

**San Diego Unified School District
E-Rate Deployed Ubiquitously (EDU) 2011 Pilot Program Proposal
WC Docket No. 10-222**

Executive Summary

The San Diego Unified School District (SDUSD) has established a Mobile Learning Program to seamlessly integrate ubiquitous, one-to-one (1:1) computing and other 21st century technology into all teaching and learning throughout the curriculum. A foundation of this effort is the i21 Interactive Classroom Initiative, a five-year, bond-funded program that will provide a classroom rate of 1:1 wireless computing in grades 3-12. The Mobile Learning Program builds on the i21 Initiative by developing and pilot testing a wireless program that will give students access to this ubiquitous computing at home as well as in school. SDUSD requests support from the E-Rate Deployed Ubiquitously (EDU) 2011 Pilot Program to implement the next step in the Mobile Learning Program pilot process: take-home computing in grade 6 in eight District middle schools and schoolwide in two middle schools. The Mobile Learning Program is closely aligned with the District's community-based reform effort to close the achievement gaps among groups of students. Therefore, the target group of schools was selected based on their poverty level, the percentage of students without broadband Internet access at home (the digital divide), student achievement, school leadership, and technology use and integration.

Introduction

The San Diego Unified School District (SDUSD) is the second largest school district in California and the 13th largest urban school district in the country. SDUSD serves over 132,000 K-12 students living within the City of San Diego at 225 educational facilities (including charter schools): 119 elementary schools, 24 middle schools, 30 high schools, 13 atypical grade configuration schools, and 15 alternative schools. The City of San Diego comprises a wide range of diverse communities. The northern and western areas of the City (particularly those areas bordering the Pacific Ocean) tend to be more affluent and somewhat less ethnically diverse than the southern and eastern areas of the City, which include the region's federal Enterprise Community. This diversity is reflected in the wide range of schools that serve the communities making up the City of San Diego. The District's students are ethnically diverse: 44.4% of students are Hispanic, 25.3% are White, 16.5% are Asian, and 13.2% are African-American. The students are even more diverse than the City of San Diego as a whole, which is 25% Hispanic, 49% White, 14% Asian and 8% African-American. SDUSD students represent more than 15 ethnic groups, and speak more than 60 languages and dialects.

The mission of the San Diego Unified School District is to ensure *“All San Diego students will graduate with the skills, motivation, curiosity and resilience to succeed in their choice of college and career in order to lead and participate in the society of tomorrow.”* The SDUSD vision for technology is aligned with the District's overall mission:

The San Diego Unified School District demonstrates system-wide commitment to using technology effectively in a 21st century learning environment to improve student achievement, support teaching and learning, and prepare students to succeed in school and the workplace.

In November 2008 San Diego voters approved a significant investment in new technology for District schools. “Proposition S” expressed the will of the community to address inequities in access to technology (the digital divide) by doing three things: (1) implementing a 21st century learning environment; (2) equipping both classrooms and students with wireless technology; and (3) upgrading infrastructure to support the wireless mission. Proposition S will provide over \$42 million per year through 2014 (and a total of \$400 million over 15 years) in funding for the SDUSD “21st Century (i21) Interactive Classroom Initiative,” a five-year phased plan to implement the significant investment in new educational technology in public schools. A key purpose of this Initiative is to ensure that the achievement gaps among groups of SDUSD students do not grow as a result of unequal access to the educational technologies that support learning.

1. Description of the SDUSD Wireless Program

SDUSD’s Educational Technology Strategic Plan includes the important objective of providing all students with adequate access to 1:1 computing resources and technology tools to meet their learning needs. The District’s Mobile Learning Program is designed to provide students access to the mobile Netbook computers, Internet and the software tools and resources that will help them achieve academic success and that will prepare them to learn, live and work in the 21st Century. SDUSD’s Mobile Learning vision includes student access to a managed network that will provide an Internet/Intranet connection that is “always-on”. SDUSD expects this effort to result in the evolution of a scalable model that can be implemented and sustained systemically to provide student and teacher ubiquitous access (anyplace–anytime).

The goal of the Mobile Learning Program is to seamlessly integrate 21st century technology throughout the curriculum and into all teaching and learning at participating schools. Project objectives include: (1) Develop ubiquitous 24/7 mobile computing for all students; (2) Prepare teachers to utilize the technology and integrate it into the curriculum; and (3) Install the infrastructure, hardware and software needed to deliver digital content to teachers and students. Implementation of the SDUSD Mobile Learning Program includes the following components:

- Hardware and Software: Lenovo S10 Netbook with Windows 7 and built-in 3G. Customized software included integrates with the classroom Interactive White Board.
- Ubiquitous Always-on Wireless Network and Internet Access: Netbook functionality enables students to flexibly use site wireless or 3G service at no cost to student. The District provides content-filtering and web-based digital storage.
- Professional Development: Teachers received training and follow-up coaching in using, managing, and integrating the Netbook with the interactive white board and software.
- Curriculum: Sites build time into their professional development structures to collaboratively plan student-centered curriculum. User Groups provide opportunities for teachers to design and peer-review technology-augmented lessons.

- Site-based Technical Support: The District provides tiered support program at each site that is supported by a Student Help Desk called the “Mouse Squad.” The Mouse Squad is an elective course offering that trains students to provide the first level of technical support at their school site.

a. The Nature of the Applicant Wireless Program.

