEAM represents science, technology, engineering, *ART* and math. STEAM promotes subject area integration and embraces technology into the educational system but it vastly improves the system and better aligns it to 21<sup>st</sup> century skills by recognizing art as a rigorous and critical component to successful college, career and life endeavors.

STEAM is a movement championed by Rhode Island School of Design (RISD) and widely adopted by institutions, corporations and individuals. In this climate of economic uncertainty, America is once again turning to innovation as the way to ensure a prosperous future. Yet innovation remains tightly coupled with Science, Technology, Engineering and Math – the STEM subjects. Art + Design are poised to transform our economy in the 21<sup>st</sup> century just as science and technology did in the last century.

We need to add Art + Design to the equation — to transform STEM into STEAM. (RISD. Web)

This approach has designed an educational pedagogy that better prepares our students for an unpredictable future. Creativity is fundamental and should not be ignored if we are going to honor the future needs of our youth. Sadly, although creativity is a potent aspect of the 21<sup>st</sup> century skills, American students are experiencing a decline of creativity in our culture.

Fifty years ago a group of nearly 400 children were given a newly designed Creativity test developed by Professor E. Paul Torrance. Torrance set out with his definition of creativity as the production of something original and useful. Creativity required divergent thinking and a synthesis of ideas for optimal results. A recent Newsweek article stated the following:

In the last 50 years, Torrance and his colleague Garnet Millar—have been tracking the children, recording every patent earned, every business founded, every research paper published, and every grant awarded. They tallied the books, dances, radio shows, art exhibitions, software programs, advertising campaigns, hardware innovations, music compositions, public policies (written or implemented), leadership positions, invited lectures, and buildings designed. Nobody would argue that Torrance’s tasks, which have become the gold standard in creativity assessment, measure creativity accurately. What’s shocking is how incredibly well Torrance’s creativity index predicted those kids’ creative accomplishments as adults. Those who came up with more good ideas on Torrance’s tasks grew up to be entrepreneurs, inventors, college presidents, authors, doctors, diplomats, and software developers. Jonathan Plucker of Indiana University recently reanalyzed Torrance’s data. The correlation to lifetime creative accomplishment was more than three times stronger for childhood creativity than childhood IQ (Newsweek, Web).

The Torrance Creativity test is a 90-minute series of discrete tasks, administered by a Psychologist. One difference between an IQ test and the CQ test is the Flynn effect. The Flynn effect shows that each generation’s IQ scores an average of 10 points higher than the previous generation. The CQ test is showing a reverse trend. American children’s’ CQ scores are falling.

Kyung Hee Kim at the College of William & Mary discovered this in May, after analyzing almost 300,000 Torrance scores of children and adults. Kim found creativity scores had been steadily rising, just like IQ scores, until 1990. Since then, creativity scores have consistently inched

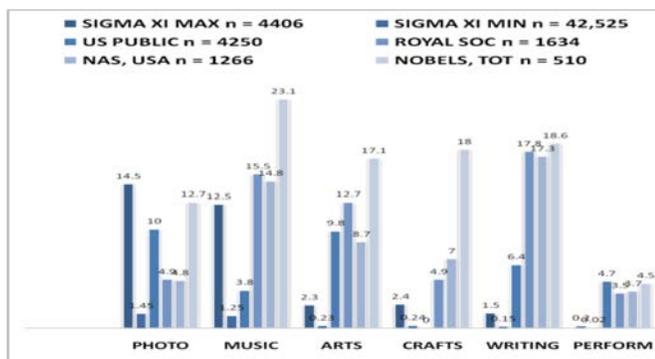
downward. “It’s very clear, and the decrease is very significant,” Kim says. It is the scores of younger children in America—from kindergarten through sixth grade—for whom the decline is “most serious.” The potential consequences are sweeping. The necessity of human ingenuity is undisputed. A recent IBM poll of 1,500 CEOs identified creativity as the No. 1 “leadership competency” of the future. All around us are matters of national and international importance that are crying out for creative solutions, from saving the Gulf of Mexico to bringing peace to Afghanistan to delivering health care. It’s too early to determine conclusively why U.S. creativity scores are declining. One likely culprit is the number of hours kids now spend in front of the TV and playing videogames rather than engaging in creative activities. Another is the lack of creativity development in our schools. In effect, it’s left to the luck of the draw who becomes creative: there’s no concerted effort to nurture the creativity of all children. (Newsweek)

