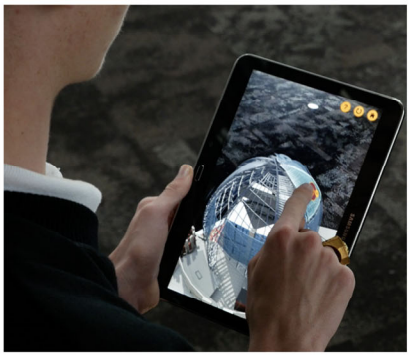
QUALCOMM® Wireless Reach™

Education | Entrepreneurship | Environment | Health Care | Public Safety

UNITED STATES



2016 Statistics

- **Life expectancy: 79.7 years**
- **Population: 321.4 million (2015 est.)**
- **GDP per capita: US $56,300 (2015 est.)**
- **Mobile penetration: 111.6%**

Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

The things that I learned about how the dome was built were interesting to me because now I am very interested in engineering.

— 9th grade student, e3 Civic High, San Diego, CA

STEAMing Ahead with Mobile Learning

Qualcomm® Wireless Reach™ and the San Diego Public Library Foundation collaborated on the STEAMing Ahead with Mobile Learning project to demonstrate how the integration of technology and extended learning through augmented reality (AR) helps to increase student engagement in learning and prepare students for future careers in the fields of science, technology, engineering, arts and mathematics. The project was implemented during the 2015-16 school year with 9th grade students at e3 Civic High, a charter high school that is housed on two floors of the The Central Library @ Joan ∧ Irwin Jacobs Common (Central Library) in downtown San Diego.

Challenge

- High wage jobs in high demand sectors in the San Diego region demand that today's students develop familiarity with a new set of career ready skills, including those most often associated with the use of science, technology, engineering, arts and mathematics, also known as STEAM.[1]
- However, only one-quarter of high school students in the United States say that they are very interested in a career field that leverages science, technology, engineering or math concepts.[2]
- Students report that to develop a stronger interest in STEAM careers they need to see these careers in action, and to understand the relationship between the academic subjects they are studying in school and how STEAM resources impacts the world around them.[3]
- It is often difficult within a school curriculum to provide students with meaningful learning experiences that can connect academic knowledge with career preparation.

Solution

- To bridge the gap between academic content and real world learning experiences, this project leveraged a unique element of the Central Library structure to engage students in learning about the impact of STEAM on the world around them. Core to this learning experience was the 113 feet high steel lattice dome that graces the top of the Central Library structure.
- Using Qualcomm technology, the project focused on leveraging AR content that utilized mobile, context-aware 4G technologies to allow the students to interact with digital information embedded within the library's physical environment. Similar to AR used by construction teams to visualize a building prior to construction, students learned about the construction of the library dome while learning the STEAM concepts associated with each structural element.
- To access the AR content, the 9th graders positioned their 4G tablets over an AR trigger, at this point the AR reveals a 3D scale representation of the dome on their tablet screen to display information about the library and dome construction in six different academic areas: humanities, science, technology, engineering, art or mathematics.
- Within each academic content area, the students could read narrative text, watch a video or review photographs, diagrams or charts. Each section also included a quiz to assess student comprehension about that academic content area. Upon successful completion of all six areas the students were rewarded with the ability to take a photo next to the augmented 3D image of the Central Library dome displayed on their tablet screen.

UNITED STATES

Impact

- Project Tomorrow®, a national education nonprofit, conducted the external evaluation on the STEAMing Ahead with Mobile Learning project. Key findings from the project evaluation include:
- The context-rich learning experience of using the 4G tablet to access the AR content increased student engagement in learning about their urban environment, and the unique structural aspects of the Central Library dome.
- Students ascribed many benefits to the learning experience including increased enjoyment in learning, ability to work on the content with their classmates in a collaborative manner, and being more interested in the dome structure and architecture than they first envisioned. For many of the students this was a first experience in understanding what is meant by structural engineering. The students were especially intrigued by how the architects and engineers used problem solving strategies to build the dome to withstand high winds in downtown San Diego.
- Because of this learning experience that married digital resources with real world context, 40 percent of the 9th grade students said they were more interested in exploring a STEAM career field. This finding opens the door for further leveraging mobile solutions for career exploration by students.
- Both the students and their teachers would like to see how mobile AR environments such as the one demonstrated in the STEAMing Ahead with Mobile Learning project could be used to impact student engagement, learning and career preparation in other curriculum areas as well.