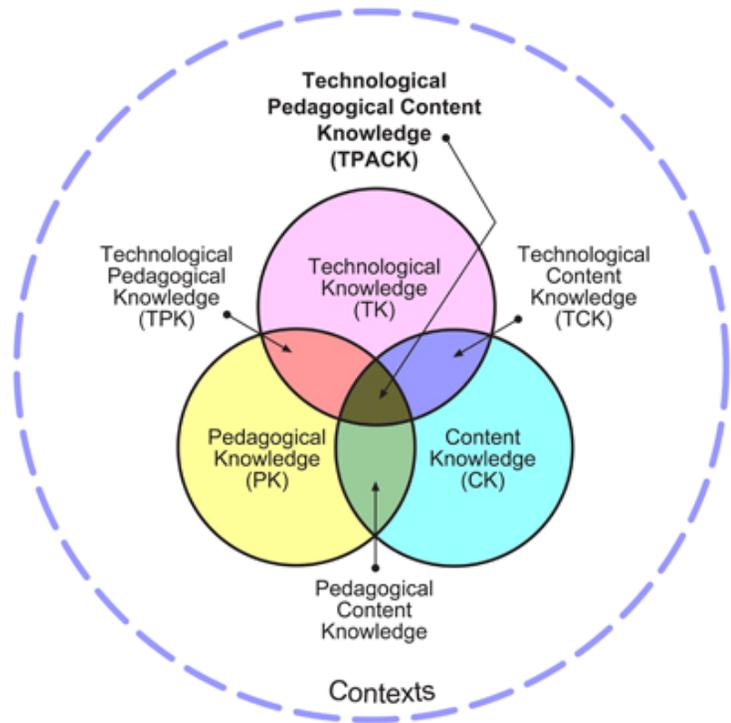
The foundation of SDUSD’s wireless Mobile Learning Program is the *Integrated 21st Century (i21) Interactive Classroom Initiative*. The i21 Initiative is a systemic approach to providing a 21st century learning environment that includes 1:1 computing and that enables teachers to appropriately integrate technology into instruction in all curricular areas. The i21 interactive technologies and resources are the foundation of the District’s 1:1 and Mobile Learning efforts. They are designed to both respond to students’ learning needs and enable students to meet the NCLB requirement of being technologically proficient by grade 8.

The i21 Initiative creates an engaging, interconnected 21st century learning environment that, coupled with ongoing teacher professional development, will (a) create opportunity for new learning practices that will support the teaching and learning of 21st century skill outcomes; (b) allow all students to become expert learners in relevant, real world 21st century contexts (e.g., through project-based or other applied work); (c) provide 21st century architectural and interior designs for group, team and individual learning; and (d) provide universal design in quality learning tools and technology resources.

Three foundational cornerstones of the i21 Interactive Classroom teaching and learning model support achievement for all students:

- 21st Century Learning Environment: The 21st Century Learning Environment creates the opportunity for new learning practices that will support the teaching and learning of 21st century skill outcomes. By providing teachers and students a content rich environment accessed through universal design in quality learning tools and technology resources, all students become expert learners in relevant, real world 21st century contexts.
- Universal Design for Learning (UDL): UDL principles assist educators to customize their teaching for individual differences in the primary brain networks. Professional development will integrate UDL principles to optimize the i21 content-rich learning environment and will empower the teacher to differentiate learning by utilizing technology tools and resources that provide multiple means of representation, expression, and engagement to tap into learners’ interests, challenge them appropriately, and motivate them to learn.
- Technological Pedagogical Content Knowledge (TPACK): TPACK is a model for i21 Interactive Classroom professional development and is based on the work of Punya Mishra and Matthew J. Koehler from Michigan State University. The TPACK framework addresses the complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). As illustrated in the Figure on the following page, the intersection of the three elements is Technological Pedagogical Content Knowledge (TPACK).

True technology integration involves understanding and negotiating the relationships between these three components of knowledge. Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship among the three components.



The i21 classroom maximizes flexibility and provides just-in-time functionality for student learning by integrating mobile computing, audio, visual and formative assessment technologies across the curriculum. A Steering Committee of SDUSD teachers and principals developed the i21 Initiative, a five-year program that will ultimately provide a classroom ratio of 1:1 wireless

computing in grades 3-12. It is anticipated that by the end of the 2015 school year, approximately 7,000 classrooms will have been updated, thus impacting teaching and learning for over 132,000 students and their teachers. The components of the i21 interactive classroom include:

1. The 95” diagonal **Interactive Whiteboard** provides students a multi-sensory experience including presenting information displayed with perceptual features that can be varied, including the *size* of text or images; *amplitude* of speech or sound; *contrast* between background and text or image; *color* used for information or emphasis; *speed* or timing of video, animation, sound, simulations, etc.; and *layout* of visual or other elements.
2. The **Presentation Station** including the **Document Camera** and **Teacher’s Multimedia Tablet Computers** provide visual and auditory options to students including enlarged text and objects from micro to macro sizes that can be seen from anywhere in the classroom; graphics, animations and video options; text to speech options (allows students to hear text read aloud); and software to highlight and annotate text and graphic features for all student to see and hear with the interactive whiteboard system.
3. **Classroom Audio Technology** including a sound-field amplification wireless microphone system that allows the teacher and students to be clearly heard anywhere in the classroom. The system also includes an HDTV tuner with closed captioning, a DVD player/ recorder for playing all formats of DVD and digital media flash drives, and four ceiling or wall speakers with amplifier to evenly distribute any audio source in the classroom.
4. **Student computers (Netbooks)**, provide classrooms with a 1:1 ratio for every 3rd to 12th grade student. Features include hard drive software applications to create content, wireless

access to the Internet and classroom printing access, eReader for eBooks and eTextbooks with text to speech options, MP3/Podcasting software for a variety of audio files, a student response system built-in as VR software for formative assessment connected and directed with the teacher’s computers; and Web-based applications in an networked academic cloud of read/write services

The i21 Initiative utilizes a strategic pervasive capacity-building (PCB) implementation model over a five-year period to transform more than 7,000 District classrooms. The PCB approach provides two advantages in large scale systemic technology implementations: 1) it enables computing tools and resources to be pervasive as students move forward from grade to grade; 2) it increases training capacity by developing expertise among teachers with shared content and teaching practices. Approximately 1,300 i21 interactive classrooms were installed in the 2009-2010 school year: all District third- and sixth-grade classrooms and 20 percent of all ninth-through 12th-grade classrooms (starting with mathematics). Please note that although all of the grades 6-12 Netbooks include a 3G card, the i21 standard implementation is in the classroom only; it does not include school-to-home computing with at-home broadband access. In Year 2 (2010) grades 4, 7, and 9-12 (Language Arts) have been transformed. The i21 classrooms will be implemented for grades 5, 8, and 9-12 (Social Studies) in 2011. The table below shows the planned scope of the i21 interactive classroom implementation through 2013:

2009	2010	2011	2012	2013
Grade 3	Grade 4	Grade 5	Grade 1	Grade K
Grade 6	Grade 7	Grade 8		Grade 2
Grades 9-12 Mathematics	Grades 9-12 Language Arts	Grades 9-12 content area	Grades 9-12 content areas	Grades 9-12 content areas

