**iMath- Reaching the iGeneration in the Mathematics Classroom**

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**Abstract**
The major aims of this paper are to: define a new generation of tech-savvy children that are in our math classrooms known as the iGeneration, discuss how instruction should be adapted to meet the needs of this new learner, and illustrate the potential of this generation’s i-devices in the math classroom. Though educational technology is not a new concept, these i-devices, such as the iPod touch and iPhone, bring a new dimension to instruction that can offer a classroom greater “motivation, engagement, conceptual understanding, and problem solving skills” (Manzano, 2009, para. 11). This paper targets teachers and schools in an effort to shed light on these fairly inexpensive, readily available technologies that have tremendous instructional potential in mathematics.

**Introduction**
Generations in the American culture have been named since the early 1900’s with the development of the Western World. Significant events like the boom in births in the 1940s, the Baby Boomers, or the creation and widespread use of the Internet, Millennial Generation, have defined groups of Americans based on cultural shifts. A new generation has cropped up that is having a major impact on how we think, teach, live, and learn. These individuals are known as the iGeneration. The formation of this generation came with the creation and widespread use of “i” devices such as iPods, iPhones, and iPads. This generation is now in elementary and secondary school. They are described “as being solidly committed to the ubiquitous use of mobile technologies, most commonly MP3 players, Smartphones, and similar devices.” (Rosen, 2010, 229) This generation thrives with individualized technologies and has them as a daily part of their lives. They have had the Internet since they were old enough to read and never knew a time without cell phones.

Technology has distinctively influenced life for all ages, not just those in the iGeneration. We are more apt to Google a topic than looking in an encyclopedia. We book flights online rather than go through travel agencies. Information is emailed more often than sent hard copy through the postal service. With this undeniable shift to a more technology-saturated world, it is time to reflect on today’s classroom and how we go about instruction. In the area of mathematics, the National Council of Teachers of Mathematics (NCTM), the largest math education association in the United States, highlights technology as a vehicle for the teaching and understanding of mathematics in their Principles and Standards of Mathematics (2000). Their vision of mathematics includes classrooms where 21st century technologies are readily available and used as a tool to engage and challenge children. The International Society for Technology in Education echoes these sentiments emphasizing the need for children to “think critically, solve problems, and make decisions” through the use of various technologies (ISTE, 2000, para. 2).
Technology is nothing new to the American classroom. Within the last ten years we have seen widespread use of such tools as interactive whiteboards, mathematics education software, laptops, and graphing calculators. The time has come, however, to make room for a new technology that is not necessarily seen in the classroom. The iGeneration uses them all the time. You might see a young boy with an iPod while mom shops or a teenager texting a friend on their iPhone. These i-devices provide many of the capabilities of a computer in the palm of the hand. This paper will focus on embracing this new generation and their technology in the mathematics classroom.

**The Growing iGeneration**

A striking reality is the research done on the boom of i-devices. Rosen (2010) in his book about the “iGen” speaks of research he did with 1,500 parents. Half of 9- to 12-years olds of these parents had cell phones and two thirds had some form of MP3 player or iPod. Even in the 5- to 12-year old category, more than half of them had video or handheld games in their bedrooms. These children are in our classrooms. With every passing day, the way these children are motivated and engaged changes.

The iGen are those born beginning in the 1990’s. This generation has never known a time without technology and sees new technologies cropping up every year. Parents of these children are embracing this technology allowing more and more of it to be a part of their child’s life. Rosen argues that this has bearing on why many children report school as boring or dull (2010). Though advances have been made with technology in classrooms, Rosen reports that it is not catching up with this generation. A teacher may use a Power Point presentation as part of a lecture but they don’t necessarily utilize the kinds of technology tools they are motivated and engaged by. This paper focuses specifically on the i-devices that have helped characterize this generation including the iPhone, iPod, and iPad. These tools have many capabilities that can be educational and a meaningful addition to the mathematics classroom.

