The Next-Generation Classroom: Smart, Interactive and Connected Learning Environments

WHITE PAPER
Sponsored by: Samsung
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EXECUTIVE OVERVIEW

The technology landscape, from tablets and e-readers to learning management systems and multimedia digital textbooks, continues to evolve and bring new opportunities for educators. The widespread adoption of tablets, mobile applications, social networks and digital content has led students to expect more interaction via software and digital content as they learn. As such, education investments need to focus on tools that not only provide value by motivating students to be active participants in their own education but also increase collaboration and connections in the learning environment.

With the changing face of school education, it is important for educators to take a look at the classroom environment through the lens of digital interaction. Integrated solutions that put tools such as screen and content sharing, instant polling and group surveys, and remote device management directly into the hands of students and teachers via tablets provide the means to keep students engaged and improve classroom management. Educators should pay attention to the potential benefits tablets and an integrated set of hardware and software solutions bring to the classroom, such as improved student engagement, better student achievement, and more efficient classroom management.

This White Paper explores the potential advantages of using digital education solutions that combine devices such as tablets with digital content and software for a more effective classroom-learning environment beyond the traditional paper or chalkboard-based approach. The methodology for this document is based on in-depth and existing IDC research in technology use in education around the globe including surveys of educators, secondary research on technology trends in education, and ongoing discussions with IT providers of education solutions.

GLOBAL TRENDS IN PRIMARY AND SECONDARY EDUCATION

Educators around the world have the same goals for their schools: providing high-quality academics that result in good student achievement outcomes, nurturing a professional teaching staff, and managing their school in an efficient and cost-effective manner.
Schools play key roles not only in the training of productive members of society but also as community centers in cities and towns. Parents often seek out places to live that offer good educational opportunities for their children. However, as the technology landscape changes with the proliferation of Internet-connected mobile devices such as smartphones and tablets, as well as the greater availability of educational software, digital books and textbooks, the expectations for schools are changing too. Parents and students want modern classrooms to incorporate and leverage up-to-date technologies. The expectation is that today's students should be prepared not only for success in deploying tomorrow's technological skills, but for an interactive learning environment.

**Transformative Impact of Connectivity**

Technology will continue to grow in importance in the school environment by providing access to educational tools, digital content and applications as well as support for managing school administrative tasks. IDC Government Insights research indicates that primary and secondary educators will continue to focus on improving school connectivity and the PC-to-student ratio, although many schools are also ready for the next step in putting PCs, digital content and educational applications to use in a wireless and interactive classroom environment.

Most modern classrooms are now connected to the Internet via Wi-Fi or wireless broadband. PCs can be found in every area of a modern primary or secondary school, from computers in classrooms, mobile laptops that are shared across classrooms, to computers in labs, libraries and classes, to the office machines used by support staff and administrators.

Indeed, Internet access has substantially changed the nature of education. Classrooms are no longer learning islands; they can be global collaborative learning centers. The growth of Internet access and connectivity in schools, coupled with digital content development and learning management systems, has enabled the start of real-time communications between students, teachers and parents. Online course development and instructional design, learning management systems, interactive multimedia-based learning, individualized self-paced learning, and online communities of excellence afford the opportunity for all schools to access the tools and information needed for effective student learning.

Educators should focus their technology efforts on investments in PCs and networking solutions that foster student connection and collaboration. Education investments in technology will continue to morph from investments to connect and deliver content to tools that actually provide educational value by securely improving student collaboration and motivating students to learn. New devices and software are tools that enable this collaboration by providing:

- Access to anywhere, anytime learning during and after school hours
- Intra-school and classroom connection and collaboration between students, parents and teachers
Intuitive and easy-to-use devices for younger learners (mobile, lightweight devices with touch-screen user interfaces)

Educational applications and digital content such as digital textbooks

Security solutions that ensure a safe and protected learning environment for students

Buying preferences should change as schools seek to improve performance on standardized tests and to meet specific goals, such as reducing achievement gaps in test scores or improving computer access by lowering the number of students who would share a PC. Currently, PCs represent 60% of all hardware spending in schools. IDC Government Insights projects growth in new devices, such as tablets or e-readers, to make up a bigger chunk of the spending in PCs as these devices are used to improve student performance and as the cost per device comes down. Figure 1 shows the U.S. example of this growth in tablet and e-reader spending over time. These devices, which make up only 7% of PC spending in the U.S. in 2011, will be 24% of spending by 2016.

