After the bell rings
Digital education outside the classroom

By Dr. Preeta M. Banerjee, R. Greg Merchant and Kevin Westcott
It’s the last week before summer break, only a few years from now, and Emma is excited—she’s going to Lake Tahoe with her family. She’s wanted to see the place since she first learned about it in her earth sciences eBook, and her sixth-grade science teacher has given her a project to gather rocks from the region. To help with her summer assignment, Emma’s tablet is equipped with geology-related apps her teacher recommended. In particular, she’s installed a blended-reality app that depicts the landscape of her current location and augments it with digital information. She plans to post images she takes on her trip on a social media group with #stonequest. Her seventh-grade teacher will pick up Emma’s assignment seamlessly when she and her fellow students return to school after summer break, and integrate her findings into her lessons.

Emma is enjoying opportunities that weren’t even dreamed of until recently—emerging technologies, platforms, and techniques that promise to revolutionize education and extend its reach far beyond the classroom.
Digital education goes mainstream

Digital education (Dig Ed) is a blanket term for the use of digital devices, materials and solutions in educational settings. It can include educational software, games, videos, podcasts and audiobooks, e-books and magazines and more, accessed through laptop and desktop computers, tablets, mobile phones, gaming systems, and even fitness tracking devices.

Dig Ed materials and solutions are transforming the classroom. Deloitte's 2016 Digital Education Survey (DES) found that many teachers, parents, and students are embracing this evolution with enthusiasm. A majority of these stakeholders believe Dig Ed makes a positive difference in learning outcomes and experiences. At present, 80 percent of teachers use Dig Ed at least once a week; 75 percent believe digital content will completely replace print textbooks within the next decade.

Growing interest in Dig Ed generated an $8.4 billion market in 2013, with an expected compound annual growth rate of nine percent through 2019. Industry group EdSurge reports that American Dig Ed companies received almost $1.4 billion in investments in 2014, 13 percent more than in the previous year. The K-12 segment accounted for $642 million in investments, a 32 percent jump from 2013. According to Edsurge, 161 Dig Ed investments reported worldwide during the first half of 2015 had a combined value of nearly $1.6 billion. The US accounted for 107 of these deals, with a total value of $1.1 billion.

US school districts are increasing their spending on educational hardware and software, online learning and learning management systems, using Dig Ed for new instructional approaches, personalized learning, mobile learning, and improved connectivity.

Yet while advanced technologies are fundamentally transforming nearly every sector of the economy, K-12 is only beginning to see their benefits. Dig Ed's potential lies in its ability to support all learners, adapting to their individual personalities and needs. And its potential extends beyond the classroom, enabling students to learn independently and effectively in school and out. By providing ways to further integrate the classroom with the world, Dig Ed could help educators combat "summer slide" and meld classroom instruction with daily life. The ‘integrated student learning life cycle’ that we highlighted in our previous paper (Digital education 2.0: From content to connections) can be extended outside the fixed times of classroom instruction, including summer and winter breaks, with the help of Dig Ed solutions (Figure 1). In an integrated digital education ecosystem, teacher, peers, parents, and real-world experts come together to provide a holistic learning experience to students who occupy a central position in the ecosystem. By exploring the extension of digital education use outside the classroom, this paper tries to add dimensionality to the discussion.

Figure 1: Adding dimension: Extending student learning outside the class

Source: Deloitte analysis
## Going outside the classroom

While Dig Ed is increasingly common inside the classroom, Deloitte’s DES shows that nine out of 10 kids use electronic devices and digital learning materials outside school, and that this use starts early, with two out of three using them by the age of five. More than 80 percent of parents and teachers are very or somewhat interested in having more at-home digital content to supplement school lessons, and 75 percent of students are interested in spending time learning more about the things they learn about in school outside of class. This interest, combined with the widespread availability of digital devices, lays the groundwork for potential sweeping change in education. Dig Ed is frequently used in the classroom to achieve a variety of goals.