Our children are changing. Our education system needs to address these changes. STEAM presents a superior option for several reasons. This new and improved version of education is a more inclusive pedagogy while it synthesizes subject areas and integrates the power of technology; it better diversifies the curriculum by honoring the Arts and the vital role of creativity in the 21<sup>st</sup> century job market. Consider the mission statement of STEAM:

The future of the US economy rests on its ability to be a leader in the innovation that will be essential in creating the new industries and jobs that will be the heart of our new economy. Where the US has historically ranked 1st in innovation it now ranks between 3rd and 8th depending on the survey. We have taken steps to reverse this slide by embracing and funding the much-needed improvements in STEM (Science, Technology, Engineering and Math) education. STEM is logic driven. Much research and data shows that activities like Art, foster creativity, which is essential to innovation. Clearly the combination of superior STEM education combined with Arts education (STEAM) should provide us with the education system that offers us the best chance for regaining the innovation leadership essential to the new economy. The competitors for that leadership, such as China and many other countries in Asia and Europe, include vigorous Arts curriculum as a national priority in their public school systems and we must do the same. The mission is to make the country, its leader and the funding agencies aware that Arts are not just a “nice” thing to have in the education systems – but rather they are an essential national priority to the future of the US in this rapidly changing global economy. Without that priority the US will slide farther down the list of economies. STEM education is necessary but it is not sufficient – we must have STEAM education – our future is at risk otherwise. (STEAM, Web)

Dr. Robert Root/Bernstein, a professor of physiology at Michigan State University has been conducting research on creativity and the undeniable connection to the sciences. Bernstein advocates the synthesis of science and the arts. His research recognizes the integration of disciplines and the crucial aspect of creativity not just in the sciences but also in all professions. His studies conclude that a focus on the arts has led to major breakthroughs in science. The success of much scientific advancement was directly correlated with a focus on the arts. In his book *Sparks of Genius: The Thirteen Thinking Tools of the World's Most Creative People*, he addresses the synthesis of subject matter and encourages our educational system to do the same. Consider the research table below:

### Adult Arts Avocation Correlates With Scientific Success



Compared with typical scientist, Nobel laureates are:

- 2X photographers
- 4X musicians
- 17X artists
- 15X craftsmen
- 25X writers

This chart reveals the correlation of Science Nobel Laureates and their involvement with the visual arts. Due to the interconnectivity of the brain, educational pedagogies should incorporate integration of subject areas because the careers of the future will require a fusing of disciplines. The demassification of subject disciplines and the acknowledgement of the unique and overlapping qualities they play in propelling advancements of other disciplines should be taken into consideration in the learning environments of the present day. This integration of subjects should, of course include technology but not at the expense of the Arts. I propose that we move toward STEAM while we continue to honor a broad definition of intelligences; this would

diversify the learning environment to provide multi-sensory engagement while recognizing the demand for 21<sup>st</sup> century skills. The integration of the arts would improve not only the learning of science but also, the learning of other subject areas.

## HOW DO WE BALANCE THE USE OF TECHNOLOGY AND VISUAL MEDIA IN AND OUTSIDE THE CLASSROOM?

The benefits of technology are irrefutable. We have for the first time in our lives instant information at our fingertips, endless opportunities for networking and collaboration, a new tool to diversify classroom education, the ability to record and publish historical moments within seconds of their occurrence, and many more extraordinary benefits for our society. However, everything has a balance. There are also negative aspects to technology.