**FIGURE 1**

*U.S. Education Spending on Tablets, Laptops and Tablets as a Percent of Total Spending, 2011-2016*

![Graph showing U.S. Education Spending on Tablets, Laptops and Tablets as a Percent of Total Spending, 2011-2016](image)

Source: IDC Global Technology and Research Organization, 2012

**Technology and Its Impact on Teaching and Learning: The Lens of Digital Interactivity**

Today’s primary and secondary students have grown up with the Internet which provides immediate access to a wealth of information and in multiple formats such as video, audio and text. Learning takes place with peers in a digital environment and through common interests. These students are growing up within an interactive world and they view learning through a lens...
of interactivity. This also means the school and classroom environment must adapt to these students.

Research shows that students of the current generation learn most through interactivity – by doing themselves and teaching peers. Figure 2 shows the retention rate of material based on the method by which it is taught. As the interactivity of the teaching and classroom environment increases, the retention rate of the material by the student increases as well. (The caveat here is that effective methods of learning differ according to each child, the skill and personality of the teacher, as well as the type of material being taught). Technology is central to enabling interactivity in the classroom and throughout the school, which is discussed in the next section.

**FIGURE 2**

Learning Retention Rates by Type of Teaching

![Learning Retention Rates by Type of Teaching](http://siteresources.worldbank.org/DEVMARKETPLACE/Resources/Handout_TheLearningPyramid.pdf)

Given the expectations of students for interactivity and their increased learning retention of material from interactive teaching, there is a clear signal for educators to incorporate new interactive methods based on the latest technologies into their classrooms and to become a smarter school with next-generation technologies in classrooms.
The Interactive Classroom

IDC Government Insights believes that school education is at an inflection point as classrooms that embed technology into the core learning processes and curriculum become what we call a Smart Classroom.

Figure 3 shows the evolution to the interactive classroom. Many classrooms around the world, mostly in developing countries, are still at the paper-based stage. Some of these classrooms may also rely on verbal repetition and oral learning if paper supplies are short. Most modern classrooms are still in the sporadic phases. In the sporadic student access phase, students have access to PCs at set times during the day for limited periods of time, and mostly to learn how to navigate and use the computer via educational games or limited educational content. This phase usually follows, or accompanies, a similar sporadic teacher access phase, in which a teacher may display a computer screen for the class, or access a learning management system via a classroom computer, but the focus of use is with the teacher and there is no different student-teacher or student-student interaction as a result of the technology.

The teacher-centric phase describes a school environment that is interactive for the teacher. The teacher interacts with administration and other teachers via a learning management system, online content and or other tools. The teacher may use technology in teaching, but the student is still mainly passive in relation to hands-on use of the technology.

A student-centric approach is the interactive classroom approach, and one that supports the learning methods described in Figure 2. In this approach, in which technology is in the hands of each student and collaborative applications are used to enhance content and encourage peer review and learning, the interactive classroom is achieved.
THE ROLE OF SAMSUNG SMART SCHOOL IN CREATING AN INTERACTIVE CLASSROOM

Samsung has observed the increased use of IT and PCs in education over the past several years. Realizing the potential benefits that tablets can offer in the classroom environment – from enabling real-time interactions and communication in class to delivering mobile digital educational content – Samsung created the solution named Samsung Smart School\(^1\) which focuses entirely on the learning environment.

