The Broadly Positive Influence of Technology on Childhood Education

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Abstract

Traditional methods of learning such as pen-and-paper tests and non-digital textbooks are rapidly becoming concepts of the past. The realm of childhood education has evolved dramatically over the past few decades and continues to progress on a consistent basis. Children now have access to novel and powerful technologies at a very young age like never before. While much of the population remains ignorant about the possibilities, these mighty innovations demonstrate great potential for educating the youth. Such technologies not only expand the access to knowledge from just the confines of the classroom, but also can assist in developing specific skills such as reading, creativity, and the success of children with learning disabilities. In this paper I will discuss the many benefits of new technologies and the impact they have on children’s ability to learn.

Keywords: children, education, technology
Introduction

Historically, education for children assumed a more traditional approach. Before the rise of technology, academia was more or less confined to the classroom and conveyed through the physical presence of an educator. Concepts such as iPads, electronic textbooks, and even learning apps were nonexistent.

A recent study by Common Sense, a non-profit that strives to create a safe and educational relationship between children and new media, illustrates a dramatic increase in the use of technology over a very short time span. In a study titled *Zero to Eight*, Common Sense reports that in 2011, only 52% of children ages zero to eight testified having access to a “Smart” mobile device, but in 2013 this number increased to 75% of children. In two years, 23% more children reported having access to at least one so-called “smart” device in their homes (Common Sense Media, 2013).

With so many new forms of communication and mediums to share information, it is no surprise that children acquire an expertise for these new skills at such a young age. Such devices are even making an appearance in a classroom setting for children as young as pre-school, and exposure often occurs before that (McPake, Plowman, & Stephen, 2013). As a result, society must recognize this new trend of childhood education and react accordingly. Many children already develop skills in new technologies by the time they reach formal education, so by expanding upon these skills in the classroom setting rather than stepping back into the historic method of teach, the children of today will be better shaped for success in the future.

In the right context, new “smart” technologies have the capability to expand children’s wide repertoire of activities. They offer benefits that society has never before experienced until
recently, and hold great potential for the future of children in terms of both academic and all-around life skills.

A Global Issue

The boom of technology is becoming increasingly more prevalent in recent years. The global population now has access to hugely intelligent devices such as iPads, Apple Watches, and Google Glass, making the gap between the technologically comfortable and the technologically uncomfortable even more extreme. The disparity between those who were raised with technology and those who were not is becoming clearer, causing an obvious separation between the elderly and the young populations of today. Concepts of that past (i.e., typewriters and Dewy-Decimal Systems) are almost foreign to today’s youth. Studies have been conducted in many parts of the world such as the United States, Taiwan (Tsuei, 2013), Scotland (Arnott, 2013), and Turkey (Kara, Aydin, & Cagiltay, 2013) to draw from just a few. The digitization of education is occurring on a global scale, and therefore, impacts the entire youth population.

Broad Impact of Technology on Childhood Education

Technology Can Improve Reading Skills in Children

In the traditional context, reading consisted of a physical book with printed pages and required the literal act of turning the page in order to progress. Now, however, the new trend of reading is within the context of various electronic devices. Generally, students with higher reading skills are more likely to succeed academically, so this shift in reading contexts requires a fair amount of attention. One added benefit to electronic books is that it condenses a number of resources (i.e., dictionary, thesaurus, highlighter) all into one device. This provides the opportunity for children to look up confusing words, expand vocabulary, and make note of important details instantly and effortlessly. One study followed three second-grade girls through
a staged book study that consisted of one print book and one electronic book. The results demonstrated that two of the three participants utilized the added resources while reading the electronic book, while none of the participants used the same resources but in the physical context (i.e., a highlighter, a dictionary, a thesaurus) while reading the paper-based book. Of the two girls who utilized the digital reading resources, one utilized two separate supplements while the other utilized five (Wright, Fugett, & Caputa, 2013). These results portray the potential that digital forms of reading have on the expansion of knowledge through the curiosity of the reader. It shows that by offering reading supplements on the same device and within easy access of readers even as young as second grade, the likelihood of utilizing such resources increases.

