Clark County School District

Technology Plan • 2012 - 2017 •

Learning, Technology, and our Children's Futures....

The Clark County School District Technology Plan 2012 - 2017: Learning, Technology, and our Children's Futures was developed by a districtwide committee with input from thousands of students, and hundreds of educators, parents, community members, and other stakeholders. This plan presents a forward thinking vision that is grounded in research and a strategic blueprint for achieving that vision.

METIRI GROUP

CCSD
CLARK COUNTY
SCHOOL DISTRICT

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"All of our efforts have one purpose: to ensure every child is 'Ready by Exit' for college or career. To do that, we must offer our students technology that engages them and teaches them with new and more effective methods. This is one of the ways we will move from the fastest-growing district in the nation to the fastest-improving one."

- Dwight D. Jones, Clark County School District Superintendent

Message to the Reader

"Technology is our children's future and our own. Fueled by human ingenuity, it brings opportunities and challenges never previously conceived. Through this plan, the Clark County School District leverages technology to enhance teaching, advance learning, and increase the effectiveness of business systems."

- Jhone M. Ebert, Chief Technology Officer

The architects of the Clark County School District 2012-2017 Technology Plan: Learning, Technology and Our Children's Futures dedicated 18 months of continuous inquiry, community data gathering, and systematic thinking to the development of this plan. A vision was set and gaps were identified between that vision and the current realities within the District. Key topics were researched, and expertise and knowledge were shared on aspects such as included cloud computing, communications, digital content, personally owned devices, blended learning, mobile computing, Web 2.0 tools, the future of Web 3.0, and digital learning across the curriculum. Led by Jhone Ebert, the Clark County School District worked in unity, across divisions, in the writing of the plan.

The plan was developed with three purposes in mind:

- To increase academic achievement by personalizing learning through technology;
- To establish all Clark County School District (CCSD) schools as high tech, with next- generation ecology of learning and teaching; and
- To conduct the business of education through a vibrant, data-informed, streamlined "system of systems," aligned to the vision and mission of the organization.

The recommendations included in this plan focus on the strategies, professional development, resource investment, and policy changes that will advance these purposes. We invite students, teachers, administrators, parents, community members, and other stakeholders to join the effort to define and build the education CCSD students need in order to be prepared for the 21st century and their futures.

Special Acknowledgements

A significant amount of time and energy was devoted to the creation of this plan. Without the contributions and tremendous effort of the many individuals involved, the development of the new technology plan could not have been accomplished.

The District is appreciative of the support received from parents, students, community members, university professionals, legislators, business leaders, government officials, associations, teachers, administrators, and support staff who participated in the many surveys, meetings, and interviews to provide their feedback, ideas, and suggestions.

Special recognition is due to the numerous individuals who have served on the Technology Planning Committee for their support and leadership throughout the planning process. They have been advocates of technology in our schools, and devoted much time in the development of the goals and action steps outlined in the plan and the review and final edit of the plan.

Special thanks to Cheryl Lemke and the Metiri Group (http://learning.metiri.com*)* for their support and guidance in the development of the plan, capturing all of the data that took place throughout the research process, and finally, compiling the information into this master document. The Metiri Group is an innovative consulting firm that specializes in K-20 educational technology and 21st Century Learning. Renowned for its systems thinking, the firm offers a broad range of services including: evaluation, research, professional development, speaking and facilitating, strategic planning, and consulting. Metiri works nationally and internationally, with a clientele that includes: school districts, national education labs, state and provincial education agencies, foundations, professional organizations, and private sector companies.

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SECTION 1: Executive Summary

"Our students are technology savvy. We have to engage them in ways that stimulates learning."

- Dwight D. Jones, Clark County School District Superintendent

Students live in a high tech era of unprecedented complexity, accelerated change, access to an overwhelming amount of information, and global-scale challenges. These students have never known a world without real-time communications via smart phones, instantaneous access to digital resources, global mass media, and 24-hours-per-day, 7-days-per week (24/7) access to digital communities. Adolescents text instead of talk, prefer the interactivity of the Internet to television, and spend, on average, over six hours a day using digital media.

Today's students will enter a workforce of knowledge-based jobs that require strong mathematics, science, and technology expertise. Even manufacturing jobs are high tech, involving robotics. Jobs will require students to be independent, self-directed learners who think critically and creatively as individuals and on teams. For many of these students, collaboration will be virtual and global, requiring cultural and global awareness. The traditional classroom-based education of past decades is no longer adequate in this new era.

K-12 educational systems are experiencing the effects of this new era. Clark County School District (CCSD) is experiencing the end of decades-long growth in student enrollment. This slowdown of growth provides an opportunity to stop and reflect on next strategies and steps toward accomplishment of the vision of the Clark County Board of School Trustees:

> *All students will graduate from high school having the knowledge, skills, attitudes, and values necessary to achieve academically, prosper economically, and contribute in a diverse global society.*

First, sound pedagogy and personalization of learning through effective uses of technology are increasingly becoming the norm in the context of the Common Core State Standards. Second, an integrated, effective business of education system is being established within CCSD, grounded in a culture of innovation that continually improves operational efficiency and effectiveness. Both the instructional and business systems are built on a foundation of robust, secure technology infrastructure and user support systems.