Program Stakeholder Roles

- **San Diego Public Library** serves the informational, educational and recreational interests of San Diego through its multiple assets. The Central Library dome located at the top of the facility in downtown San Diego provided the context for the AR learning experience.
- **San Diego Public Library Foundation** supports excellence in the San Diego Public Library system through philanthropy, advocacy and outreach and was the managing partner for this project.
- **e3 Civic High**, a charter high school in downtown San Diego, served as the host site for the implementation of the project with their 9th grade students and teachers. They developed the content that was integrated in the AR app.
- **Project Tomorrow**, an independent, third party research organization, designed and completed the evaluation study and provided guidance on project outcomes.
- **Trigger**, a digital agency, designed and developed the AR app experience with help from e3 Civic High and the San Diego Public Library.
- **Qualcomm Wireless Reach** provided funding as well as project management support.

[1] http://www.sandiegobusiness.org/about
[2,3] Project Tomorrow Speak Up 2014 National Results; www.tomorrow.org

Qualcomm® Wireless Reach™
Qualcomm believes access to advanced wireless technologies can improve people's lives. Qualcomm Wireless Reach is a strategic initiative that brings wireless technology to underserved communities globally. Wireless Reach invests in programs that foster entrepreneurship, aid in public safety, enhance the delivery of health care, enrich teaching and learning and improve environmental sustainability. For more information, please visit www.qualcomm.com/wirelessreach.

Connect To Learn

Aiming to Improve Learning Outcomes of Impoverished Girls in Myanmar

The Connect To Learn program is a public-private partnership that brings mobile technology and 3G-based Internet access to underserved schools in Myanmar, offering students the opportunity to leapfrog to a 21st century education. The program promotes universal access to quality secondary education by providing user-friendly 3G learning devices for teachers and students to use in the classroom. The program delivers information and communication technology (ICT) infrastructure and training to approximately 21,000 students and 155 teachers from 31 schools. In a country where retention of girls in school is a growing challenge, Connect To Learn aims to effectively integrate teacher training programs to enrich learning experiences, reverse the tide of girls dropping out of school and improve workforce readiness.

MYANMAR

2018 Statistics*

Population (2017 est.) **56.3 million**

Life Expectancy **68.2 years**

GDP Per Capita (2017 est.) **US$6,200**

Mobile Penetration (est.) **122.4%**

Challenge

- For many schools in Myanmar, mobile broadband offers the only viable connection to the Internet and a 21st century education.
- In 2015, only 39% of the population aged 15-65 owned a mobile phone and an active SIM card.[1]
- Enrollment of school-age children in Myanmar's secondary schools hovers at just over 50 percent, one of the lowest figures globally.[2]
- The Myanmar Ministry of Education has prioritized the use of ICT in classrooms to support the ongoing Comprehensive Education Sector Review initiative, and is currently the only ICT program for education in the country.

Solution

- Distribution of 3G-enabled laptops to teachers and Qualcomm-enabled tablets to students allow access to cloud-based, educational content and resources in the classroom. Classrooms in participating schools utilize a range of technologies.
- A professional development program for teachers focuses on the effective use of ICT-based resources to improve student learning, particularly in English Language, Life Skills and Mathematics.
- A comprehensive English Language program delivered via mobile technology fosters the development of skills to be successful in a knowledge-based global economy.
- Through the delivery of a life skills and empowerment program via tablets, girls improve their communication skills and build self-confidence.
- A scholarship program for impoverished girls enables them to stay in school and complete their secondary education.

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

Impact

Connecting 10,500 Impoverished Girls

The Connect To Learn program connects 31 schools to mobile broadband networks to improve the learning outcomes of 21,000 students in Myanmar, including 10,500 impoverished girls.

Cloud-based Education

The program provides the technical building blocks to enable accelerated access to cloud-based education content and collaboration systems.

Improved Teaching Quality

Teaching quality is expected to increase through effective use of ICT in improving teaching and learning and over 150 teachers will be trained.

Increased Employment Opportunities

Students will be able to improve numeracy and language literacy skills that can lead to increased employment opportunities.

Emphasis on Educating Girls

Female students from secondary schools will be empowered to communicate effectively about issues that are important to the community, including the importance of education for girls.

Technology

- Ericsson Mobile broadband connectivity via 3G/HSPA together with Myanmar Posts and Telecommunications (MPT).
- 3G-enabled laptops and Qualcomm-enabled tablets.
- An open source, cloud based education platform from Ericsson, that includes a cloud content management system that makes education content available on different types of devices, with the experience optimized for each device type.
- A real time managed cloud front end for Android Tablets from Finja Five that provides the educational applications in the tablets.
- Portable carts accommodate charging, secure storage and easy transport of tablets to classrooms.
- Universal Power Supply units provide a stable power supply for the ICT equipment.