\(^1\) The Samsung Smart School Solution is also referred to as Samsung Joinclass in some geographies

Samsung Smart School aims to address the following key areas:

- Creating an interactive classroom-learning environment that would result in better student engagement and academic performance
- Helping teachers more efficiently manage their classrooms and student’s learning
- Enabling schools to smoothly implement and manage a packaged educational solution
Samsung has focused on these three areas based on extensive research with educators about their needs and requirements for an improved learning environment. Samsung designed specific components to address these key need areas.

There are three core components of Samsung Smart School:

- The Interactive Management Solution which supports in class interactive education using tools such as screen sharing and monitoring, group activities, Q&A, testing, and instant polls.
- The Learning Management System which can be used during or after class to help teachers with classroom management and lesson planning by being able to upload and share course material, create schedules, post to school or subject boards, access student information, participate in forums, create quizzes and send and receive messages.
- The Student Information System for managing student information such as attendance, special education plans, and contact information.

The Samsung Smart School solution is a digital education package consisting of tablets (like the Samsung GALAXY Note 10.1) and software designed to provide better teacher-to-student interaction, more efficient communication and improved classroom management. It functions as an inclusive digital learning system that features targeted services, devices and software to create a managed digital learning setting. Options include digital content (such as Microsoft Office files), content sharing, communication capabilities between teachers and students, group activities, instant quiz results and student display monitoring.

Samsung also provides implementation services to launch the solution. Services include a school assessment for integrating current platforms with the Samsung solution, providing new interactive learning content, delivering the devices and software, and providing maintenance and support. Samsung can be the point of contact for support from its certified partners so that schools can have reliable product support.

Samsung Smart School is based on the Android OS. All of the solution components are designed, developed, manufactured and deployed by Samsung which ensures compatibility between all the components. At the core of the solution are Samsung tablets and the associated education software. As students spend a good amount of time with the tablet during the lesson and extended exposure to the any screen display can cause loss of vision. For this reason, Samsung tablets satisfy ergonomics standards such as TCO Tablet 1.0 and ISO9241-307.
Key Features and Functions

Samsung Smart School has many unique features and functions that are targeted specifically at the goals of an interactive learning environment (see Table 1).

### TABLE 1

<table>
<thead>
<tr>
<th>Feature/Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen sharing</td>
<td>Screen sharing allows teachers with tablets to display content on their students’ tablets and students to display their content on each other’s tablets. Screen sharing goes beyond screen shots as it is the actual content being shared, not a static picture. This function allows dynamic interaction between everyone in the class.</td>
</tr>
<tr>
<td>Content sharing and remote app execution</td>
<td>Teachers can share content (such as documents, movie clips, images, and URLs) with students by sending it to their tablets. Teachers can also run third-party apps remotely to liven up lessons (e.g., a calculator app for Maths and Google Maps for geography).</td>
</tr>
<tr>
<td>Group activity</td>
<td>Samsung tablets have large screens that allow for group activities. Students can easily see the screen while working in groups on group reports or reviewing materials together. The screen’s content can be split into multiple screens to share, compare and contrast images and other content side by side. Remote monitoring means a teacher can view group progress on their tablets without having to have each group present to the class; this allows more time on the actual group activity.</td>
</tr>
<tr>
<td>Remote control and monitoring of student tablets</td>
<td>To ensure the proper and secure use of the tablets, and follow student progress, teachers can remotely lock student's screens or input functionality.</td>
</tr>
<tr>
<td>Messaging and Q&amp;A</td>
<td>The solution has messaging and Q&amp;A functions that enable students to actively participate by messaging the teacher or asking questions. The teacher can assess the understanding and engagement levels of the students, as well as determine how well the class understands the lesson and change plans if there is poor understanding of the material. The teacher can also quickly identify which students may need personal attention.</td>
</tr>
<tr>
<td>Quizzes and instant polling</td>
<td>Teachers can administer quizzes, conduct instant polls or surveys and quickly understand how the class is absorbing and understanding the class materials. Teachers can adjust their lesson plans based on this feedback. By checking individual scores, teachers can offer more assistance to those who need it.</td>
</tr>
<tr>
<td>Enhanced pen stylus</td>
<td>The GALAXY Note 10.1 has an S-Pen that feels and can be manipulated like a regular pen. Specially designed for the educational environment, the GALAXY Note 10.1 integrates the functionality of a book, notebook and pen into one device. The S-Pen is designed to work to smooth out rough edges or lines. The ability for students and teachers to mark-up and add to digital content on their screens makes for a unique way to interact with their tablets and share their ideas with the class.</td>
</tr>
<tr>
<td>Student information management</td>
<td>Teachers can view and edit student information, including general data, grades and attendance on their tablet. With the student management function, students can access their own information, allowing them to closely track their progress.</td>
</tr>
</tbody>
</table>