However, untapped opportunities may lie beyond the classroom. The DES shows that there were significant gaps between Dig Ed’s potential and its actual frequency of use. Particularly when it was related to providing learning opportunities outside the classroom and during school breaks.

As seen in Figure 2, 74 percent believe that technology would make a significant difference in providing learning outside the classroom while only 33 percent use it regularly to do so. Similarly, 64 percent believe technology would make a significant difference in allowing students to get feedback and help when school is not in session, while only 25 percent use it regularly to do so.

Recent research shows that digital education outside class can improve student performance. Students who use digital technology to participate in school-related discussions and projects both in and out of class achieve better academic outcomes than those who participate only in class. “Real-life” projects provide a better understanding of the processes involved in scientific inquiry. And Dig Ed can be used to reduce the time and location barriers that once kept many kids from participating in such projects.

In particular, digital learning during summer break provides opportunities to combat the negative effects of “summer slide” on student performance. After each summer, teachers have to spend a considerable amount of time “re-teaching” previous content, and for many students, summer’s disruption of the school year leads to lower achievement. On the other hand, students who pursue summer learning activities show significant improvement in areas such as reading, vocabulary, and mathematics.
Seventy-three percent of the responding students in the DES said that the time they spent on summer learning would increase to some extent, if it involved digital tools such as educational games, apps, videos, and software. The response illustrates substantial interest—and an opportunity. If parents, teachers, and students are interested, what’s hindering the adoption of digital education solutions outside the class? To find out, we analyzed open ended responses to the general question of how Dig Ed can address neutral or negatives impacts. Results suggest (Figure 3) consistency in three main themes including 1) providing additional training, 2) connecting inside and outside the classroom, and 3) engaging students.

Parents may believe, for instance, that technology detracts from connecting with the classroom—impacting the social interaction and hands-on activities. But when they can see the benefits and positive outcomes, their opinions toward Dig Ed become significantly more positive.

For teachers, lack of training is one of the biggest barriers to increased use of educational technology in and outside the classroom. And, perhaps unsurprisingly, student interest appears to be greatest for activities that are fun, that result in real rewards or give them a chance to hang out with friends.

To help succeed in the out-of-the-classroom market, digital education players could create and capture value by tailoring their offerings according to the specific needs of teachers, parents, and students.

**Figure 3: Top challenges to digital education adoption**

Source: Deloitte analysis; * with neutral or negatives view of impact of Dig Ed
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Opening the door to new opportunities

Outside the classroom, Dig Ed strategies should allow students to develop personalized learning programs tied to real-life activities and based on individual interests and career aspirations. The emergence of digital workplaces and open talent networks could offer new opportunities for these real-life projects, introducing students to innovation and entrepreneurship at a very early age.

In Kansas, for example, the Blue Valley School District’s Center for Advanced Professional Studies (CAPS) allows students to immerse themselves in a professional culture, earning credit while solving real-life problems, employing standard technologies and approaches while being mentored by actual employers in fields such as biosciences, medicine, engineering, business, and media. The students, for instance, pursue projects using tools like robot kits, simulators, and even 3D printers.²⁰ CAPS’ self-described goal is to “produce personalized learning experiences that educate the workforce of tomorrow, especially in high skill, high demand jobs.”²¹

To enhance the adoption of digital education outside the class, we propose three main strategies to prepare teachers, influence parents, and engage students.

Preparing the teachers

DES findings show that teachers can influence decisions related to the choice of digital education solutions, both inside and outside the classroom. Many teachers are uniquely trusted by other teachers, parents, and students, and looked to for advice and opinions. Yet four in 10 teachers say that their own lack of training in education technology is one of the biggest barriers to increasing its use.²² Solution providers can play a key role in overcoming this barrier by encouraging teacher training and credentialing in Dig Ed tools and concepts.