In 2012, a small study of U.S. adolescents reported that boys between the ages of ten and thirteen were playing video games on average a staggering 43 hours a week (although the number of subjects was fairly small, 184). Yet even conservative estimates indicate that the average U.S. child between the ages of eight and eighteen is spending 73 minutes a day recreationally in this one screen-based activity. That means at least an hour a day spent not interacting with the real world (Greenfield, 40).

Yes, video games improve sensorimotor coordination and perceptual learning but this amount of time is extensive and does not promote a balanced life. This substantial number of hours dedicated to computer gaming is hardly moderate. One should ask if they are gaming between 10 and 40 hours a week, when are these children studying, exercising, communicating face-to-face, creating, spending time outdoors or just reading for fun? The time our children spend using technology should be balanced with all of the above. There can be no doubt that this astounding amount of daily technology use, and the visual media besiegement are changing our students' neural pathways and the world in which they live and interact.

Some experts say that because communication is so convenient in our technology based world, children are communicating much more often with each other. They connect faster and

more efficiently than ever before. We are able to maintain relationships with family members and friends across the world in less than a second. The downside to this is the aspect that the communication does not involve eye contact, facial expression and it is depersonalized with anonymity. Greenfield states:

The researchers are also looking into a direct link between high levels of screen time and lower levels of empathy. “We should also be asking why those who already have problems empathizing, such as individuals with autistic spectrum disorder, are particularly comfortable in the cyber world. Could this sanitized and limited type of interaction account for the ease with which bullying, has now found unconstrained expression in the cyber world.” (Greenfield, 40)

The implementation of technology in the classroom should be embraced, but it is imperative that we address the need to promote the establishment of boundaries not only in our lives but also in the lives of our youth.

The aspects of technology in the new millennium will none the less result in questions of how we live our lives, what parameters need to be set, and a thorough investigation on how technology opportunities have altered us emotionally, physically, educationally and culturally. The educational advantages and disadvantages of technology and visual media have conceived and given birth to a different generation with a different neural networking. These neural dendrites are adapting quickly to an ever-changing environment filled with technology and visual media. The human brain is very plastic; this one to three pound organ will adapt to whatever environment surrounds it. These neural changes will no doubt, have different educational expectations for the instructors. We will no longer be able to expect a classroom of students to listen passively in rows while we strictly teach one subject; that is the old educational paradigm and former neural system. Teaching and learning must become collaborative, a teaming of shared information across disciplines and an active participation that involves technology. Rather than building an educational structure around the teacher’s knowledge, the new educational

paradigm will be constructing a scaffolding of tools that honors a variety of intelligences while fostering 21<sup>st</sup> century skills.

The simplified question remains, “Is the inevitable use of technology and visual media good or bad for the educational, emotional and physical well being of our youth?” The question is too simplified and incongruous. The fact remains that the advantages and disadvantages of technology and visual media is an inter-contextual one that allows for immense possibilities and enormous responsibilities for its users and the care providers of our children.

## CONCLUSION

This paper has examined 21<sup>st</sup> century pedagogy as three illusionary races, the race between STEM and STEAM (honoring creativity, integration and 21<sup>st</sup> century skills or not), the race to embrace technology and visual media with guidance and balance (or not) and the race to adapt to our ever changing student body by altering our own teaching methods through diversification of instruction (or not). I believe that we can and should move forward by synthesizing aspects of all three races. This would not only embrace rigor and the union of the sciences, technology, engineering and math, but also recognize the 21<sup>st</sup> century skills and the importance of art and creativity. This new shift in the educational paradigm would endorse visual media through the inclusion of technology in our classrooms, celebrating its’ advancements while proposing balanced boundaries.