Source: IDC Government Insights, 2012
Figure 4 assesses each feature and function of Samsung Smart School against key areas of importance to educators. It is interesting to note that almost every feature contributes to the interactive classroom. Students are even involved in tracking their own educational progress via the student management system.

**Figure 4**

*The Samsung Smart School Solution Features and their Impact and Benefits*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Increased Interactivity</th>
<th>Personalized Learning</th>
<th>Efficient Classroom Management</th>
<th>Better Student Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen Sharing</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Content Sharing and Remote App Execution</td>
<td>●</td>
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<tr>
<td>Group Activity</td>
<td>●</td>
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<tr>
<td>Split Screen</td>
<td>●</td>
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<td></td>
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<tr>
<td>Messaging and Q&amp;A</td>
<td>●</td>
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<td>●</td>
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<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Source: IDC Government Insights, 2012

**Samsung's Future Outlook for Improving the Global Educational Environment**

It is only the beginning of the development of the interactive classroom and Smart Schools. Samsung has a long-term vision for the direction of education and the role of technology in improving the global educational environment. The Smart Classroom fits into this overall direction which includes:

**Broadening the learning horizon via collaborative learning.** With broadband networks and content-rich devices, the power of learning is in the hands of the student. Samsung envisions anywhere, anytime learning and collaboration as students can connect to their school and classroom content from any location convenient to them. Such an online environment facilitates collaborative learning by not only enabling students to share content and ideas easily but also encouraging spontaneous feedback from teachers and parents. This collaborative approach to learning and teaching will drive mutually beneficial and pedagogical innovation in the education industry.

**Enriched learning experience that is adaptive and personalized.** Schools have seen the benefits of virtualization – from servers to desktops. The next
stage is cloud models for applications that enable large-scale global connections around topics, for specific age groups, and for many devices. Secure multi-device compatibility and support for the N screen experience expands the scope of connections for students and the content available to them. With cloud educational services, modular and custom content can be accessed by students and teachers for content that is tailored to each student and monitored individually by teachers.

The potential for change in the education system and the opportunities provided to students and teachers from current and future technologies is unprecedented. Samsung envisions a connected and interactive classroom that is not limited by the physical classroom or school space and instead opens up a world of content and global interaction. By working to provide access to these opportunities to all students globally, the education gap between wealthy and lower-income students will decrease and the potential of all children can be realized.

**Case Example: Gyeseong Elementary School**

The Gyeseong Elementary School is located in Seoul in the Republic of Korea. The school has 125 teachers and staff and 720 students ages 8 to 13 years old. The students at Gyeseong live in one of the most advanced wired countries in the world; South Korea is the second-fastest country in terms of broadband speeds and where 90% of the population owns a mobile phone. The country also uses Digital Multimedia Broadcasting technology, so everyone has access to TV, movies and other digital content from their mobile devices. Given the level at which digital content and technology permeates the Korean society, Gyeseong knew that their classrooms needed to be modernized to maintain the interest level of its tech-savvy students.

