

Connected learning: How mobile technology can improve education

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Education is at a critical juncture in many nations around the world. It is vital for student learning, workforce development and economic prosperity. For example, research in Turkey has found that raising the compulsory education requirement from five to eight years increased the percentage of women having eight years of school by 11 percentage points, and had a variety of positive social consequences.¹

Yet despite the emergence of digital learning, most countries still design their educational systems for agrarian and industrial eras, not the 21st century world. This creates major problems for young people who are entering the labor force as well as teachers and parents who want children to compete effectively in the global economy.² With the world moving towards robotics, artificial intelligence, and machine learning, countries need to update their curricula in order to train students with new skills.³

This paper looks at ways that mobile devices with cellular connectivity improve learning and engage students and teachers. Wireless technology provides new content and facilitates information access wherever a student is located. It enables, empowers, and engages learning in ways that transform the learning environment for students inside and outside of school. Mobile devices allow students to connect, communicate, collaborate, and create using rich digital resources. Learning to be comfortable with such devices prepares students for shifts in the global economy and helps them adapt to quickly evolving new technologies.

PERSONALIZED EDUCATION

One of the virtues of mobile devices is that they make it possible to customize educational content for individual students. In most nations, teachers deal with classrooms of very diverse students. Pupils come from different backgrounds, have divergent interests, and learn in unique ways.

In their individual lives, young people are accustomed to personalized content and instantaneous communications. They seek information around the clock and pursue information that is relevant to their particular interests. Indeed, one of the benefits of mobile devices is their ability to provide personalized digital content 24/7. Content should be ubiquitous and customized so that students can follow their learning passions and figure out where to get answers to basic questions.

Research in Turkey with 221 university students has found that e-learning was as effective as face-to-face instruction for learning English. A comparison of those who received training through electronic means reported more positive attitudes and equally effective results compared to traditional approaches.⁴

Other studies show that students are quite open to using technology for learning and that they are aware of new learning tools such as online courses, virtual reality, and video games for instructional purposes. While widespread improvements in technology and communications have modernized some aspects of the education system, mobile has the capacity to accelerate and compound technology's impact by joining massive amounts of information with a student's particular interests.

REAL-TIME ASSESSMENT

Another benefit of the digital world is the ability to embed assessment within learning tools. Mobile devices enable detailed metrics on how students approach subjects, the process by which they acquire knowledge, and how quickly they pick up on key concepts and skills. When content is delivered in digital form, it is easy to deploy pop-up quizzes that evaluate comprehension and knowledge.⁵

These tools free teachers from the mundane tasks of grading rote items and provide immediate feedback for students. Software offers nuanced measures of student attainment. Teachers can develop dashboards that track classroom activities and individual student achievement on his or her learning curve. Students can be categorized into different groups based on whether they have fallen behind their peers and need remedial attention, are on course with their fellow students, or have mastered current material and need more challenging assignments in order to advance their learning.

Pupils in the first category often don't get the extra attention they need to master key concepts and major skills and those in the third category are bored because they learn quickly and have to wait for the rest of the class to catch up with them. Teachers have to focus on the classroom average because that is where many of the students are in the learning process. Neither advanced students nor those requiring extra help are well-served under the current status quo.

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INNOVATIVE PRACTICES

Digital technology helps people think about new classroom models. Students can take more responsibility for their own learning, while teachers can focus on more advanced problem-solving and

building critical skills for those in their classrooms. The result is an educational collaboration that is more satisfying for students and teachers.