Comprehensive technology system. SDUSD provides teachers, students and administrators access to a comprehensive technology system to support the implementation of the District technology plan and i21 Initiative, with its curriculum and professional development activities. The components of the comprehensive technology system include:

Physical infrastructure and networking. Networking and Internet access requires the appropriate physical infrastructure (and related software applications) at both school and administrative sites. The LAN backbone operates at 1 Gigabit per second (Gbps) speed over 50/125 fiber optic cable, which is installed between the central switch and all connecting switches. The LAN operates at 10/100 Megabits per second (Mbps) from the interconnecting switch to the desktop devices. Enhanced Category 5 (Cat 5e) cable is installed from the interconnecting switch to the wall plates in the classrooms. Proposition S will install a wireless network in each school site and upgrade site electrical systems as needed. It will increase the backbone to 10 GB between the District Data Centers and network sites. Elementary schools will be increased from 15 MB to 100 MB per site; middle schools and high schools will be increased from 20 MB to 500 MB.

Telecommunications. The telecommunications network currently includes basic phone and services (including alarm lines, centrex lines, conferencing services, custom calling services, direct inward dialing, directory assistance, FAX lines, homework hotline services, wire maintenance, local measured service and lease charges for trunk or transport lines), long distance

service, cell and paging services. Internet access includes digital subscriber lines, domain name registration, email services, firewall services, GSP services, web hosting and wireless Internet access. In January 2010 the San Diego Board of Education approved the acquisition of a Voice-over-Internet Protocol (VoIP) system to provide the communications and networking applications required for integrating technology into the curriculum and professional development. This will include video over the Internet as well as voice communications, directory services, appropriate filters for SPAM, viruses, and email web security.

Information Systems. SDUSD has implemented several student information system (SIS) applications, including a student management system for enrollment, attendance, assessment, transcripts, etc. (C Innovations' Zangle SIS); ENCORE, a web-based Individualized Educational Plan (IEP) software system to manage the individualized learning process for all students receiving special services including special education; and a content management system (Schoolwires Centricity) to provide online access to educational resources, tools and information for teachers, students, administrators, staff, parents and community members.

Electronic learning resources. To succeed in school and their careers, students must develop both a deep knowledge of both the core academic content areas (English language arts, science, mathematics, geography, history, economics, world languages, government and civics, and arts) and the 21st century skills they will need to apply their knowledge, work with others and manage their lives. With the implementation of the i21 classroom, teachers will have access to a variety of digital tools to create curricula materials that provide access, engagement and achievement to a diverse group of learners in the classroom. These tools allow the teacher to configure the learning environment according to the context of the student-centric work at hand to meet state standards and learn 21st Century skills as thinkers, creators, designers and builders.

SDUSD provides a variety of electronic learning resources to support content areas, including:

- Productivity software such as Word, Excel, and PowerPoint
- Digital media applications such as iMovie, Movie Maker, Pinnacle and Media Blender
- Artificial intelligence skill development programs such as MyAccess and Cognitive Tutor
- Data-collection software such as probeware and datalogger
- Digital resources/data base tools such as Pro Quest, Worldbook and United Streaming
- Academic content tutoring programs
- Online coursework (including Advanced Placement and credit recovery courses)
- Universal design software (such as Kurzweil)

The District LAN infrastructure provides access to the Digital California Project K-12 Statewide Network, allows students and teachers to access content on the Internet and World Wide Web, and allows learning to occur both internally within District classrooms and externally from remote locations. SDUSD is preparing to adopt digital textbooks that are downloadable and may be projected on a screen, viewed on a computer, printed, or bound for use in the classroom.

Technical Support. Additional technical support at the school sites is needed to help teachers ensure that the technology they are integrating into the curriculum is up, running, and providing students with access to the Internet, communications, software applications and rich content resources. The SDUSD Information Technology (IT) Department provides technical support for

the maintenance and operations of all operating systems, including the telecommunications systems and Local Area Networks, and the integrated information system. The IT Department operates a Help Desk that utilizes a tiered support model that offers telephone assistance, remote repair when possible and Computer Repair Technicians sent to the work site to repair the equipment when needed. The IT Department also provides centralized technical support to K-8 school sites through a tech support pool consisting of 20 Network Systems Media Technicians.

In fall 2009 SDUSD began pilot testing the “Mouse Squad” as part of an integrated technical support plan for school sites. Pilot tested at the three middle schools (Innovation Middle, Millennial Tech Middle, and Memorial Middle School) that have been the pilot sites for the District 1:1 computing program, the Mouse Squad is a group of students enrolled in the Career Technical Education course “Introduction to Technology Support Services.” This course is designed to introduce middle school students to possible career paths in computer science, information systems and electronic technology. Students in the course support their school’s implementation of technology as they gain hands-on experience in a variety of areas, including software and hardware troubleshooting, help desk and telephone support systems, computer repair and maintenance, network essentials, and an array of technological support services.

b. How Long the Wireless Program Has Been in Operation and Wireless Device(s) Used.

SDUSD has taken a slow-but-steady, continuous improvement approach to the implementation of its 1:1 computing and Mobile Learning Programs to avoid expensive financial and technology mistakes and to identify the best strategies for scaling up. The 1:1 computing and Mobile Learning Program implementation is integrated with the i21 Interactive Classroom Initiative and has six phases:

Phase I: Initial pilot of nine classrooms at five schools using existing Lenovo R61 laptops (March-June 2007). Nine teachers (315 students) participated including 2 elementary school teachers, two middle school teachers, and 5 high school teachers. Schools included Valencia Park Elementary, Mann Middle, Kearny High, Henry High, and Clairemont High. Teachers reported that student performance improved after the laptops arrived in their class and were available on a daily basis, particularly in the areas of student computer skills, student research skills, and student performance on projects and assessments.

Phase II: Netbook pilot implementation of 1:1 student to computer ratio, with customized Lenovo S10 Netbooks, in seven targeted classrooms at three middle schools (September-November 2008). Each teacher received a set of laptops on a cart for use with their classes. Teachers and students provided detailed feedback on the laptops, Internet access and software applications. Teachers reported that student engagement in laptop-related class activities increased and student disciplinary actions decreased. Participating schools included Innovation Middle, Millennial Tech Middle, and Memorial Middle School.