Many previous studies dealing with children and electronic-based reading found that girls actually outperform boys on reading comprehension tests after participating in an e-book based reading activity. However, a recent study by researchers Yueh-Min Huang, Tsung-Ho Liang, and Chiung-Hui Chiu (2013) revealed no significant gender difference in reading comprehension between the two genders, but rather a gap in reading rates between the sixth-grade boys and girls. This study discovered that girls were able to read much quicker than boys, implying that girls practice the technique known as *skimming* more often than boys do, leaving them with a higher likelihood of acquiring more information during a reading task, but not necessarily comprehending more information (Huang et al., 2013). This research pertaining to technology demonstrates the benefit for electronic-based reading for girls, and the potential that these technologies also reveal for boys. The creation of a digital reading device that can attend to the issue of slower reading rates in young boys could provide the opportunity for boys to acquire just as much information as girls, allowing for equal academic success for both genders. By
manipulating the concept of e-books by tailoring them to specific genders, both boys and girls can benefit.

Another important note about the benefits of electronic-based reading on childhood education is that both genders rate the technologically based reading context more highly than the traditional paper-based book context, despite the gender gap (Huang et al., 2013). This provides evidence that children enjoy learning through digital means, so by tailoring learning to their preferences, they are more likely to succeed academically through such means.

**Technology Can Improve Math Skills in Children**

Digital devices have the potential to improve academic success not only by cultivating important reading skills, but also by advancing math skills as well. One such game known as Tug-of-War offers a platform in which children ages 8-11 can develop their proficiencies with fractions. This computer-based gaming system allows students to compete with one another using their knowledge of mathematical operations in order to both engage and teach students. (New, 2013).

**Technology Can Improve Science Skills in Children**

A number of computer-based games on various technological devices have been created to increase childhood learning in the realm of science. As a traditionally hand-on subject of learning, scientific teaching for young children has evolved and is now manifested in various contexts on a number of digital devices. One example of a digitized but educational scientific game is called Impulse. This activity requires students to guide a particle towards a goal, avoiding the obstacles of other particles along the way (New, 2013). Although simple, it teaches basic Newtonian Laws such as mass and force and requires students to engage in such material as opposed to simply reading it out of a textbook. Impulse also provides a safe platform for
students to make a mistake when it comes to dealing with powerful particles and provides instant feedback about ways to improve and ultimately succeed in the game.

Another educational tool with the power to hugely benefit the teaching of scientific concepts to young students is known as Citizen Science. This game deals with science topics pertaining to lakes, and encourages students to take actions to learn more about local lakes in their vicinity. The implications for this type of game are mighty in that they could even provide sway for local legislation and could bridge the gap between science and civic action (New, 2013).

These various technology-based learning platforms provide students with the opportunity to immerse in a wider range of scientific topics while also engaging them with interactivity. Such games provide a safe space for scientific curiosity to be executed and also allows for immediate feedback, therefore notifying students on their progress in scientific education instantly.

*Technology Can Improve Creativity Skills in Children*

Before the development of virtual techniques, creativity was often measured tangibly. Now that technologies have the ability to meet an increasing amount of human demands compared to what they were able to historically, virtual games have been created to measure creativity among children. In recent years, games such as Rosebud, StoryMat, Dolltoy, and StoryToy all encouraged young children to recount their own narratives with the presence of a digital toy (Glos & Cassell, 1997, Cassell & Ryokai, 2001, Vaucelle & Jehan, 2002, Fontijn & Mendels, 2005).

The new creativity toy known as StoryTech combines both an element of recounting personal narratives with the ability to create a fantasy world. It demonstrates a “dynamic storytelling toy for children by providing a mixed-reality environment” in which they can
actively display creativity (Kara et al., 2013). A recent study found that children who participated in a task using the StoryTech device spent more time immersed in the activity, elaborated more, and actually scored higher on measures of imagination used while engaging with the storytelling device as opposed to those using more passive and less hand-on storytelling devices. This study concluded that a more active approach to storytelling in youths benefits creativity and provides a number of possible implications for the future of innovation in the context of children and education (Kara et al., 2013).