A study of Turkish classrooms found that blogs improved student achievement and knowledge acquisition. Comparing undergraduates before and after a computer class demonstrated that those who collaborated through blogs and social media achieved higher scores than those who did not. This led researchers to conclude that “blogs can be used as supplementary mediums to promote achievement and knowledge acquisition.”⁶

Mobile provides great benefits through new learning applications. It represents a way to connect teachers, tutors, students, and peer groups. Pupils can utilize social networks in order to share information and knowledge. It also provides new platforms for reaching the millions of children and adolescents who are currently not enrolled in school. Researchers calculate that mobile enables 180 million students to further their education by 2020 in developing countries.⁷

One project compared mLearning between urban and rural areas in developing nations. The authors found that “students in the rural village, seriously lacking educational resources and technology exposure, may have benefited substantially more from mobile technologies than urban school students.” They argued that mobile devices in rural areas helped students because it gave them access to information that their higher socioeconomic status peers living in urban areas already had.⁸

EMPOWERING WOMEN AND THE DISADVANTAGED

Mobile technology offers particular assistance to women and the disadvantaged by broadening their access to information and connecting them with other people. Many people face major barriers to doing business in the developing world. It is hard to get access to education, financial capital, or business opportunities. Digital tools that help them overcome these obstacles are needed.⁹

In the business area, evidence from the Bangladesh Rural Advancement Committee shows that “those participating in microfinance programs who had access to financial services were able to improve their well-being both at the individual and household level much more than those who did not have access to financial services.” In that country, for example, “clients increased household expenditures by 28% and assets by 112%. The incomes of Grameen members were 43% higher than incomes in non-program villages.”¹⁰

These types of programs are especially helpful to women. In many places in the developing world, females have difficulty getting loans from traditional financial institutions. A combination of social norms, cultural values, and religious practices make it challenging for them to obtain the resources to form companies or launch businesses.

Researchers have found that “access to financial services has improved the status of women within the family and the community. Women have become more assertive and confident. In regions where women’s mobility is strictly regulated, women have become more visible and are better able to negotiate the public sphere. Women own assets, including land and housing, and play a stronger role in decision making.”¹¹ Empowering the half or more of the population that faces major barriers through mobile technology can unleash tremendous innovation around the world.

In the education area, an innovative program called “Snowdrops” developed by Turkcell and the Association in Support of Contemporary Living has provided thousands of women with new opportunities. Twenty-nine thousand have received scholarships, 15,000 have graduated from high school, and 1,450 have universities degrees that helped them advance positions.¹² Improved access to education has been transformational for those who participate in this program.

The company’s Turkcell Academy also has provided training for nearly 50,000 employees, both male and female. This includes programs in leadership, technology innovation, and customer relationships. Courses cover topics such as sales and marketing, mobile communications, knowledge technologies, and management training. This helps them advance their skills and gain high-level positions.¹³

Some of these classes are online through the Coursera digital learning platform. Students can take a wide range of educational offerings in Turkish or English.¹⁴ Others are “massive open online courses” (MOOCs) through the Massachusetts Institute of Technology. They cover topics such as business, entrepreneurship, science, and finance.¹⁵

Researchers have found that computer literacy training is especially helpful for women. A study of 175 females who received this kind of instruction adapted more easily to digital applications and displayed more positive attitudes towards computers. These types of programs reduced the digital divide and brought more people into the electronic era.¹⁶

THE “INTERNET OF THINGS”

Mobile connectivity is very important for what has come to be known as the “Internet of Things.” In 2009, writer Kevin Ashton coined this term to describe the emergence of machine-to-machine communications linked through high-speed networks and cloud-based solutions.¹⁷ Years later, what started out as a theoretical construct has emerged full-blown and is changing people’s lives.¹⁸

Smart objects enable manufacturers to track their supply chains more effectively. Through digital tags attached to particular items, managers can see where their supplies are and whether they have the inventories needed to build particular products. This type of connectivity, when used in conjunction with the Global Positioning System (GPS), can be transformative in a number of different areas. In conjunction with smartwatches and smart appliances, it is clear that new devices are transforming contemporary life.

Consultant Nam Pham has analyzed the situation and concluded that “with the increased adoption of mobile phones throughout the world and the growth of phones with GPS positioning capabilities, mobile phones and networks are now an essential tool for things like agriculture, transportation/logistics, and emergency response and disaster management, as well as providing important tools and information to protect and aid individuals.”¹⁹

Smart appliances help consumers keep track of their heating and security needs. For example, consumers can use mobile devices to set their thermostats or turn on their home security systems. They can make sure that dishwashers run at optimal times from the standpoint of saving energy and refrigerators keep products cool. Smart meters show people how they are consuming energy and what the cost is at various points in time.