I have posed the question of technologies importance and warning signals considering how it is impacting our educational system and the neural networking of our students. The simple question of whether technology is good or bad is inapplicable because the answer is multi-layered. This looming question reminds me of the ancient Taoist story of an old farmer who had worked his crops for many years. One-day the farmer’s horse ran away and his

neighbors sympathetically said, “Such bad luck”. The farmer replied, “We shall see.” The next day the horse returned bringing with it three more horses. The neighbors said “What good luck”. “We shall see,” said the farmer. The following day, the farmer’s son broke his leg riding one of the wild horses. The neighbors again offered their sympathy to the old man. “We shall see,” the farmer answered once again. The day after, army officials came to the village to draft young men; because the son's leg was broken, they passed him by. The neighbors congratulated the farmer on how well things had turned out. “We shall see,” said the farmer.

All things strive to balance.

All things have positive and negative properties to them. The synthesis of technology in our youth’s education, leisure time, communication and social networks is inevitable. The question of whether this infusion is a favorable one or a detrimental one, is much too simple. Personally, I would respond in a very Taoist fashion. “We shall see.” The answer lies in whether we can utilize the best aspects of visual media in our future while remaining able to recognize that every technology breakthrough is only a small part of the larger whole in a quality life.

Kailash Satyarthi stated in his Nobel Peace Prize acceptance speech:

I am afraid that the day is not far when the cumulative result of this failure, will culminate in an unprecedented violence, that will be suicidal for humankind. We live in an age of rapid globalization. We are connected through high-speed Internet. We exchange goods and services in a single global market. Each day, thousands of flights connect us to every corner of the globe. But there is one serious disconnect. It is the lack of compassion. What we need is a transformative compassion that leads to equality, freedom and justice. Let us inculcate and transform this individuals’ compassion into a global movement. Let us globalize compassion. Let us unite the world through the compassion for our children.

If we are going to best prepare our students for an unpredictable future and evolve into a culture that is happy, healthy and highly conscious, then we must embrace the technology advancements in our world and in our classrooms, while at the same time building the necessary boundaries for

ourselves and for our children as we cultivate compassion and interconnections. The research in this paper has revealed some of the neural changes occurring in our fast-paced world filled with technology and visual media. It has questioned the role we play as parents, educators and a society that hopes for a bright future. Will technology and visual media improve our future and help produce a higher level of ethics and understanding of connections in education and with each other?

We shall see....

## Notes

1. Gardner, Howard, *Multiple Intelligences, The Theory in Practice*, (Harper Collins, New York, NY, 1993), 15.
2. Cortland University, Web, <http://web.cortland.edu/andersmd/learning/MI%20Table.htm>
3. Harvard University, *The Children We Mean To Raise, The Real Message Adults Are Sending About Values*, (Web, <http://isites.harvard.edu/fs/docs/icb.topic1430903.files//Executive%20Summary.pdf>)
4. Greenfiled, Susan, *Mind Change, How Digital Technologies Are Leaving Their Mark On Our Brains*, (Random House, New York, NY, 2013), 14.
5. Greenfiled, Susan, *Mind Change, How Digital Technologies Are Leaving Their Mark On Our Brains*, (Random House, New York, NY, 2013), 17.
6. Hom, Elaine, *What is STEM education*, (Web, <http://www.livescience.com/43296-what-is-stem-education.html>)
7. National Education Association. (Web. <http://www.nea.org/assets/docs/A-Guide-to-Four-Cs.pdf>)
8. RISD, STEAM (Web, <http://stemtosteam.org/>)
9. Newsweek, *The Creativity Crisis*, (Web. <http://www.newsweek.com/creativity-crisis-74665>)
10. STEAM, (Web, <http://steam-notstem.com/about/mission-statement/>)
11. Bernstein, Robert, *Sparks of Genius*, (Mariner Books, New York, NY, 1999), MAEA Conference, 2012).
12. Greenfiled, Susan, *Mind Change, How Digital Technologies Are Leaving Their Mark On Our Brains*, (Random House, New York, NY, 2013), 40.
13. Greenfiled, Susan, *Mind Change, How Digital Technologies Are Leaving Their Mark On Our Brains*, (Random House, New York, NY, 2013), 37.
14. Satyarthi, Kailash, Web. [http://www.nobelprize.org/nobel\\_prizes/peace/laureates/2014/satyarthi-lecture\\_en.html](http://www.nobelprize.org/nobel_prizes/peace/laureates/2014/satyarthi-lecture_en.html)