Phase III: Initial pilot test of the School-to-Home Mobile Learning Program at the District’s new virtual high school, using a Lenovo S10 Netbook with 3G access (November 2008-June 2009). This phase of the Initiative introduced the District’s first school-to-home program. Students at the District’s iHigh Virtual Academy were issued a Lenovo S10 Netbook for use at home and

were provided Internet access through 3G service (at no cost to student). Students were able to access their online coursework from anywhere and at any time.

Phase IV: Implementation of schoolwide 1:1 computing in three targeted middle schools (2009-2010 school year). This phase implemented schoolwide site-based 1:1 mobile computing in three targeted middle schools (2009-2010). This phase of the *Initiative* scaled 1:1 computing campus-wide for all students at the targeted schools, rather than for selected classrooms. Participating schools included Innovation Middle, Millennial Tech Middle, and Memorial Middle School. Teachers reported increased levels of student engagement and higher levels of independent learning.

Phase V: Expand Mobile Learning Pilot program with ubiquitous wireless access to home and community using 3G service at Innovation Middle School (February-June 2011). Innovation Middle was the first middle school to expand ubiquitous *Always-On* access to home and community using 3G services. In this phase, Innovation Middle School issued each student a Lenovo Netbook with built-in 3G and content filtering for 24/7 Internet connection with their schoolwork, teachers and classmates. Students reported that they believed that the school-to-home access enhanced their learning.

Phase VI: Scale-up Mobile Learning Program pilot school-to-home 3G computing access to additional pilot middle schools (2011-2012 school year): Expand school-to-home 3G access to additional pilot middle schools.

c. Description of Technical Issues Associated with Implementing the Wireless Program.

Several challenges and technical issues have been identified during the first five phases of the 1:1 computing and Mobile Learning Program implementation:

- School site wireless capacity (Innovation, Millennial Tech Middle, Memorial). Existing wireless capacity at the school site was not sufficient when the three middle schools started implementing their 1:1 pilots (in Phase IV of the Initiative) due to high volumes of traffic generated by 1:1 computing. The schools' wireless networks were overwhelmed in classrooms when a class of 30-35 students attempted to login at the same time. SDUSD used a two-pronged approach to address this. First, wireless capacity in each classroom was expanded by adding new "managed" Access Points. Second the District re-configured the school site local area networks (LAN) to expand their bandwidth and maximize their efficiency of operation with the District's Wide Area Network (WAN).
- At-home connectivity with 3G (Innovation Middle). At the start of this pilot in Phase V of the Initiative, students reporting that they were losing 3G connectivity when at home. SDUSD found that 3G performance was weak in a few areas of the Innovation Middle school community. The District worked with the carrier (AT&T) to methodically identify those areas in the neighborhood that had inadequate coverage and/or penetration. ATT remedied the issue by redirecting local towers as well as implementing a 850MHz GSM frequency band (rather than the more finicky and shorter-range 1900Mhz band), which resulted in ubiquitous coverage and enhanced penetration.

- Saving files at home, outside the District network (Innovation Middle). During the Phase V pilot, saving files presented a significant technical challenge when students were off-site, outside the District network (firewall). The initial group policy that was developed and applied proved troublesome, with technical issues that impacted the end-users ability to save and retrieve files. The District implemented a new Group Policy for 2010-2011 that resolved the issue by enabling automated syncing of off-line files. In addition, the District has developed and launched a web-based virtual desktop application, which may power the District Mobile Learning Program by providing file access, applications, and resources via a web-based student portal (<http://my.sandi.net>) for any device a student may choose to use that has an internet connection (e.g., Netbooks, iPhones/iPads, Smart Phones).

d. Training Provided to Teachers, Librarians, Students or Parents.

The i21 Initiative professional development program is designed to enable teachers to appropriately integrate technology into instruction in all curricular areas through a variety of interactive technologies and resources designed to be responsive to students' learning needs as well as enable students to meet the NCLB requirement of being technologically proficient by grade 8. To ensure the successful integration of this technology investment into District classrooms, every professional development opportunity offered in the District will contain a thread on the use of 21st century classroom tools. Teachers and administrators will receive training on all features of the new technology tools to ensure they are integrated into daily classroom teaching as each grade level or department is equipped through the i21 program.

SDUSD has a 7-person Educational Technology Team that provides the i21 training to teachers and administrators. The Educational Technology Team has developed a list of i21 technology proficiencies that are organized around the California state standards for technology usage and integration (as adopted by the California Commission on Teacher Credentialing). Professional development provided through the i21 Initiative is organized as a sequence of trainings, self-checks, and on-site support to enable teachers to attain identified proficiencies in order to integrate technology into teaching and learning. The Educational Technology Team provides a series of intensive i21 training and professional development workshops for teachers and administrators. Four full-day workshops are required:

1. Introduction to the i21 Initiative: This workshop includes a review of the i21 vision and goals, and introduction to the teacher's PC tablet computer. In this workshop teachers experience what it will be like for students to engage in a 21st century classroom.
2. Use of the Promethean Interactive White Board I.
3. Training in the use and management of Netbooks in the classroom.
4. Use of the Promethean Interactive White Board II.

A number of optional 2-hour sessions are offered for interested teachers on topics such as using the Internet for instruction; Internet searching; online bookmarking; integrating digital resources

into Promethean flipcharts; using the i21 Classroom Media Cabinet and document camera; and using a variety of tools on the Netbooks, such as ActivExpressions/Engage, Wiki, blogging, and using Glogster to allow students to make interactive posters.

Each school site implementing i21 is required to designate a Lead Technology Teacher, who will lead site user groups and model the effective use and integration of the i21 technology tools and resources in their teaching and learning activities in their classroom. The Educational Technology Team provides two additional days of intensive training to these i21 Lead Technology Teachers and then provides ongoing coaching and support.

e. Extent to which the Applicant Wireless Program is Integrated with Federal, Tribal, State, Regional or Local Governmental or Non-profit Initiatives to Achieve Educational or Community Access Outcomes.