Motor vehicles now are equipped with GPS chips that monitor engine performance and make sure that the cars are operating at peak efficiency. Smart cars can help people park in tight spaces and anticipate possible accidents through early warning systems. Mobile apps can tell people when a particular bus they need will arrive at their street corner. This helps people deal with the issues of day-to-day living.

As the world evolves from human-to-human computing to electronic sensors and machine-to-machine communications, mobile devices will have even greater value than today. Once they are embedded in a range of daily activities, it will become apparent how much they contribute to a number of different endeavors. According to Maravedis, “20% of mobile carriers say M2M will be a number one source of revenue growth 2013-2017.”²⁰

CONTRIBUTIONS TO ECONOMIC GROWTH

One of the greatest benefits of mobile technology is the contribution to economic growth. According to the World Economic Forum, “no socio-economic factor is a better indicator of a nation’s economic success than its investment in education and mLearning. [It] offers fascinating opportunities to systemically redefine the way that individuals and communities can contribute to society.”²¹

An analysis by economists Harald Gruber and Pantelis Koutroumpis found that national growth improves significantly based on mobile usage. Looking at 192 nations from 1990 to 2007, they found increasing returns in terms of productivity and growth based on the use of mobile devices. For high income nations, mobile technology added 0.20 percent annually to Gross Domestic Product, while in low income countries, it contributed 0.11 percent.²² They also looked at mobile infrastructure investment and found that it paid off in economic growth. Nations that invested saw GDP gains of 0.39 percent in high income places and 0.19 percent among low income places.²³

A number of studies have looked at the economic impact of mobile for specific countries, and found a significant tie. For example, the consulting firm LECG undertook an analysis of India and found that “an investment of US\$20 billion in 3G networks over the next five years will benefit India’s economy by more than US\$70 billion and create up to 14 million jobs.” And in China, it said that, “the current and future economic benefits from Chinese operators’ proposed investment of \$59 billion is likely to exceed \$110 billion.”²⁴

Similar trends are apparent elsewhere. GSM research demonstrates that the mobile economy is likely to add \$729 billion to Asian Pacific GDP by 2020. It is anticipated that two million jobs will be created and there will be \$131 billion in new tax revenues. In some cases, analysts have found that “states with 10 percent higher than average mobile phone penetration enjoy an annual average growth rate 1.2 per cent higher than those with a lower teledensity.” This leads research leader Rajat Kathuria of the ICRIER to conclude that: “telecommunications is a critical building block for the country’s economic development. Our work also shows that the real benefits of telecommunications only start when a region passes a threshold penetration rate of about 25 percent. Many areas have still not attained that level, which indicates the importance of increasing teledensity as soon as possible.”²⁵

THE MOBILE REVOLUTION

To summarize, mobile technology represents a growing part of the economy and is a driver of major innovation. Through new products and services in education, health care, and community living, among other areas, the mobile economy is creating new jobs and opportunities for many different people.²⁶

There already is a wide range of digital content available to students and teachers. This includes instructional games, augmented reality, interactive websites, and personalized instruction. The virtue of electronic information is that it gives students greater control over their curriculum, thereby allowing students to proceed at their own pace and in their own learning styles.

This digital revolution furthermore enables real-time assessment of student performance. No longer do we have to wait weeks for students to receive feedback regarding their skill mastery. Teachers can embed pop-up quizzes in online content delivery and pupils can be evaluated on an on-going basis. This provides regular, real-time feedback to students and parents, and allows teachers to see which individuals need extra help and which ones require more challenging assignments.

Finally, mobile technology is a way to transform learning. It is a catalyst for creating impactful change in the current system and crucial to student development in the areas of critical-thinking and collaborative learning. Those are the skills that young people need in order to secure their place in the globally competitive economy.

Note: Thanks to Joshua Bleiberg, Hillary Schaub, and Beth Stone for valuable research assistance on this project.

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