## Bibliography

- Baines, Lawrence. *Multisensory Learning*, (ASCD Publications, Alexandria, VA, 2008).
- Bernstein, Robert, *Sparks of Genius*, (Mariner Books, New York, NY, 2012), MAEA Conference, 2012).
- Harvard University, (Web, <http://isites.harvard.edu/fs/docs/icb.topic1430903.files//Executive%20Summary.pdf>)
- Hom, Elaine. *What Is STEM Education?*, (Web, <http://www.livescience.com/43296-what-is-stem-education.html>), 2014
- Gardner, Howard. *Frames of Mind, The Theory of Multiple Intelligences*, (Basic Books, New York, NY, 2011)
- Gardner, Howard. (Web, <http://infed.org/mobi/howard-gardner-multiple-intelligences-and-education/>, Web 1999: 180-181)
- Jenson, Eric. *Teaching With the Brain in Mind*, (ASCD Publications, Alexandria, VA, 2005)
- Jenson, Eric. *Enriching the Brain—How To Maximize Every Learner’s Potential*, (Jossey-Bass, San Francisco, CA, 2006)
- Greenfield, Susan, *Mind Change, How Digital Technologies Are Leaving Their Mark On Our Brains*, (Random House, New York, NY, 2013)
- National Education Association. (Web. <http://www.nea.org/assets/docs/A-Guide-to-Four-Cs.pdf>)
- Newsweek. *The Creativity Crisis*. (Web. 7/10/10, <http://www.newsweek.com/creativity-crisis-74665>)
- Robach, Kimberly, The Multiple Intelligences – Chart. (Web. <http://web.cortland.edu/andersmd/learning/MI%20Table.htm>)
- Rhode Island School of Design. (Web. RISD STEAM <http://stemtosteam.org/>)
- Satyarthi, Kailash. (Web. [http://www.nobelprize.org/nobel\\_prizes/peace/laureates/2014/satyarthi-lecture\\_en.html](http://www.nobelprize.org/nobel_prizes/peace/laureates/2014/satyarthi-lecture_en.html))
- Silver, Harvey. *So Each May Learn*, (ASCD Publications, Alexandria, VA, 2000)
- Solso, Robert. *The Psychology of Art and the Evolution of the Conscious Brain*. (MIT Press, Cambridge MA, 2003)
- STEAM, The New Movement In Education, STEAM, (Web. <http://steam-notstem.com/about/mission-statement/>)

The Extraordinary and Inevitable Synthesis  
of  
Visual Media,  
Education and  
  
Neurological Transformations in  
21<sup>st</sup> Century Pedagogy

Donna F. St.John  
Professor – Brad Yarhouse

# Presentation Objectives:



- ✓ Finding **BALANCE** – exploring the assets and disadvantages of media and technology
- ✓ Neurology and Education
  - ✓ Plasticity of the brain, Priming
  - ✓ Ubiquitous Nature of Visual Media in Education / Culture
- ✓ 21<sup>st</sup> Century Pedagogy
  - ✓ Multiple Intelligences, STEM, STEAM
  - ✓ 21<sup>st</sup> Century Skills and Creativity
  - ✓ **Global STEAM**



- ✓ The Secretary of Education, Richard Riley stated, “The jobs in the greatest demand in the future don’t yet exist and will require workers to use technologies that have not been invented to solve problems that we don’t yet even know what they are.”

Educational progress should not be assessed by the amount of information that a student can process. Educational success should be measured as the astute ability to creatively synthesize seemingly disparate ideas in order to solve global problems in a collaborative way, with the realization that our entire existence is co-dependent.

# Our Brains are VERY Plastic and Malleable

—  
There is no doubt- our technological environment is changing us for both better and worse.