SDUSD's i21 Initiative and Mobile Learning Program are integrated with the National Education Technology Plan 2010 (NETP), which presents a model of learning powered by technology. The NETP includes goals and recommendations in five essential areas: learning, assessment, teaching, infrastructure, and productivity.

The NETP outlines a plan to transform teaching and learning by utilizing technology to create engaging, relevant, and personalized learning experiences for all learners. In contrast to traditional classroom instruction, this requires a change in paradigm to a student-centric approach in which students are empowered to take control of their own learning in preparing to be a productive member of a competitive global workforce.

The NTEP identifies *Always-on Learning* as a necessary component in providing mobile computing access anywhere-anytime to enable students to engage in relevant learning experience with real-world tools such as wikis, blogs, and digital content for research, collaboration, and communication. A 21st century infrastructure for learning is always on, available to students, educators, and administrators regardless of their location or the time of day. It supports not just access to information, but access to people and participation in online learning communities. (NETP 2010, pp. 51-60)

Goal 4.0 (Infrastructure) of the NETP is aligned with the National Broadband Plan (FCC, March 2010), which provides a blueprint for improving Internet access for all citizens, including student access at school and at home. Goal 4.0 of the NETP states that *all students and educators will have access to a comprehensive infrastructure for learning when and where they need it*. The following actions are recommended (NETP 2010, p. 61):

- 4.1 Ensure students and educators have broadband access to the Internet and adequate wireless connectivity both in and out of school. Students and educators need adequate broadband bandwidth to access the Internet and technology-based learning resources. "Adequate" should be defined as the ability to use the Internet in school, on the surrounding campus, throughout the community, and at home. It should also include simultaneous use of high-bandwidth resources, such as multimedia, communication and collaboration

environments, and communities. Crucial to providing such access are the broadband initiatives being individually and jointly managed by various federal agencies.

- 4.2 Ensure that every student and educator has at least one Internet access device and appropriate software and resources for research, communication, multimedia content creation, and collaboration for use in and out of school. Only with 24/7 access to the Internet via devices and technology-based software and resources can we achieve the kind of engagement, student-centered learning, and assessments that can improve learning.
- 4.3 Support the development and use of open educational resources to promote innovative and creative opportunities for all learners and accelerate the development and adoption of new open technology-based learning tools and courses.

SDUSD receives federal Title 2D/NCLB funding through the state's Enhancing Education Through Technology Program, which provides formula funding for technology as well as regular competitive program applications. SDUSD has utilized this funding to implement the successful Enhancing Science Education Through Technology (E^SETT) Initiative. This research-based program provided extensive planning and coaching for teachers as they implemented instructional technology (including laptops on a 2 students to 1 computer ratio) in the science classroom. Initially pilot tested at two District middle schools in the 2004-05 academic year, the E^SETT Initiative was then expanded with the support of EETT competitive grants to another twenty-six District middle schools that serve low-income and diverse students.

2. The Poverty Level Based on the Percentage of Students Eligible for a Free or Reduced Price Lunch under the National School Lunch Program (NSLP), and the Current Discount Rate of the School District.

In May 2010, 62.2 percent (80,403) of the 129,204 K-12 students enrolled in the District were certified eligible for free or reduced-price meals. This is 1.9 percentage points higher than in May 2009. SDUSD's current discount rate is 74%. Approximately 40% of SDUSD students report that they do not have a computer with broadband access available to them at home.

3. The Financial Need of the School District, Including Any Additional Budgetary Hardships, Notwithstanding the School District's Current Discount Rate.

California has been operating at a significant deficit for the past ten years. The California Legislative Analyst's Office predicts that the State's budget *deficit* will be approximately \$14.4 billion in 2010-11, \$21.3 billion in 2011-12, and \$23 billion in 2012-13. This is actually a *structural* deficit; the State's current revenue structure (taxes, fees, and other sources) provides insufficient income to maintain services at the current level. The deficit is a result of a number of factors, including federal and state income tax cuts and Proposition 13, which restricts property tax rates, thereby reducing the property tax revenues available for school districts and increasing the state's share of responsibility for school finance.

California currently lags the nation as a whole with respect to per-pupil spending, teacher-pupil ratios, and education spending as a percentage of personal income (California Budget Project,

2006). During the decade before the 1978 passage of Proposition 13, California's per pupil spending was close to or modestly higher than that for the U.S. as a whole. After 1979-80, however, California's per-pupil spending fell below the national average and has remained below the average since then. The U.S. Census Bureau reported that in 2006, California's per-pupil spending was 7.1% below the national average (\$8,486 per pupil in California, compared to \$9,138 in the U.S. overall).

California's budget deficit has caused the state to cut \$8.2 billion in K-12 funding in the past three years. SDUSD suffered a 14% reduction in per-pupil funding in 3 years – from \$5,789 in 2007/08 to \$4,946 in 2009/10. SDUSD's state funding was cut by \$90 million in 2008 and another \$93 million in 2009. These cuts are not over: SDUSD faces a budget cut of over \$83 million in state funding for the 2010 fiscal year (about 7% of the District's operating budget). The San Diego Board of Education has made every effort to minimize the impact of state budget cuts on students. With input from stakeholders and the public, the Board has implemented early retirement incentives to reduce instructional costs, increased class sizes, cut school supply budgets, eliminated 250 central office staff positions and \$20 million in central office expenditures, and streamlined operations through reorganization and increased use of technology. All certificated staff members are taking five furlough days for the first time this year, while classified staff began furloughs earlier to help balance the District's budget. With salaries and benefits making up 84% of the District's unrestricted budget, further reductions in staff are likely in the face of continued budget cuts.

In addition to state budget cuts, SDUSD faces several additional budgetary challenges:

- Increases in utility costs. The prices of utilities and gasoline have increased steadily over the past five years (gasoline prices alone have risen 10% in the past year). In the coming year, SDUSD expects utility costs to increase an additional 10%.
- Labor costs. SDUSD utilizes a step progression schedule that provides salary increases to each classification of employee each year they are employed. As the District's teachers and staff gain seniority and become more experienced in their jobs, the overall costs of the District's labor force rises. Salary costs are projected to increase 2.5% annually.
- Costs of employee benefits. The cost of providing health and welfare benefits to District employees has increased significantly over the past five years. These costs are expected to increase by up to 10% annually.
- Special Education costs. In December 2008, 12.4% of all students enrolled were in Special Education. The cost of providing the Special Education services mandated by the federal government continues to grow as labor costs and transportation costs continue to increase. Federal funding, however, does not cover all of these costs. SDUSD must make up the difference from the District's general fund, and spends about 18% of its annual budget to cover these additional costs of special education.

