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Technology's Impact on the Creative Potential of Youth

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The importance of educating students to think critically and creatively was recognized over 2,000 years ago by Socrates, reworked in the 1950s by Benjamin Bloom, and reinforced by many modern-day educators. With changes in lifestyle brought on by innovations in digital technology, teachers, administrators, and parents alike are questioning the effect that these habits could be having on a student’s ability to focus. Teachers, especially, are faced with challenges and unknowns in working with students who have grown up in a digital environment that some researchers warn could be disabling important systems of brain development that relate to lack of exposure with traditional reading. Faced with balancing use of traditional texts and an increase in technological resources, teachers are questioning whether today’s students have the innate capability of negotiating higher-order thinking and generating creative ideas, as the nature of study habits undergoes transformation. This article explores how ability to use creative and higher-order thinking processes relates to exposure to modern technology.

Have the digital habits of youth robbed them of the mental facilities necessary for the deep thinking that formed the basis of creative problem solving, and might this affect their potential to be creative? Have technically savvy youth dulled their ability to use higher-order thinking, distracted by the digital world, with increased tendencies to multi-task? Or is it the case that technological advances can ignite synapses in areas of the brain that have never been tapped, with consequences for an expanded evolution of creative and higher-order thinking?

The impact of technology on many areas is being debated. Although the Nations Report Card (2009) reported no gains in reading scores over the past several decades, the National Endowment for the Arts Reading Study (2009) showed that declining trends in reading over the past several decades reversed, and the rise in e-book interest (and sales) started to make significant gains. Shaughnessey and And (1994) warned of negative consequences for the effects of TV watching on cognitive development, yet Johnson (2006) portrayed a new evolution in TV programming complexity that may be enhancing reasoning skills. Rosser et al. (2007) found surgeons who play video games committed fewer surgical errors compared to those who do not, but Anderson and Bushman (2001) inferred causality between the violent nature of some video games and tendencies to act out that behavior in real life.

A thorough review of the research showed results that supported the doomsayers. DeStafano and LeFevre (2007) reviewed 38 studies that involved reading with digital technology. Findings indicated that the increased potential of enriched information offered by the Internet was more than brains could handle. The evolution of the information delivery system was running ahead of the brain’s ability to take advantage of assimilating the material. It should be noted that most of the research reviewed in the aforementioned meta-analysis focused on the effects of short-term memory as opposed to creativity and higher-order thinking, which may be much harder to analyze and operationalize.

Is it possible there is a generational/cultural conflict involved in the analysis and judgment concerning the habitual effects of digital technology on youth? After all, other instances of generational conflict characterize previous periods of major creative breakthroughs.
CREATIVITY

The act of creating came from an amalgamation of forces synergistically melding with each other. There was the individual, whose exposure to an educational medium led to an innovative breakthrough that redefined preexisting boundaries. Also, there was the society or community who recognized and accepted the creation, opening doors to establish credibility in spite of the novelty of the creative concept, which by nature tends to lie outside the realm of prescribed norms (Lau & Li, 1996). Csikszentmihalyi (1997) saw the process as involving the child and the master, an individual and the work or medium that was used in the creative process, and the relationship between the creator and the society at large.

The interplay between domain (creative medium) and the creator was a component that related to the environment and society at large (Gardner, 2001). Without a supply of marble that was extractable with the technology of the day, Michelangelo could not have chosen sculpture for his creative outlet, and without a society that was desirous of artwork, there would not have been motivation to create. Without a supply of rocks that were known to be able to take a sharp edge, ancient man could not have developed the creative impulses and actions that resulted in making the stone tools that were used to help prepare meats and vegetables for eating. The hunger or desires that motivated creative activity and instilled the impetus to break from established molds focuses this discussion.

Franken (2006) described three reasons why people were motivated to be creative. One was a need for a variety of new experiences, two was a need to communicate, and three was a need to come up with solutions for problems. Franken’s third reason coincided with Magyari-Beck’s (1996) outlook, relating the essence of creativity to the process of surmounting a variety of limitations. Need may be defined as a “physiological or psychological requirement for the well-being of an organism” (Merriam-Webster, 2011). Thus, the creative impulse is intrinsically linked to basic functions that were important to the survival and evolutionary growth of the species. It was not an extraneous process incidental to the course of living, but rather a basic drive that coincided with maintaining health.

ONE OF THE FIRST INNOVATIONS

Archaeologists tracked the time of evolution in the manufacture of ancient stone-cutting tools in millions of years, from about 2 million years ago to 10 thousand years ago. There is little doubt that there were long periods when innovations and creativity were subdued, a sense that the few tools and customs of the time were used consistently, generation after generation, for thousands upon thousands of years, with little variation or change (Mithen, 1998).