# Technology Positives

- ✓ Gender equality through the ambiguous nature of technology communications
- ✓ Social Justice equality through historic documentation
- ✓ Multi-sensory engagement – in the learning environment
- ✓ Information is at our fingertips
- ✓ Democratic distribution of information
- ✓ Medical breakthroughs
- ✓ Global economy – Global awareness
- ✓ Reduction of Bar fights?!

# Technology Negatives



- ✓ People are less likely to value information if it isn't on line
- ✓ Students are accustomed to learning in their own time – less acceptance of “school hours”
- ✓ Attention spans are shortening
- ✓ Violence has risen in schools -Since 1970 we had an average of 3 – 4 shootings in every decade

**In 2013, we had 8 SCHOOL SHOOTINGS!**

- ✓ Overload of information – hard to stay in reality - simulacra
- ✓ Difficulty staying on task with the bombardment of media

- 
- ✓ Technology SHOULD be part of a classroom – BUT we should use it intentionally – teaching and modeling a sense of balance
  - ✓ Finger Painting – on the computer?



- ✓ CHARLES FIDAL: “We are not in an educational race against China or North Korea, we are in a race against human kind; I predict we have just two decades to figure this out.”

**Brain Conference, 2013**

# Shift Happens-



<https://www.youtube.com/watch?v=PcZg51ll9no>

# The Human Brain-

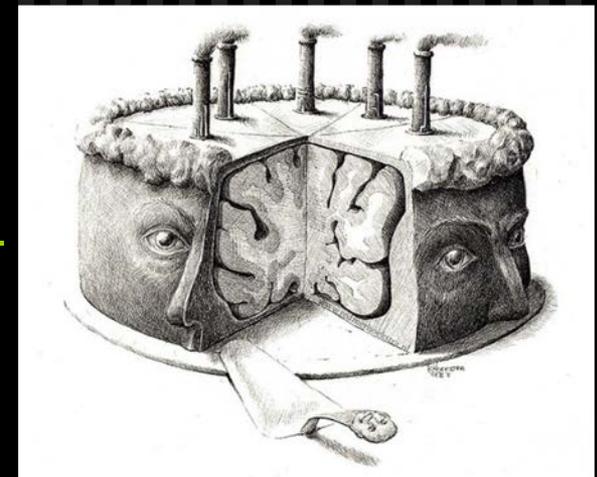
It's ALL Connected and VERY Plastic

**Everything** you experience alters your  
brain



- ✓ “In 2012, a small study of U.S. adolescents reported that boys between the ages of 10 & 13 were playing video games on average a staggering 43 hours a week. Yet even conservative estimates indicate that the average U.S. child between the ages of 8 & 18 is spending 73 minutes a day on recreational videos.” (Susan Greenfield, Mind Change, How Digital Technologies are Leaving Their Mark On Our Brains )

- ✓ One thing we MUST be sure about – neural changes are occurring!



# Visual Media Neural Adaptions -



- ✓ “Humans adapt. It is what we do better than any other species. Accordingly, our predecessors have always had to embrace a changing world where new inventions and technologies have, in turn, driven lifestyles, insights, taste, and priorities. So, why should this digital age be any different?” Greenfield

# Consider Priming –Neural Adaptions - The Oldest Trick

– **Everything** in the environment affects the brain

and our behavior....



- ✓ Priming is used by everyone – teachers, dentists – Really....poster above your head – “Today is going to be a good day?”
- ✓ It was even used by the Iowa football team...
- ✓ Millions of dollars spent getting that PINK out of there – that’s just a couple of hours – don’t underestimate the changes in 3 – 4 hours

# Iowa State University - Priming



# John Bargh Primed for action...



Imagine that I've asked you to come and see me in my office. You walk down a long corridor, come through the doorway, and sit down at a table. In front of you is a sheet of paper with a list of five-word sets. I want you to make a grammatical **four-word** sentence as quickly as possible out of each set. It is called a scrambled sentence test. Ready?