4. All Costs, Including Those Eligible for E-rate Support and Those Not Eligible for E-Rate Support, Associated with Implementing the Applicant Wireless Program.

The table below provides an estimate of the full implementation costs for each of the five years of the Educational Technology Strategic Plan. The table includes technology acquired through

the full range of budget resources available to the District. The cost estimates include the total cost of ownership.

Category	Year 1 2010-2011	Year 2 2011-2012	Year 3 2012-2013	Year 4 2013-2014	Year 5 2014-2015
1000: Certificated Salaries					
<ul style="list-style-type: none"> • Educational Technology Dept manager and resource teachers 458,000 471,740 485,892 500,469 515,483 • i21Lead Technology Teachers: professional development time 487,500 487,500 487,500 487,500 487,500 • Certificated Technical Support Personnel 1,485,000 1,485,000 1,485,000 1,485,000 1,485,000 					
2000: Classified Salaries					
<ul style="list-style-type: none"> • Educational Technology Department staff (network media technician, secretary) 136,000 140,080 144,282 148,611 153,069 • Information Technology Dept. staff 5,000,000 6,500,000 6,500,000 6,500,000 6,500,000 • School Site Technical Support Staff 743,750 743,750 743,750 743,750 743,750 					
3000: Benefits					
<ul style="list-style-type: none"> • Certificated salaries 680,540 684,387 688,350 692,431 696,635 • Classified salaries 1,881,520 2,362,826 2,364,170 2,365,555 2,366,982 					
4000: Books, Materials and Supplies					
<ul style="list-style-type: none"> • Computers for staff access to DWA 1,000,000 1,000,000 1,000,000 1,000,000 1,000,000 • VOIP telephones 500,000 500,000 500,000 500,000 500,000 • Software, electronic learning resources, instructional applications and content 100,000 100,000 100,000 100,000 100,000 • i21 classroom technology 34,638,156 34,638,156 34,638,156 34,638,156 34,638,156 					
Category	Year 1 2010-2011	Year 2 2011-2012	Year 3 2012-2013	Year 4 2013-2014	Year 5 2014-2015
5000: Other Operating					
<ul style="list-style-type: none"> • Professional 					

development services and consultants	100,000	50,000	50,000	50,000	50,000
• Travel to professional conferences (EETT)	2,500	2,500	2,500	2,500	2,500
Contracts for:					
• 3G Wireless Services	65,000	330,000	400,000	500,000	500,000
• Electronic learning resources, including digital data storage	300,000	300,000	300,000	300,000	300,000
• PeopleSoft Business Applications (with business applications data warehouse)	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
• Content Management System	2,000,000	1,000,000	1,000,000	1,000,000	1,000,000
• Telecommunications and VOIP system	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
• Student information data warehouse	1,000,000	200,000	200,000	200,000	200,000
• Document management system	500,000	500,000	500,000	500,000	500,000
6000: Capital Outlay					
• Infrastructure upgrades to sites and central office	400,000	400,000	400,000	400,000	400,000
TOTAL	\$53,677,966	\$54,095,935	\$54,189,601	\$54,313,973	\$53,339,076

5. The Committed School Resources Available to Implement the Entire Applicant Wireless Program, Including Whether Those Funds are from the School District’s General Budget or From an Outside Funding Source.

SDUSD has committed funding to implement the i21 Initiative and the Mobile Learning Program. These funding sources include:

- Bond funds. Proposition S, passed by the voters in the City of San Diego in 2008, provides funding for the Integrated 21st Century (i21) Interactive Classroom Initiative which provides technology upgrades for 7000+ classrooms at the District’s elementary schools, middle and high schools. The Proposition S bond measure will provide over \$25 million per year through 2015 for educational technology (and a total of \$400 million over 15 years).
- General fund. SDUSD has committed some of its unrestricted state and local funding to cover the implementation costs. General funds are used to cover the majority of the District’s ongoing operations, including books, supplies, employee salaries and benefits, instructional programs and professional development.

- Categorical funds. Categorical funds are state and federal funds that are restricted in their use to specific purposes and programs. Categorical funding programs include Title I/Part A (federal funding to support economically disadvantaged students). Where allowable, categorical funds are often used to acquire technology and support the integration of technology into the curriculum.
- Grant funds and donations. The District receives grants from the state and federal government and from foundations and other organizations. The District usually must compete to win these grants, which are primarily categorical in nature, with restricted uses for the funding and full accountability to the funding agency for fulfilling the criteria and/or requirements of the grant. The District also receives donations of equipment and services from companies and organizations.
- K12 Educational Technology Voucher Program: The K12 Ed Tech Voucher Funds are available as a result of a settlement agreement in an antitrust case against Microsoft Corporation. Per the settlement agreement, a fund was established to offer vouchers to public schools that can be used to purchase computer hardware, software, or professional development.

SDUSD also participates in a number of programs to reduce its costs for telecommunications and computers. These programs include: (1) the *E-Rate Program*; (2) the *CALNET Contract*, statewide contracts competitively bid and negotiated by the California Department of Governmental Services; (3) *The California Teleconnect Fund*, operated by the California Public Utilities Commission, and which provides 50% discounts of most ongoing costs for telecommunications services provided by common carriers (4) *Western States Contracting Alliance*, which provides competitive prices on computers and peripheral products; and (5) *The California Multiple Awards Schedule (CMAS)*, which provides contract terms and negotiated discounts on equipment and services.

6. The Effect EDU2011 Support for Off-premise Connectivity is Likely to Have Upon the School District's Projects.

Approximately 40% of SDUSD students report that they do not have a computer with broadband access available to them at home. This contributes to a substantial digital divide among the District's students, with some having access to the best computers and fastest Internet access, and many others having no regular access to technology outside of the school. The costs of the 3G wireless Internet connection comes out of each school site's budget. SDUSD estimates cost allocations and develops and submits one central e-Rate 471 application on behalf of the school sites. The District also selects the carrier in accordance with e-Rate guidelines. Each school site is then responsible for paying for its 3G.