Gyeseong Elementary identified three key areas for improvement:

- Modernizing the learning environment for mobile and technology savvy students
- Enabling anywhere, anytime learning from home, the classroom, or any location with student access to school resources
- Integrating devices, content and applications for a smarter classroom

**The solution**

Gyeseong Elementary selected Samsung Smart School as the solution to the challenges. The packaged solution is based on the GALAXY Tablet 10.1, an interactive classroom e-board, and a set of software that provides an interactive management solution. Key elements of the solution include:

- The GALAXY Tab 10.1 tablet and e-board with the Interactive Management Solution (IMS) software that allows sharing of content on the e-board to the student's tablets
- Software that supports two-way, multimedia communications in class; students can ask questions via the device and receive teacher feedback, the
A mobile learning management system that supports self-study outside of the school for anywhere, anytime learning with features like resource sharing and assignment management

Remote control and monitoring of student devices by the teacher

Gyeseong Elementary has experienced many reported benefits from the Samsung solution the most important of which has been increased interest and concentration by the students on course material. Since the classrooms are now more interactive, students are more engaged with each other, the teacher and the content which Gyeseong expects to lead to better student performance. The ability for students to access class materials after school hours also should contribute to this improvement. A survey of students showed an increase in student satisfaction by 23% after the solution was deployed. This increase was supported by similar results in a second pilot of Samsung Smart School.

IMPORTANT CONSIDERATIONS AND POTENTIAL CHALLENGES

Of course, no new technology implementation is without its challenges. In looking at Smart Classroom technologies, educators should keep in mind:

An interactive classroom should balance technology-enabled interaction and non-technology-based interaction, and digital and non-digital learning. Students need to be able to communicate effectively in person and without technology, and fundamental skills like math, writing, reading and problem-solving should be practiced without computer assistance.

A Smart Classroom strategy needs to be considered in the context of the entire school. Can the school afford solutions for every class? Is it necessary for all classes to have the same access to technology? The support and maintenance for devices needs to be included in the overall cost of the new solutions, since IT staff resources will likely be needed to maintain the solution, update software, deal with security issues, and troubleshooting.

Take costs models into consideration. While tablets offer specialized benefits for connecting classroom participants and an intuitive usability for younger users, schools may have limited resources that preclude their purchase, or they may consider PCs as an alternative. A viable option is a "Bring Your Own Device" (BYOD) strategy that may be more amenable to tablets due to their portability.

Effects of digital eye strain must be considered. Prolonged use of digital devices can pose health risks in the form of eye strain to students. The use of tablets should be balanced with other learning mechanisms and interactive teaching methods. When used, tablets should meet ergonomics standards such as TCO Development Tablet 1.0 and ISO 9241-307 to minimize health risks.

Teachers may have varying levels of comfort with new devices. It is important not to underestimate the difficulty some teachers may have with
changing their ways of teaching. Teachers have developed curriculum and exercises that will have to be adapted to new technologies like tablets and e-boards. Once lesson plans have been adapted to new devices, teachers need to be confident that the software and device will be reliable when it comes time to teach the class. In addition, some teachers may not themselves be familiar with how to use these devices. New technologies require teacher and staff training and buy-in. School administrators should be sure to include teachers in the discussions of the Smart Classroom, and provide ample training and time for teachers to feel confident about the new solutions.

**CONCLUSION**

It is clear that the technology landscape continues to evolve and bring new opportunities for schools and educators. With the advent and widespread adoption of tablets, mobile devices, mobile applications and digital content, students will expect more technology in classrooms and more interaction via software and digital content as they learn.

Given financial restraints on capital budgets, even modern schools can be cautious about technology innovations. Given the potential benefits of solutions like the Samsung Smart School solution, educators cannot afford to shy away from these new technologies and their impact on student achievement, classroom management, and overall school performance. Education investments need to focus on tools that provide value by motivating students to be active participants in their own education.

Education today must include a technology strategy for the classroom and school-wide learning environment. Technology provides the means to help keep students engaged, foster a positive learning experience, provide more personalized attention, improve classroom management, and mitigate the digital divide by providing access to technology at school for those students who may not have access at home. Educators cannot ignore the potential benefits of tablets and the opportunities afforded by bringing an integrated set of hardware and software solutions in to the classroom.

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