Technology Can Improve Language Learning Skills in Children

Historically, the desire to learn a new language typically required a number of different resources such as another individual who speaks that language and various supplies in order to effectively teach. Now, various devices exist in order to ease the process of acquiring language skills while also making the reality more accessible for a broader range of people. The language learning software known as the Rosetta Stone® is transforming the medium through which people of all ages gain knowledge of various different vernaculars. It guides individuals of all levels through reading comprehension, speaking, writing, and vocabulary tasks at a customized rate and combines convenience, entertainment, and knowledge into one device.

A recent study conducted by Mengping Tsuei (2013) demonstrates the effectiveness of using an electronic educational tool as a supplement to face-to-face learning for fourth-grade children learning Chinese. This electronic tool, known as Electronic Peer-Assisted Learning for Kids (EPK), exhibited numerous benefits for children in terms of their acquired Chinese language skills. First, the electronic-based task involved several different sub-tasks, which promoted various types of peer interactions within a single activity between the two partners using the device together. Second, reading comprehension for children using the EPK was
significantly higher for the students in the EPK condition than students in the face-to-face learning condition, meaning that the computer-based supplement can be an effective tool when introducing a new language to children (Tsuei, 2013).

Technology Can Improve Non-Academic Skills in Children

Past research has identified the advantage of technology in an academic context in terms of typical school-related subjects. Expanding the implications away from simply a school setting and into the broader framework of childhood education, technology offers a number of opportunities. One recent device focuses primarily on delivering nutritional information to children. Footgaming, an activity that consists of a wireless mat that requires students to use their feet as the mouse and combines entertainment, nutritional anecdotes, and physical contact, elaborates on the belief that video game-based learning is effective for motivating children (Blumberg & Altschuler, 2011). This study implemented the Footgaming device into various classrooms of third through fifth grade students, asked students to journal their experience with the device, and measured students’ knowledge of nutrition both before and after exposure.

The study showed an 18% learning increase for third grade students, an 11% increase for fourth grade students, and a 24% increase for fifth grade students. In the journal entries, children reported an awareness for their increased learning through comments like, “I feel great because it helps me learn more healthy foods,” meaning that students understand both the entertainment aspect and the educational aspect to this tool. In addition, teachers provided the researchers with immensely positive feedback regarding the implementation of the Footgaming device by revealing the effectiveness of using the game as a reward for good behavior in the classroom (Mellecker, Witherspoon, & Watterson, 2013).
Expanding upon basic nutrition skills, a new game called Virtual Sprouts provides a platform on which children can learn about basic gardening techniques, virtually grow their own garden, and learn about a healthy, well balanced diet in the process. This game allows children and families to maneuver gardening tasks such as selecting, planting, harvesting, and preparing crops in a collaborative setting. It assumes a game-based medium but can also be used as an intervention for preventing obesity.

There are a number of implications for educational games in teaching children about various practical topics. The nature of these devices is both engaging and educational, making the process of learning seemingly mundane concepts much more entertaining.

Benefits of Technology on Different Groups of People

Low Socio-Economic Status

The widely held belief in the past has been that the technological divide between people from high socioeconomic status and low socioeconomic status was extremely large, however, current research has suggested otherwise. The technological shift in daily life affects individuals from both high SES and low SES. A recent study suggests that in both groups, even children as young as preschool have access to “smart” devices like cell phones, video games, and iPads (McPake, Plowman, & Stephen, 2013).