Innovation Middle School uses 3G access as a strategy in its Single Plan for Student Achievement, which provides the rationale for the site's budget to be used to pay for the service. Innovation Middle paid about \$11 per activated card for the 2009-2010 school year after applying the e-Rate discount and estimating cost-allocations for using the Netbooks offsite. EDU2011 support will enable schools to allocate the resources needed to implement One-on-One

wireless take-home programs. This will mean that the teachers will be able to utilize 21st century technology through learning activities undertaken at school and at home, secure in the knowledge that family income will not determine a student's access to learning tools.

7. Analysis of the Cost-effectiveness of the Current or Planned Applicant Wireless Program as Compared to the Use of Other Types of Technology that Would Also Meet the Program's Objectives.

SDUSD considered three options for the i21 technology: a full-featured laptop, a Netbook and a work station (thin-client appliance). The cost of each technology option was analyzed on a per-classroom basis for K-3 and grades 3-5, 6-8 and 9-12 within the context of the i21 Initiative criteria of being a scalable and sustainable solution. The Netbook turned out to be the most cost-effective solution that could work both in school and at home.

SDUSD also considered the option of requiring that each family provide sufficient home-based Internet access for their students before the children could participate in programs that would allow them to take a laptop home. However, because approximately 40% of District students do not have access to a computer with Broadband Internet access outside of school, this option would only exacerbate the sizable digital divide already present in the District by providing the technology-enhanced learning opportunities only to those students whose families could afford to provide the Internet access. Therefore, the District committed to paying these costs.

8. Any Relevant Technology Planning Documents and, If Applicable, a Statement of Long-term Objectives for the Program.

The goal of the SDUSD Mobile Learning Program is to seamlessly integrate 21st century technology throughout the curriculum and into all teaching and learning at participating schools. Project objectives include: (1) Develop ubiquitous 24/7 computing for all students; (2) Prepare teachers to utilize the technology and integrate it into the curriculum; and (3) Install the infrastructure, hardware and software needed to deliver digital content to teachers and students. The SDUSD Technology Strategic Plan is provided as an attachment to this proposal.

9. A description of the specific measures taken to ensure compliance with the Children's Internet Protection Act and measures to protect against waste, fraud, and abuse;

When school computers leave the network, both the computers and the users can be exposed to harmful content and safety and security risks. The San Diego Unified School District has addressed these concerns and risks by implementing the Guide Mobile Filter (GMF), a Mobile Internet filtering solution from Lightspeed Systems, which ensures the safety of students by enforcing District Acceptable Use Policies. The GMF provides CIPA-compliant Internet filtering for mobile computers; reporting of off-network activity; ability to block all forms of proxy servers (anonymous and secure); forced SafeSearch for Google and Yahoo search engines; local policy control (Active Directory and LDAP); password-protected uninstall; and cross-platform support for Windows and Macintosh (including iPad, iPhone, and iPod touch devices). The GMF works from any location, with any type of Internet connection.

The GMF ensures a safe online learning experience on both private and public networks. It is carrier independent:

- It extends policies and protection to off-network computers. District Acceptable Use Policies protect both the user and the equipment. Traditionally when laptops were taken off the network they had no content filtering applied. GMF allows SDUSD to ensure that blocked sites remain blocked, no matter where the computer is being used.
- It keeps users safe with comprehensive filtering. The GMF detects and/or blocks access to inappropriate material on the Internet based on an extensive, education-specific URL database and custom allow and block lists, helping to ensure safety and CIPA compliance.
- It reduces the cost, time, and frustration of compromised computers. By blocking sites known as threats for spyware, malware, and viruses, the GMF helps keep school computers secure and safe when they are off the network, helping to keep computers functioning properly.

The GMF communicates Internet-browser requests from the mobile computer to a Lightspeed server at the District. In turn, the Lightspeed server references the URL requests with its content database and either allows the request to be processed or sends a blocking and redirect message to the user. In this way Acceptable Use Policies are consistently enforced for users alternately attached to the local network or working remotely. The GMF protects off-network computers from any location, with any type of Internet connection.

10. Description of Internal Policies and Enforcement Procedures Governing Acceptable Use of the Wireless Devices Used in the Program Off the School's Premises.

The San Diego Board of Education has adopted a districtwide policy on *Student Use of District and School Data Communications Networks and the Internet* (Administrative Procedure 4580, adopted in 1995 and updated in 2005) that complies in full with the Children's Internet Protection Act (CIPA). This Board policy established a District Acceptable Use Policy that identifies District and teacher responsibilities, the SanDiNet (the District electronic network with access to the Internet) use guidelines, acceptable and prohibited uses of the network, user privileges, network rules and etiquette, security, cyber vandalism and cyber-bullying. The Board-approved Administrative Procedure 4580 also sets policy on the use of cellular telephones and other electronic signaling devices on school property.

Parents receive information about Internet safety and the SDUSD Acceptable Use policies in the *Facts for Parents* handbook distributed to parents each year. All parents of students under age 18 and students over age 18 are required to sign the "Student Connect Responsibility Contract." The disciplinary actions that may result from abuse of District network privileges are outlined in the document, and include denial, revocation or suspension of the student's user access as well as other disciplinary actions.

Teachers receive informational materials about the Internet safety, protecting online privacy and avoiding online predators, curriculum materials on the subject for use in their classroom, and formal training in Internet safety during the District's ongoing Educational Technology training sessions. Teachers may also attend training sessions on Internet safety offered by the San Diego Police Foundation. Teachers integrate instruction in Internet safety into classroom activities.