Malcolm Gladwell

Him was worried she always  
From are Florida oranges temperature  
Ball the throw toss silently  
Shoes give replace old the  
He observes occasionally people watches  
Be will sweat lonely they  
Sky the seamless gray is  
Should now withdraw forgetful we  
Us bingo sing play let  
Sunlight makes temperature wrinkle  
raisins

John Bargh Study



- ✓ Now we have discussed the malleability of the brain – we would be foolish to think the ubiquitous nature of technology is not altering our brains
- ✓ now let's discuss pedagogy...

# Pedagogy in the 20<sup>th</sup> Century- Auditory Learning



# Pedagogy Today- Multi-Sensory/Collaborative/Depth of Learning



# Multiple Intelligences and Multi-Sensory Learning- Dr. Howard Gardner

- ✓ **VISUAL/SPATIAL**
- ✓ **VERBAL/LINGUISTIC**
- ✓ **MATHEMATICAL/LOGICAL**
- ✓ **BODILY/KINESTHETIC**
- ✓ **MUSICAL/RHYTHMIC**
- ✓ **NATURALIST**
- ✓ **INTRAPERSONAL**
- ✓ **INTERPERSONAL**
- ✓ **EXISTENTIALIST**

# Me - Visual Learner



# One Advantage of Technology in the classroom – Visual Media is Multi-Sensory:

Visual

Musical

Linguistic

Interpersonal

Intrapersonal

Existential

Kinesthetic - However Not the Cure- ALL

# One Band-Aid- STEM

STEM is the Synthesis of technology and  
education -

- ✓ STEM –Synthesis of 4 subjects:
- ✓ Science
- ✓ Technology
- ✓ Engineering
- ✓ Math

✓ Georgette Ackman

# Advantages of STEM Integration + Technology

- ✓ Making meaningful connections to other disciplines.
- ✓ Provides more relevance to the subject you are teaching.
- ✓ It is brain compatible.
- ✓ Incorporates Technology

# A BETTER Solution -

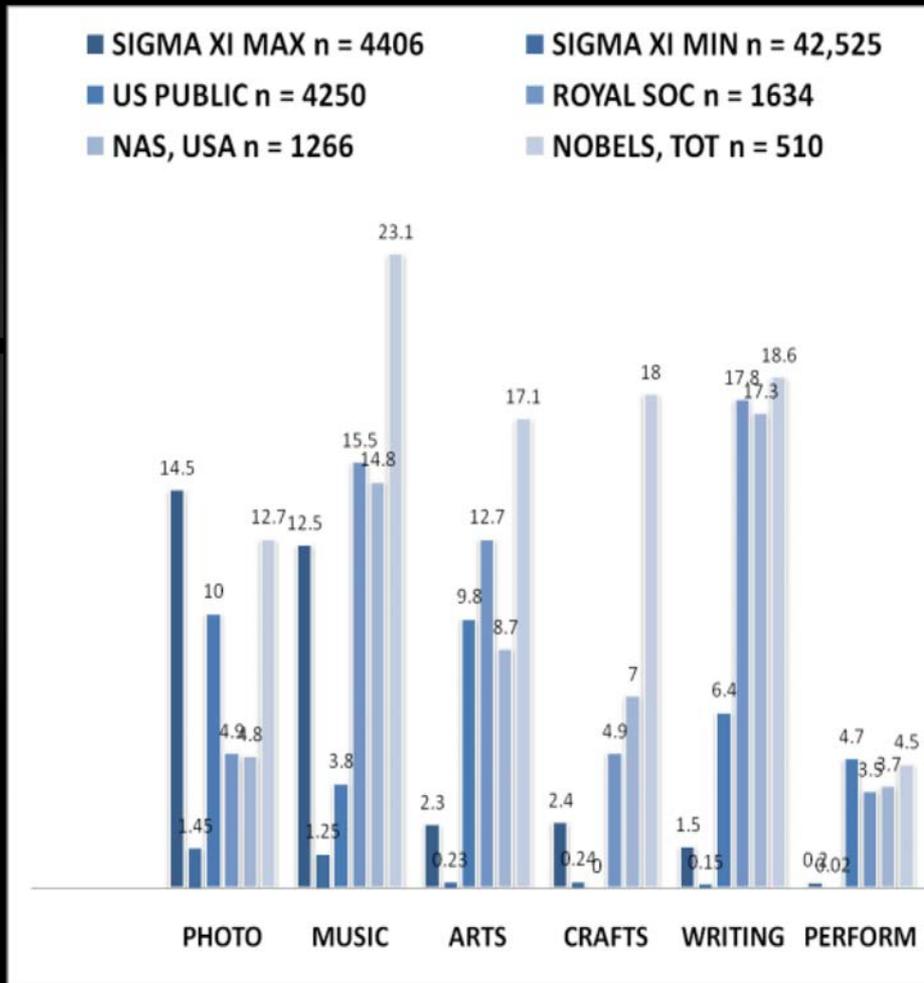
- ✓ STEAM – Synthesis of:
- ✓ Science
- ✓ Technology
- ✓ Engineering
- ✓ ART
- ✓ Math - RISD