Credentials offer teachers an opportunity to develop specific expertise in digital education, in devices, content, or delivery; just as importantly, they serve as a proof of valuable and transferable knowledge. One nonprofit dedicated to educational innovation, Digital Promise, has teamed with the Dig Ed company, BloomBoard, to provide an online platform that allows teachers to earn “micro-credentials” in specific competencies ranging from classroom management to performance assessment.²³

A similar initiative developed by a consortium of nonprofits, universities, and educational agencies, Leading Edge Digital Educator Certification, aims to establish national Dig Ed certifications for educators.²⁴ And Google has launched a new center to train educators in the use of Google Dig Ed products in class. The center offers free professional development resources for teachers using Google education apps, and offers certifications in the use of their products.²⁵

The next step may be the expansion of credentialing in products and techniques that take Dig Ed outside the classroom. To develop such competencies, smaller Dig Ed companies could partner with larger credentialing entities.

How can companies see returns on such investments? One way is by cultivating teachers as trusted advisors. Trained teachers can easily connect and collaborate with others to expand their learning horizon and find new, real-world educational opportunities for their students.

By using tools such as simulators,²⁶ accelerators,²⁷ and social networks, educators can model real-life situations, perhaps by identifying problems in the local community and building student projects or challenges around them.²⁸ Such efforts, often called “authentic learning,” place student activities in the context of real-world experiences and challenges.
Influencing the parents

Teachers might hold the power to influence, but when it comes to spending on digital education products and services outside the classroom, parents make the final call. Even if they are issued by school, use of digital education requires parents’ consent. For parents, solution providers could adopt a two-pronged approach.

First, the security and privacy of student data represents a challenge. Many parents have raised concerns about the misuse of students’ personal data. Much is being done to address such concerns through data anonymization and other approaches. The Consortium for School Networking’s Smart Education Networks by Design (SEND), for example, employs a suite of network strategies to keep data secure.

The challenge not only lies with the potential organizational misuse of students’ personal data. Additionally, as the number and variety of digital technology used in the classrooms increases, the attack surface can increase. For example, the proliferation of personal devices brought into the classroom, presents challenges for the individuals charged with managing and securing K-12 networks. Some state information technology (IT) organizations are starting to help by extending state-level capabilities such as security event monitoring and intrusion detection capabilities to the districts.

Secondly, educational technology solutions can be made more attractive to parents by specifically tying them to benefits that matter, such as making learning more interesting, or allowing students who have mastered a topic to move on without waiting for others to catch up. Showing educational technology in action could help. By placing Dig Ed in potential co-learning spaces (such as maker labs, libraries, or mall kiosks), companies can allow parents to experience the benefits themselves.

Clear communication of benefits and proper positioning of offerings may spur greater adoption. Small tweaks in branding and positioning can make Dig Ed products more attractive to parents, such as replacing “learning game” with the more palatable phrase “educational app.”

Engaging the students

Competing for many students’ time and attention has become an uphill battle, due to the onslaught of digital platforms, gadgets, and entertainment avenues. Research shows that Generation Z students have shorter attention spans and an increased tendency to multitask, making it tougher to engage them.

So how can we earn a share of the student’s time and motivation? One way is through what’s been called “gamification,” giving students a chance to earn rewards for participation. In the era of video games, competition can be feverish for intangibles such as virtual currency, badges, and unlockables. A case in point is Fruity Fractions, an app that uses an unlockable story to motivate first- through third-graders to learn and apply concepts of fractions.

But some games succeed because they offer players a chance to socialize, which can be a tangible reward for kids in itself. An educational game that allows students to hang out with friends will likely draw more kids than one played in isolation. Unsurprisingly, the DES indicates that a chance to spend time with friends is the second-strongest motivation for kids to participate in summer learning.
Real-life educational experiences can be designed to take advantage of technology in a way enticing to the gaming-savvy student. Emerging technologies such as conversational interfaces (voice-operated learning systems), blended reality (virtual reality and augmented reality), and ambient computing (technologies responsive to a human presence) can help create immersive experiences that connect classroom concepts with real-world situations.