Required Information (schools only). The applications filed by schools also must contain:

- (1) The location of the school;**
- (2) The name of the school applicant, along with a complete list of the individual schools that will be served, including their billed entity numbers;**
- (3) A description of the school district or school, including the type of school, such as private, public, charter, or other special type of school;**

The San Diego Unified School District is a public school district serving the City of San Diego, California. SDUSD proposed to implement the next phase of the development of the District’s Mobile Learning Program by implementing take-home computing with broadband access in 6th grade at eight District *public* middle schools and schoolwide in two schools (Innovation Middle and Millennial Tech Middle. The schools were selected based on several considerations: their student poverty level, the percentage of students without broadband access at home (the digital divide), school leadership, and technology use and integration. In addition, schools were selected to represent the diversity of the District. Selection of a diverse group of schools will enable SDUSD to assess whether there are different impacts of the program on different types of schools. The specific school names, locations, billed entity numbers, enrollment and student poverty levels are indicated below:

School Name and Billed Entity Number (SDUSD: 143662)	School Address	Total Number of Students Fall 2010	% eligible for Free-Reduced Lunch Fall 2010	Number of Students Participating In Project	Number of Teachers in Project
Innovation Middle (7-8) 16053387	5095 Arvinels Ave, San Diego, CA 92117	529	66%	529	19
Millennial Tech Middle (6-8) 16053389	1110 Carolina Lane, San Diego, CA 92102	516	71%	516	21
Dana 202753	1775 Chatsworth Blvd, San Diego, CA 92107	809	45%	426	15
Knox 104237	1098 S. 49 th St., San Diego, CA 92113	635	97%	300	12
Lewis Middle 104308	5170 Greenbrier Ave, San Diego, CA 92120	1,080	51%	355	15
Longfellow 104197	5055 July St., San Diego, CA 92110	739	48%	80	6
Mann Middle 104265	4345 54 th Ave., San Diego, CA 92115	827	91%	217	10
Montgomery 104216	2470 Ulric St., San Diego, CA 92111	446	86%	134	10
Pershing 104304	8204 San Carlos Dr., San Diego CA 92119	882	46%	280	12

Wilson 104159	3838 Orange Ave., San Diego, CA 92105	571	97%	167	14
Total				3,004	134

Note: Shaded schools will implement schoolwide; all others will implement in grade 6 only.

(4) Description of the Program’s Curriculum Objectives, the Grade Levels Included, and the Number of Students and Teachers Involved and/or Being Served as Part of the Program.

The goal of the Mobile Learning Program is to seamlessly integrate 21st century technology throughout the curriculum and into all teaching and learning at participating schools. There are two project curriculum objectives:

Objective 1: Develop ubiquitous 24/7 mobile computing for all students, extending access so that learning can happen outside the school day (when and where they need it).

Objective 2: Prepare teachers to utilize the technology and integrate it into the curriculum to meet the California Department of Education’s (CDE) Content Standards in English language arts, mathematics, history-social science, science, visual and performing arts, and English language development, and locally-developed content standards aligned with state frameworks in subject areas not yet covered by the statewide Standards (including physical education and world languages).

Throughout the i21 Initiative and the Mobile Learning Program the state standards are used as the written curricula that describe for teachers what students must know and be able to do in each subject. District curriculum, student level assessment, textbooks, instructional materials and professional development activities are all aligned with the standards. High quality instructional materials and intensive professional development enable teachers to teach to the state standards.

The table above lists the number of students and teachers participating in the proposed project.

(5) A Summary of any Data Collected by the School on Program Outcomes and Achievement of Program Objectives.

SDUSD has identified four types of performance indicators to help determine the impact of the i21 Initiative on student engagement, academic outcomes and equipment performance:

- Student Engagement Indicators: Student attendance and number of disciplinary actions; Increased time on activities related to instruction and learning; Use of Measuring Success flip charts to survey teachers.
- Student Outcome Indicators: Multiple measures in ELA, math, social studies or science; Number/percentage of students who earn grades of C or better; Student performance on course projects and assessments; Student and teacher perceived impact on learning; Graduation rate; Referral data for Special Education; Technological proficiency.

- Teacher Outcome Indicators: Increase in teacher integration of technology tools and resources; Teacher retention at the site; Number of flipcharts created.
- Equipment Performance Indicators: System ease-of-use and performance; Educational software utilization including multimedia; Connectivity, break/fix rates.

These performance indicators will be assessed as the i21 Initiative is implemented. Teachers have not yet implemented the i21 Initiative in the classrooms for a full academic year, so full teacher and student outcome results are not yet available. A teacher survey conducted in spring 2010 (at the end of the first full year of implementation of the i21 Interactive Classroom) found an increasing percentage of teachers reporting that they have moved to a higher stage of technology adoption in their classroom. When asked what they believed to be the most significant impact that i21 implementation had on classroom teaching and learning to date, teachers most frequently cited increased student engagement and motivation, and noted that i21 provides a more engaging way to present and interact with instructional material. In a survey of the grade 7 and 8 students at Innovation Middle School who were involved in the spring 2010 pilot test of the take-home computing, 81% reported that the Netbooks helped them improve academically over the course of the semester.

The success of SDUSD's Enhancing Science Education Through Technology (E^SETT) project provides some indications of the student outcomes that can be expected on a longer-term basis. The E^SETT project served as a pilot test of the implementation of technology in the classroom and is the model for the professional development that is a fundamental part of the i21 Initiative and the Mobile Learning Program. The research-based E^SETT program provided extensive planning and coaching for teachers as they implemented instructional technology (including laptops on a 2 students to 1 computer ratio) in the science classroom. The E^SETT Initiative was implemented at twenty-six District middle schools that serve low-income and diverse students. The effects on both teachers and students were significant, both on their use of technology in the classroom and on gains in academic proficiency. Over a two-year period, teachers participating in the E^SETT program demonstrated much greater increases in computer knowledge and skills than did all middle school teachers (a 22.4 percentage point gain vs. a 9.7 point gain). While all middle school teachers reported a 48.7% increase in using technology in the classroom (Standard 9) over the two years, E^SETT teachers reported an 82.3% increase. E^SETT teachers also reported a 73.5% increase in using technology to support student learning (Standard 16), compared to a 42.5% increase for all middle school teachers. In addition, E^SETT students overall demonstrated a much faster rate of academic growth – gains in proficiency in science on the California Standards test) than did students across the District. Across the District, 69.5% more students scored proficient or advanced in science in 2008 than in 2006. At E^SETT schools (which started at a lower level of proficiency than average), the average growth rate was 167.6%.

The SDUSD Office of the Chief Information Technology Officer will work with the District Research Office to collect and analyze student and teacher outcome data for the proposed project, and will prepare and submit a report to the Wireline Competition Bureau describing the data collected in detail and describing lessons learned from the program.