Program Stakeholders

The Earth Institute Columbia University · eduval edueval.com · Ericsson · Finja 5 · Girls' Education Challenge · UKaid from the British people · UNESCO United Nations Educational, Scientific and Cultural Organization · Qualcomm wireless reach

[1] http://lirneasia.net/wp-content/uploads/2015/07/LIRNEasia_MyanmarBaselineSurvey_DescriptiveStats_V1.pdf
[2] http://www.unicef.org/infobycountry/myanmar_statistics.html

September 25, 2018

Qualcomm® Wireless Reach™
Qualcomm believes access to advanced wireless technologies can improve people's lives. Qualcomm Wireless Reach is a strategic initiative that brings wireless technology to underserved communities globally. For the last ten years, Wireless Reach has invested in programs that foster entrepreneurship, aid in public safety, enhance the delivery of health care, enrich teaching and learning and improve environmental sustainability, impacting over 15 million beneficiaries.

www.wirelessreach.com **@QualcommforGood**

Qualcomm 21st Century Classroom

Using Mobile Technologies to Modernize Education and Alleviate Poverty in China

To meet the priorities of the Chinese government's national "Three Connections, Two Platforms" plan, the Qualcomm 21st Century Classroom program is a collaboration with China Children and Teenagers' Fund (CCTF). A mobile broadband-based learning program, the Qualcomm 21st Century Classroom supports the Chinese government's use of information and communications technologies (ICT) to modernize education and reduce poverty. Mobile technology has fundamentally changed access to educational materials and this collaboration enables even greater opportunities to enrich teaching and learning, and address learning disparities by decreasing the digital divide.

CHINA

2018 Statistics*

Population (2017 est.) **1.38 billion**

Life Expectancy **75.7 years**

GDP Per Capita (2015 est.) **US$17,000**

Mobile Penetration **90.06%**

Challenge

- In China, there are more than 40 million children living in impoverished areas. The development levels of these children, particularly in health and education, are far behind the average.[1]
- Leveraging ICT to modernize education is a clearly stated policy priority of the Chinese government. In 2016, the Ministry of Education released the *13th Five Year Plan for Informatizing Education (2016-2020)*. In 2012, the Ministry of Education released the *Ten-Year Development Plan of Informatizing Education (2011-2020)*. During the same year, the State Council launched the "Three Connections, Two Platforms" national education development initiative.

Solution

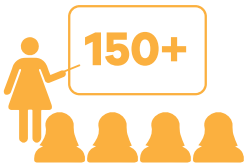
- The program developed a cutting-edge, 21st century learning environment in selected classrooms at Guang'An Second Middle School in Guang'An District, and Meng Ya Primary School and Wen Xing Middle School in Yilong County. These three schools are located in government-designated poverty-stricken areas.
- All classrooms in participating schools are provided with broadband Internet connectivity and electronic smartboards.
- 200 teachers and 360 students have received Qualcomm® Snapdragon™ enabled tablets to learn ICT skills, access state-of-the-art digital educational materials and better communicate with one another.
- All smartboards and mobile tablets are linked directly to a customized resource platform where diverse digital education content can easily be downloaded and uploaded through the wireless broadband network. Smartboards and tablets are also linked to a classroom management system that allows teachers to access courseware, prepare classes, assign homework, prepare tests and track scores. The classroom management system also allows the students in pilot classes to review class videos, access reference books, communicate with classmates and teachers, and prepare for tests.
- Through augmented broadband capacity and an on-campus wireless network, participating teachers and students can also access the Internet and digital education resources at anytime.
- Teachers were trained on how to use the new mobile devices to build curriculum, use digital platforms, work with digital content and leverage advances in individualized learning to improve student and teaching outcomes.

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

Impact

Over 4,000 Students and Teachers

Since the program implementation began in late 2015, 200 teachers and 4,000 students age 7 to 15 have benefited.



Over 150 Hours of Training

Teachers have received a total of 152 hours of instructor-led trainings. 80% of teachers who participated in the trainings report their teaching skills and ICT knowledge have improved since the program began.

Materials Delivered Online

Over 450 teaching materials have been created and shared on the online platform.

Results Create New Partnerships

Based upon the program results achieved in the Sichuan Province, Qualcomm Wireless Reach is collaborating with CCTF to expand the program to Jiangxi province.

Program Stakeholders

[1] State Council, 2014-2020 Development Plan for Children in Impoverished Areas. http://www.gov.cn/zhengce/content/2015-01/15/content _ 9398.htm

July 20, 2018

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