As ancient humans scavenged their first taste of meat, before anyone conceived of making a sharp edge on a rock to make it easier to cut, techniques for preparing a meal were dependent on the tools at hand: teeth, hands, and feet. With an increase in protein from eating meat, slowly but surely, the brain of ancient man changed. It became bigger and grew capacities for symbolic thoughts and creative thinking by enabling the evolution of new synapses that were not inherent in earlier forms of the species. Adding protein to the diet helped to create a brain that could conceive of making a tool to facilitate the consumption of yet more protein; the brain found a way to evolve itself amidst an environment whose focus was alleviating hunger. The impetus that fueled the motivation for making the first known invention of the human species was based on an underlying drive to evolve and live, Franken’s and Magyari-Beck’s third reason for why people were motivated, or as Stoll (2010) put it, “It is the voice of life that calls us to come and learn.”

THE FIRST GENERATIONAL DIVIDE

In the midst of this change from using a sharp rock rather than fingers and teeth, there must have been some form of resistance from those who were raised with strong eating habits that had been engrained culturally and biologically for thousands of years. With established norms from communal living, any behavior that detracted from contributing according to the accepted means of the day was likely met with considerable resistance (Bronowski, 1973).

The concept of delayed gratification (taking the time to make something that will help in a task at a later date instead of jumping into the work with whatever is at hand) was a byproduct of the larger brain and involved new regions of synaptic activity. During those thousands of years that stone tool making was evolving, the individuals who had not yet made the cognitive leap of understanding the benefits of delayed gratification may have had the sense that this new form of tool preparation was akin to evolutionary suicide (Coolidge & Wynn, 2009). Resistance to change may be an internal reflex to survive, especially when the vision of the future is obscured by the customs of the times. These conflicts possibly laid the foundation for the battle of the generations, which continues in a heated-up fashion to this day.

READING AND THE ORAL TRADITION

The history of creative evolution and human potential was marked again during the onset of using writing to
supplant the well-established oral traditions of early cultures. The events in the Bible started around 7000 BCE with the creation of the world, Adam, and so on, and the earliest known written record of the Bible dates to 700 BCE. Thus, there were literally thousands of years of oral traditions that passed on the dates, events, and people involved in the earliest known documented history of our species and the planet.

Back in the fourth and fifth centuries BCE, at a time when oral traditions of learning were in full force, Socrates, a student of Diotima (a woman philosopher from Manitea), practiced the intellectual pursuit of challenging ideas through oral dialogue. His method of oral discourse extended the pursuit of honing memory skills for purposes of verbatim recall, pushing the power of logic and thought toward higher/creative levels (Wolf, 2007). The creative impulse evolved from a hunger for food to a hunger for truth, with oral discourse serving as the vehicle for achieving the goal. Mortensen claimed that Plato (Socrates’ student) aimed to argue that in every sense, the oral tradition was superior to communication in written form (Mortensen, 2000). In Phaedrus, one heard the last gasp of reason to hold onto the belief that an oral tradition should be the exclusive form of learning:

If men learn this (reading), it will implant forgetfulness in their soul; they will cease to exercise memory because they rely on that which is written, calling things to remembrance no longer from within themselves, but by means of external marks. What you have discovered is a recipe not for memory, but for reminder. (Plato, 360 BCE)

In the midst of this philosophical struggle to define creative potential, Menander wrote, “Those who can read see twice as well” (Rosas, 2009) during the fourth century BCE, a resurfaced struggle to adopt innovative changes within the context of established cultural trends. The impetus motivating the use of writing as a form of learning was the need to evolve intellectually and creatively (Franken’s second reason for motivating creativity), not just for the privileged few who were fortunate enough to be associated with a wise mentor day in and day out, but for all. Motivations for creativity evolved to include the power to influence and be heard.

The change in lifestyles over the past 300 years, due to a steady uptick in technological innovations that changed the tempo and character of the times at an ever faster clip, created ever wider differences in generational attitudes, compared to the evolution of biological adaptations that eeked out changes in an interminably slow path through the ancient world. Two thousand years after the innovation of reading won the day from a stubborn cultural trend that favored oral learning, technological advancements could make reading (in its traditional form) a relic of times past.

READING, USE OF TECHNOLOGY, AND CREATIVITY

With hundreds of years as a foundation, the human brain had the opportunity to rework synapses and grow into an organ that could handle the multitude of thoughts and schematic connections that occur while reading. Reading’s relationship to the act of creativity, though, seemed to be indirect. In Gardner’s (2001) study of seven creative profiles (Einstein, Freud, Picasso, Stravinsky, Eliot, Graham, and Gandhi), one common trait emerged. Each grew up in a household that promoted a strong work ethic, a trait that Weisberg (1993) also mentioned as a necessary component in the creative process. Runco described personal creativity as evolving from a capacity to generate novel expressions from previous experience (Henshon, 2010). Thus, creativity spawned from connections of new synapses, the nerve endings that connected through thought forms forged from prior experience, thought forms that derived from experience/work (study and reading).