South Korea and Singapore are officially adopting  
STEAM



- ✓ STEM is more practical; STEAM is more expressive and creative.
- ✓ STEAM is not a class; it is a culture.
- ✓ STEAM is reciprocal; the objectives for art are also integrated into the other disciplines.
- ✓ STEAM is project based/ constructivist learning environment
- ✓ STEAM cultivates integrated projects (at least two per project)

# Dr. Root Bernstein



Compared with

typical  
scientist,  
Nobel  
laureates are:

- 2X  
photographers
- 4X musicians
- 17X artists
- 15X craftsmen
- 25X writers
- 22X  
performers
- (R-B, et al.,  
2008)

# STEAM = 21<sup>st</sup> Century Skills



- ✓ Critical Thinking and **Problem Solving**
- ✓ Communication
- ✓ Collaboration
- ✓ **Creativity**

- ✓ The STEAM approach has designed an educational pedagogy that better prepares our students for an unpredictable future because it cultivates the arts. **Creativity** is fundamental and should not be ignored if we are going to honor the future needs of our youth. Sadly, although creativity is a potent aspect of the 21<sup>st</sup> century skills, American students are experiencing a decline of creativity in our culture. **Creativity is not something we can ignore.**

# Creativity Decline:

- ✓ The Torrance Study of Creativity –
- ✓ a 90-minute series of discrete tasks, administered by a Psychologist.
- ✓ IQ test and the CQ test
- ✓ The Flynn effect - each generation's IQ scores is an average of 10 points higher than the previous generation. The CQ test is showing a reverse trend. American children's CQ scores are falling.

# Did You Know...Future



<https://www.youtube.com/watch?v=QpEFjWbXog0>

Educational progress should not be assessed by the amount of information that a student can process. Educational success should be measured as the astute ability to creatively synthesize seemingly disparate ideas in order to solve global problems in a collaborative way, with the realization that our entire existence is co-dependent.

St John – Global STEAM

# Presentation Review:

- ✓ Finding **BALANCE** – exploring the assets and disadvantages of media and technology
- ✓ Neurology and Education
  - ✓ Plasticity of the brain, Priming
  - ✓ Ubiquitous Nature of Visual Media in Education / Culture
- ✓ 21<sup>st</sup> Century Pedagogy
  - ✓ Multiple Intelligences, STEM, STEAM
  - ✓ 21<sup>st</sup> Century Skills and Creativity
  - ✓ **Global STEAM**

Technology is here to stay – as it should be - but we need...



Balance....



✓ Kailash Satyarthi stated in his Nobel Peace Prize



# Global - STEAM



Is Visual Media and Technology a  
— positive or a negative aspect  
in education and our culture.....

We Shall see.....