Although the access to technology outside of the classroom for children of high SES and low SES is similar, rural, low wealth schools struggle to draw superior teachers, and in turn, are less likely to set their children up for success than wealthier school are (Vernon-Feagans, Kainz, Hedrick, Ginsberg, & Amendum, 2013). Technology offers children from disadvantaged backgrounds more access to information and a better quality of learning, which can therefore aid in this disconnect between high and low wealth classroom settings.
Children with Learning Disabilities

Much of the medical and psychological research in the past has been performed on the subgroup of individuals with special needs pertaining to physical or sensory impairments. However, the second subgroup of individuals with special needs pertaining to cognitive and learning difficulties has historically received less attention. Students that require learning assistance due to learning disabilities like ADHD, Dyslexia or Autism are likely to have more difficult experience in the classroom than students who do not. Such individuals require attention, flexibility, and patience, three traits that technology has the potential to aid in.

Autism has particularly benefitted from technological supplements in the context of delivering mands, essentially requests enhanced with rewards in order to encourage learning, to children (Rudy). One effective method to mand training has shown to be a picture exchange activity, and recent technologies have assisted in the development of this technique. A recent study compared a physical Picture Exchange method of mand training with a digital approach on a Speech Generating Device, more specifically an iPad, for five Autistic children with a mean age of 4.5 years old. Each child who participated in this study typically received many house of therapy both in the classroom and outside of the classroom. Results from the study revealed that the iPad-based mand training system yielded an 85% independent response rate during the mand-task, meaning that children responded voluntarily, without any cues from the experimenter, 85% of the time. The regular Picture Exchange task yielded only a 64% independent response rate. In addition, four out of the five child participants indicated a higher preference for the iPad-based mand training as opposed to the regular Picture Exchange method. This study demonstrates that technology has the power to not only produce more effective results for delivering mands to
children with Autism, but also engages the children more than the non-digital approach (Lorah, Tincani, Dodge, Gilroy, Hickey, & Hantula, 2013).

Video games also demonstrate a digital device that provides a number of benefits to both individuals with learning difficulties and teachers facilitating classrooms with a wide range of learning abilities. One aspect of these games that could aid in education is the fact that students generally have the ability to access them both inside and outside of the classroom, and therefore, they can influence learning in both contexts.

This new medium of education can be easily adaptable to individual learning techniques, has the ability to instantly provide feedback, can be designed to promote specific skills, and can also provide a platform for children with disabilities to assume a new and equal identity (Durkin, Boyle, Hunter, & Conti-Ramsden, 2013). One psychologist describes that by using video games, “Children got an opportunity to show new competence in the eyes of others, and thereby to display an ‘able’ rather than ‘disables’ identity,” (Wästerfors, 2011, p. 346), therefore furthering the social potential of such devices on the learning impaired population (Arnott, 2013).

Broad Impact of Technology on Teachers

Technological Shift in Childhood Learning Affects Teachers

The digitization of education impacts both student and teachers by altering both learning and teaching styles. Since children often acquire savvy technical skills now by the start of formal education, teachers must respond and alter their lessons accordingly because digital technologies hold great potential to expand the repertoire of young children’s activities when used in the right context by educators (McPake et al., 2013).

A recent study by Arrow and Finch (2013) demonstrates a large gap between teachers and children on perceptions of media use. This research showed, through a number of interviews
and surveys, that teachers perceived their students, typically from low SES families, to use various forms of technology such as video games and TV for entertainment use much more often than they actually did. It shows a clear disconnect between teachers and their students, implying that educators hardly understand the popular culture of the population in which they teach. If teachers do not understand the stability of the relationship between their students and technology, they are likely to implement educational digital-devices into the classroom setting at a much slower and inefficient rate (Arrow & Finch, 2013). Therefore, bridging this separation between students and teachers could greatly increase literacy.

*Technology Can Assist Teachers*

Comparable to the benefits that digital games present for children, they also display advantages for teachers as well. Much like the educational games that exist for children on a wide range of subjects, similar activities provide teaching professionals with the proper skills to deliver knowledge to their students by acting as a type of refresher course in the specific subject. An example of a web-based activity used to educate teachers is called PlatinuMath. This online math game reintroduces the fundamental skills required by the specific context of teaching, engages the teachers in the same type of learning that young students are increasingly being exposed to, and also aligns with Common Core Standards, criteria that educators must become familiar with and diligently follow in their practice if required by the institution (New, 2013). Ultimately, it familiarizes teaching professionals with the learning styles of their students and can aid in developing new in-class techniques that better position young students up for success in the future.