A number of companies are developing innovative coding platforms and robotic toolkits that make it easy for students to learn programming and automation in a fun and engaging way. Codecademy uses games to make programming less daunting. As a real-world exercise, for instance, students could create their own learning games for their fellow students. Tasks like these empower students to take charge of their own learning and be more proactive learners rather than just being a recipient. According to the DES, about 90 percent of responding parents are comfortable with allowing their kids to play a digital learning game.

With the right design, allowing students to immerse themselves in scenarios and make decisions in virtual situations can empower them to use that knowledge in the real world. Virtual reality and artificial intelligence can be combined in “adaptive learning environments,” which themselves learn from student’s responses and change to gradually increase in difficulty, imbuing critical thinking skills. Teachers and students can jointly explore such environments to test and practice concepts learned inside the classroom.

Moving education into the world
While many digital education players have been focused on delivering engaging content to the classroom, the next big opportunity may lie in connecting the same concepts to the world outside the class. Ongoing enhancements in technology, platforms, and interfaces that can promise convenience, security, and engagement can engender greater penetration for digital education solutions outside the class. Enabling the teachers through training, credentialing and offering toolkits to model real-life situations can increase their usage and support of Dig Ed solution. Similarly, secure Dig Ed solutions earmarked with clear opt-in policies and tangible benefits could help in winning the trust of parents. Developing solutions that empower students and allow them to learn, have fun, collaborate, and earn rewards at the same time will likely gain their attention. Many Dig Ed players have a huge opportunity—right now, today—to move digital education outside the classroom by making teachers ready, showing parents clear benefits, and engaging the student through the technologies, games, and apps they already love. Solution providers who consider all these strategies and meaningfully adopt emerging technology trends can capitalize on extending the next wave of digital education from content to connections, both inside and outside the classroom.

Methodology
Deloitte’s Media and Entertainment practice commissioned the 2016 Digital Education Study. An independent research firm conducted the survey in May and June 2016. The survey sample included 503 teachers, 1,304 parents and 1,014 children from the same household as the parent respondent. The sample was obtained from online panels including the research firm and approved partner-panel vendors. It was targeted to known teachers and parents known to have children under age 18. All respondents were rescreened to meet study criteria and sample balancing was applied minimally, to bring teacher and parent/child samples in line with national norms. The study also included open-ended questions for teachers, parents and students. Responses were analyzed using n-gram text analysis. Frequently occurring phrases were identified and clubbed into categories based on the similarity of themes.
Digital education outside the classroom

1. Digital learning materials include: educational software or apps, educational games, educational videos, educational audio (e.g., podcasts, audiobooks), research sources (e.g., online news) eBooks, eMagazines, eTextbooks, simulations / virtual reality (e.g., virtual science labs).

2. Devices include: tablets, phablets, mobile phones, eReaders, laptops, desktop computers, gaming devices (handheld and consoles), interactive whiteboards, digital audio devices (e.g., iPods, mp3 players), televisions, fitness tracking devices (e.g., Jumpy, Fitbits, etc.).

3. Digital education solutions includes devices and digital learning materials used in the context of learning.

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14. Preeta M. Banerjee & Gerald Belson, “Digital Education 2.0: From Content to Connections.”


19. Deloitte analysis based on the text analysis of 397 responses to the open-ended question: “Why do you say educational technology has had a neutral/ negative impact on the role of the teacher?” Question from the 2016 Digital Education Study.


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26. A device or content designed to provide a realistic imitation of the controls and operation of a complex system (such as aircraft, surgery etc) used for training purposes.

27. Accelerator specialized spaces that are used to promote spirit of entrepreneurship in students which encourages students to think about new ideas, products and services.


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