**The Tools of the iGeneration**

The focus of this paper is on just one of the many categories of technology that has quickly grown in popularity with the iGeneration or “iGen”. The iPod Touch or iTouch, iPhone and iPad all fall within the category of wireless mobile devices (WMD). These i-devices are hand-held computers providing users with instant access to the Internet, communication tools, and a great variety of applications. They dominate the technology landscape of youth. For instance, Apple reports 160 million i-devices sold as of April 2011 (Ogasawara, 2011). Of those, 55 million are iPod Touch users. 46% of these users are under 18 years of age (Loechner, 2009). I-device features that make them so enticing to youth include touch screens, colorful graphics, real-time video, and quick access to Internet and applications. According to Rosen, i-devices have “great promise in education” (2010). However, these educational tools have not been used beyond small, isolated studies (Rosen, 2010).

One of the most popular and well known features of these i-devices is the applications, known by iGen simply as “apps”. Apps are a piece of software like software that can be bought for a desktop computer or a videogame for a gaming system. These apps number in the hundred thousand with ten thousand plus specifically in the education category (Go Rumors, 2010). Applications are often free or inexpensive costing on average about $3-$5. They span a wide range of topics including mathematics. A quick search of the word “math” in the Apps Store on these devices will find anything from a simple flash card to graphing calculator app. Teachers are beginning to see the potential of these tools for the math classroom. A We Are Teachers blog article (2010), for example, offers educators a list of math education apps ranging from early learners to secondary school children. The popular McGraw-Hill education publishing company
has created a collection of apps focusing on math teachers and their math curriculum (PadGadget, 2011). Even books published on apps such as Best iPad Apps feature apps suitable for the math classroom (Meyers, 2010).

Adapting Math Instruction for the iGeneration
With a new breed of learners comes a fresh perspective on how we teach them. Rosen’s book Rewired (2010) has inspired many educators to reflect and consider how the classroom can be adapted to better meet the needs of the iGen learner. In the paragraphs to follow, major traits are considered that motivate the proposal to utilize i-devices in the math classroom.

iGens are said to be a “creative, multimedia” generation” (Rosen, 2010, p.218). They thrive in environments that blend sights, sounds, video, colors, etc. This doesn’t mean that a clever Power Point presentation is enough to appease the iGen. Teachers need to consider varied digital modalities to reach them (Wood, 2010). Teachers shouldn’t be afraid to use audio, video, or web-based information to teach with or to blend these approaches. iGens are multi-taskers so let them possibly use headphones while working on an assignment or have an iPod while they do a group activity. The more opportunities these learners have to be independent and active with digitally rich sources the more engaged they are likely to be.

Another area where iGens thrive is in creativity. These children “live to create” (Rosen, 2010). “Teachers can engage students by giving them choices in demonstrating content-area knowledge through different tools, whether it be a movie, podcast, digital poster, or webpage” (Wood, 2010, para. 1). iGens want access to all the tools they have, digital and traditional. Teachers should provide them with choice and flexibility when given a major assignment to work on.

Freedom to work at their own pace is preferred by iGens in school. It’s said to be a product of their fast-paced lives. iGens can easily shift from task to task and work well under pressure. With a few carefully set guidelines, these learners want to be set free to approach the task (Rosen, 2010). Wood (2010, para. 1) warns in his blog that this would likely work best with check points to ensure learners are on target with their progress.

iGens have added a fourth R to the well known three R’s- reading, writing, arithmetic, and realistic technology (Rosen, 2010; Wood, 2010). Teachers are encouraged to embrace technology as the fourth R and “use it to teach and augment the original three” (Rosen, 2010, p.225). There is also the “realistic” aspect of technology. Technology offers the chance for teachers to bring the real world into a lesson and the lesson into the real world (Shuler, 2009).

Teachers shouldn’t fear this new generation of learners. However, there is an undeniable call to consider adapting the more traditional models of instruction. I-devices and their apps offer much of what the iGeneration seeks as part of their learning and is seen as a “key to the future of education” (Rosen, 2010, p.203). A professor who was sharing thoughts on a recently national report called Pockets of Potential (Manzo, 2009) compares the potential impact mobile devices can have on learning to that of Sesame Street on television. Just as this TV program convinced viewers that TV could be more than a tool for amusement, mobile devices are likely to some day be seen as a tool for engaging and activating learners in the classroom (Manzo, 2009).