Another technological device that has potential to encourage more effective teaching methods is known as the Targeted Reading Intervention (TRI). This instrument is directed at
assisting struggling readers and providing teachers with the tools to improve proficiencies within this population of student. A recent study concerned with the TRI was performed in the context of children from risk backgrounds in rural, low wealth schools, in order to explore different practices to increase the level of education in these contexts. The TRI is a web-based program that trains teachers in effective and realistic strategies for helping struggling student-readers progress. This professional development program consists of several in-person training sessions before implementing the techniques in the classroom and bi-weekly check-ups during and after the implementation between the teacher and a TRI coach.

In a study investigating the effects of the TRI on Kindergarten and First Grade students from low SES schools, this tool yielded extremely positive results. Schools that utilized the TRI outperformed those that did not on a measure of reading comprehension. Results also showed that the webcam method of delivering professional development skills to educators was extremely effective and relatively effortless on the part of the teacher. It introduced educators to new strategies to progress struggling readers’ reading skills and produced a positive outcome in the general realm of reading comprehension for all students (Vernon-Feagans et al., 2013). The implementation of a tool like this into the classroom setting of low SES and low reading comprehension schools could immensely benefit the quality of education that the younger generation receives, therefore, shaping students for achievements in the future.

Another concept that could enhance the level of education that teachers provide their students with in the classroom is known as a Technology User Group (TUG). Often times in the education system, workshops for teachers are ineffective in teaching new trends, skills, and mediums through which to educate. These events are essentially unsustainable in terms of providing children from all different backgrounds, ages, and learning capabilities with a superior
education. Technology User Groups would act as the liaison between new technologies and the education system by introducing teachers to new learning tools, enhancing their skills with useful classroom devices, and providing a safe space to ask questions about the implementation of technology in a classroom setting. Each TUG would be led by one of more professionals and the entire program would entail a number of required practice sessions.

A study that tested the effects of TUGs in the classroom setting yielded positive results. After being trained in a number of devices, all of the seven teachers in the study began to use PowerPoint either daily or two to three times a week in the classroom to deliver information to students, and almost all of the teachers started using the ceiling mounted projectors daily (Parette, Hourcade, Blum, Watts, Wojcik, & Chrismore, 2013). This innovation shows the impact that a group developed specifically to educate teachers on different device to implement into the classroom in order to advance the quality of the classroom setting can have on the education system. It provides support for TUGs as a form of professional development to educators.

Conclusion

As a general trend, children today often have access to “smart” device both inside and outside of the classroom, regardless of SES. Unlike the traditional method of teaching, “The use of a handheld technology has become widely accepted as part of the classroom-learning environment, and such devices are readily available to students and teachers” (Peluso, 2012, p. 638). By this logic, such devices can have an impact on children’s lives both inside and outside of the classroom, making the proper education on how to use “smart” devices for an educational advantage all the more vital.
In the context of the classroom, digitally based products have the potential to engage students on a number of topics such as reading, math, science, and creative thought. Outside of the classroom, the benefits of these devices persist by providing information about a wide range of topics such as healthy diets and gardening. In addition, the design-based nature of new technologies allow for the production of specific tools aimed at individual learning styles or impairments.

As well as benefitting young, tech-savvy students, new devices and methods of training such devices has been proven extremely advantageous for educating professionals as well. They allow for professional development programs to assume an entirely new form, therefore broadening the quantity of teachers profiting and advancing from the newly acquired skills.

When used in the correct context, technology can vastly boost the standard of education for young students. An increasing number of children enter formal education now with already acquired proficiencies in a number of digital devices, and by capitalizing on this new trend, technology can immensely benefit childhood learning.
References