Many authors (Abelson et al., 2008; Bauerlein, 2008; Carr, 2008; Jackson, 2008; Jacoby, 2008; Keen, 2007; Postman, 1993; Siegel, 2008; Wolf, 1997) have warned the experience of growing up with digital habits (TV, cell phones, video games, etc.), and the resultant changes in the physiology of the brain were contrary to supporting the ability to maintain the kind of focus and attention that previous generations derived from reading traditional text. However, Small (2008) reported that the daily use of computers stimulated areas of the brain that were unaffected by reading in the traditional sense. Specifically, the dorsolateral prefrontal cortex was more highly activated in subjects that were Internet-savvy compared with those that read text in the traditional fashion. After 5 days of practice, for subjects who were not heavy Internet users, that part of the brain showed a significant increase in activity. If more brain activity related to overall mental growth and creative output, then these results from Small’s study imply potential benefits for incorporating as much computer-related focus as possible. However, Small & Vorgan (2008, pp. 4–6) warned of overexposure to digital resources, whereby brain regions that control mood and thought can actually be altered, with potential for deleterious results.

Other research showed, however, that the brain was elastic enough to bounce back quickly from techno-burnout. Mednick and Ehrman (2002) held that by manipulating the way information was presented on
a screen and allowing intermittent naps, participants were able to recover from overexposure. This held promise for the potential to shape and optimize the digital environment to allow the human brain to more fully absorb knowledge and take advantage of the increased pace and quantity of information that was made available through enhanced resources.

JUDGING CULTURAL TRENDS

It was unlikely that ancient man could have evaluated the effects of making stone tools on the human mind as the activity was in a process of emergence, nor could Socrates grasp the potential benefit of reading given the foundation of his experience and beliefs. Cell phones and the Internet have been around for the past 20 years. Many studies that showed a decline in an ability to comprehend material when using digital sources compared to traditional reading material may not have taken into account the time necessary for evolving into a new culture of learning habits (Bergen, Grimes, & Potter, 2005; DeStephano & LeFevre, 2007; Foerde, Knowlton, & Poldrack, 2006; Miall & Dobson, 2001; Nielsen, 2006; Ophir et al. 2009; Prensky, 2001; Sweller, 1999; Tun, 1998; Zhu, 1999). One of the confounding variables related to these studies involved the relatively new nature of computer literacy for students that lacked regular exposure to it as a learning resource, and the more demanding task of assimilating a greater variety of material at a faster pace. It seemed, while the brain had the ability to quickly adapt to the expanding rapid informational sources available through the Internet, there was a lag in the ability of those newly activated systems of the brain to shown gains in knowledge via traditional models of assessment. A meta-analysis that focused on comparing which educational platforms were most effective predicted that given additional time, people would become more literate with the digital medium and the cognition lag would likely diminish (Rouet & Levonen, 1996).

DISCUSSION

Two factors stand out in the analysis of judging the effects of technology on the potential to use higher-order creative thinking. 1) Was there a significant change to the motivations that drive creativity in these times, and 2) could the changes in synaptic brain function from using digital technology cripple the physical ability to innovate?

The underlying drive to create seemed to be a function of life itself, which had overlap with a basic human drive to solve problems, construct unique interpretations of experience, and overcome obstacles. With ancient man, that drive was stoked by a physical hunger to survive, and at the time mankind evolved into using written forms of communication; the impetus to extend the power of ideas and communicate proved to be a strong motivating force that expanded possibilities of creative thought. The current digital generation has its own unique characteristics, spawned by a need to create that has overlap with basic tenets that drove mankind from the outset. Power, curiosity, intellectual evolution, and hunger for new experiences, which relate to Franken’s (2006) and Magyari-Beck’s (1996) motivating factors, still form the foundations upon which creativity is acted on today. Although the digital landscape has dramatically changed how people are spending their time, those underlying motivations are still prevalent.

Although reading certainly helped develop overall intellect and establish functions of the brain that relate to following complex thought forms, it seems to have an indirect relationship on the act of innovation. Johnson (2006, p. 22) spoke about the mental work involved in processing and storing information with reading, invoking powers of imagination, ideas that were cobbled together from different disciplines, networking in a new configuration of synapses that evolved over time. Increasing synaptic activity in areas of the brain with digital exposure has an intuitive relationship with the sparks, epiphanies, and potential to come up with innovative ways to connect old ideas, and may contribute to expanding possibilities for creative activity. If, over time, the ability to read devolved to a significant degree, the aha moments of synaptic convergence may not be able to relate to substantive schema that was founded in sound precepts, somewhat like creating without the guidance of the master. This might not have an effect on the ability to create, but may have a drastic effect on the quality of the creations. Although reading did not have a direct relationship with creativity, it did supply the foundation on which creative thoughts flourished. Let’s hope enhanced brain functions that result from using digital sources will compensate for traits that may be lost as traditional reading skills slowly elapse.

REFERENCES