Apps for the Mathematics Classroom
The iGeneration sits in today’s classrooms. With a sense of who they are and what they need, the teacher has the task of determining how to adapt what they do to bring the “i” into their math instruction. I-devices feature inexpensive apps that can be loaded and played with only a few screen touches. These apps are a way to bring the characteristics of learning that an iGen hopes for in their classroom.
When looking at apps for i-devices in the area of mathematics education, the list grows daily. As of May 2011, a search done in the Apple App Store of an iPad using the key word “math” within the education category results in 2,533 apps for the iPhone and iPod as well as 1,006 for the iPad. These apps cover a wide variety of categories and each have their own unique spin on learning and practicing mathematics.

For this paper, apps were reviewed and categorized based on a number of features to reduce the thousands of apps listed down to a manageable set of quality math related apps for possible classroom use. One feature considered was the style of the app. iGens love multimedia so apps that offer a blend of strong audio and visuals are a good choice. These apps look and feel like a video game. HyperBlast, for example, offers an arcade like feel with 3-D graphics and three game play levels. While battling aliens, children can practice their basic facts in addition, subtraction, multiplication, and division. Other apps utilize mathematical thinking to play the game. Blokus, for example, has players using transformations to place geometric pieces on a game board. In Cut the Rope a player must decide how to cut swinging ropes so a piece of candy can be sent to the hungry animal waiting for it. These types of apps are “game-based” offering mathematical practice while playing a game.

Real world connection is another important iGen characteristic that apps can offer a classroom. Lemonade Tycoon is a perfect example. The player in this app manages his/her own lemonade business with the goal of making a profit. The player has lots of options including the choice of location, recipe, and weather. A more simplistic app for younger players is Pizza Fractions. This app uses pizza to illustrate fractional parts. In any of these real world apps, the player experiences real life application of mathematics in some form. i-Gens appreciate this connection because it establishes a link between what they are learning in school and its relationship to their everyday life.

Many of the apps that can be found offer children a chance to practice a math skill. There are also apps that teach skills and offer tutorials to help understand mathematical concepts. Fractions Helper is one such app offering the user a step-by-step walk through on how to solve addition problems with fractions. Another app called Cheater Pants can offer students a step-by-step visual of the solving process for doing basic arithmetic problems.

Other features that are cropping up among the many apps are the ability to reward the user and provide progress reports. In the app Cash Cow, for example, you can earn virtual money to purchase items and complete tasks on your own virtual farm. The app Academy rewards correct answers with stickers that can be used to decorate selectable backgrounds. Froggy Math app provides a “report card” to let the player know how they are progressing at each level of play. Both of these types of features add a more personalized feel that appeals to the iGen learner.

Apps offer a wide variety of options and mathematical topics to the classroom as a whole. The chart, found at www.tinyurl.com/iMathBoakes, lists a total of 55 apps selected for the many features discussed. Beyond this analysis, each of these apps received a user approval rating of at least 4 out of 5 stars through the Apple App Store rating system. Apps are organized in alphabetical order and are categorized based on the NCTM (2000) mathematical standard area, grade level of the user (lower elementary, upper elementary, middle, and secondary), as well as features including price, game based/real world, practice/tutorial, reward, and progress report. With some creative new thinking, teachers, parents, and iGens themselves can use these apps to enhance and develop understanding of mathematical concepts and skills.
Conclusion
The focus of this paper was to highlight the ever-changing composition of the math classroom. When it comes to technology, the pace of advances is even more pronounced. This new generation of learners known as the iGeneration is cause for pause and reflection on how we approach instruction. iGens think and learn differently. They thrive in media-rich environments especially those that include the i-devices they are aptly named for. Studies over the past five years by the Research Center for Educational Technology at Kent State University in Ohio have found that using these hand-held devices in the classroom can improve students’ motivation, engagement, conceptual understanding, and problem-solving skills. (Manzo, 2009, para. 11).

The applications of i-devices discussed are a simplistic way to begin capitalizing on the iGen’s interests in the math classroom. Apps span all grade levels and mathematical standard areas. They can provide many of the characteristics that an iGen seeks in their learning from realistic applications to an engaging, multimedia style. With the prevalence of hand-held technologies and inexpensive versatile apps, it is time for all those who teach to consider this possibility as a way to reach today’s learner.

References