Technology will play an essential role in the CCSD mission during the next decade. In a benchmarking exercise, elements of CCSD were compared to similar districts. The resultant strengths and areas of growth identified in the Gibson Report[1] are integrated into this plan. That report showed the District's student performance was behind peer districts, particularly in mathematics and science, and among minority students.

Through polls conducted to gain perspectives from internal and external constituents, a majority of constituent groups revealed concerns that CCSD graduates are leaving school unprepared for the 21st century. It is clear that technology will become the gateway to 21st century learning. The envisioned system is described through in-depth visioning, gap analysis, action planning, and budgeting in five areas:

- Teaching and Learning Environments
- Business of Education Systems and Services
- End-User Access and Support
- Infrastructure and Communications Systems
- System to Ensure Sustainability and Currency

The sections below list an overview of the vision, gaps identified when the vision was compared to the current status, and recommendations for attaining the vision. This gap analysis is designed to be a system of interdependent recommendations:

I. Teaching and Learning Environments (see Section 4)

Relevant, interactive learning and teaching is personalized, facilitated, and supported through the informed use of technology.

Current State/Gap	Recommendations
The Gap CCSD does not yet fully integrate technology to support learning and achievement, as evidenced by: • Surveys indicate that the community believes changes in teaching and learning is necessary. • Surveys indicate that CCSD students are ready to use technology to learn. • There is uneven integration of technology in learning across the district. • Teacher exchanges on best practices are not yet widely used. • There appears to be a lack of systemic vision, culture of innovation, and policies for leveraging technology for teaching and learning. • Technology integration professional development is available but inconsistent.	**Closing the Gap** Establish a new ecology of learning by: 1. Increasing appropriate student technology use at every level and every content area. 2. Providing systemic professional development paths that include accountability. 3. Providing streamlined and clear purchasing procedures, allowing flexibility for pilot projects. 4. Using appropriate technologies to efficiently collect, access, analyze, and share data for decision making.

II. Business of Education Systems and Services (see Section 5)

An integrated, data-centric, service-oriented suite of systems and processes effectively and efficiently links the goals and functions of business to the aims of PreK-12 education.

Current State/Gap	Recommendations
The Gap • There is a lack of districtwide integration of operational and educational systems resulting in a lack of automated business intelligence. • There is a lack of formal data policies that clearly define a limited number of recognized data sources results in ambiguity about who is the data owner and decision maker concerning data. • A lack of confidence in the accuracy of the data results in a lack of clarity on the associated data requirements, which are critical for data accuracy. • Canned reports are provided, but, in some cases are not as fully used.	**Closing the Gap** 1. Define/establish districtwide core business practices and systems. 2. Establish a process for digitizing, upgrading, and linking core business practices, prioritizing those of high need (i.e., Student Information System, Human Capital Management). 3. Define and establish an enterprise architecture, supported by a service-oriented organizational structure, for tight integration among core business of education systems. 4. Establish a system of governance for the enterprise architecture that is transparent, participatory, and focused on gaining educational and operational efficiencies, while also allowing local flexibility for innovation. 5. Establish procedures for data ownership, collection, and storage districtwide. 6. Establish business intelligence analysis and reporting capacity districtwide. 7. Establish a culture of data that promotes an awareness of available data, educator professional development and credentialing, and leadership in using data to inform decision making.

III. End-user Access and Support (see Section 6)

Students and educators have ready access to tools required for learning, teaching, and operational efficiency.

Current State/Gap	Recommendations
The Gap • No standardized method for oversight of technology access and deployment across the District. • Students have access to instructional software only at the school sites. • No coordinated, comprehensive, collaborative process for identifying, selecting, purchasing, deploying, and supporting end-user tools. • Policies restrict students from using mobile devices in school. • Limited focus on developing school networks to support students' use of personally owned devices. • No gauge of the technical expertise or knowledge of CCSD employees. • Uneven site-based technology support.	**Closing the Gap** 1. Build the capacity of teachers, administrators, and other staff through professional development designed to address the knowledge gaps related to effective use of technology among those audiences. 2. Enhance access to systems and devices to promote productivity and learning. 3. Adopt hardware and software standards to meet instructional and business needs. 4. Adopt comprehensive deployment and technical support for hardware and software managed through the Technology and Information Systems Services Division.

IV. Infrastructure and Communications Systems (see Section 7)

Safe, secure, high-speed infrastructure and communication systems will meet or exceed the capacity requirements of new teaching and learning environments; and an integrated business environment will support new designs in teaching and learning.

Current State/Gap	Recommendations
The Gap • CCSD lacks clearly documented standards and a process for updating the standards. • There are missing detailed assessments of all classrooms (and non-classroom spaces) comparing what is present (as-built) to the standards. • There are topology gaps in bandwidth requirements, upgrades, identification of emergency services, and alignment to the teaching and learning vision. • There is no systematic approach to decision making related to the implementation plan, schedule, cycle that synchronizes deployment, or readiness/needs of the schools.	**Closing the Gap** 1. Technology standards for infrastructure and communications systems must be developed, adopted, communicated, and approved by the Technology Governance Committee. 2. Design and implement a technology conditions assessment process. 3. Develop and implement project standards to inform prioritization schedules and resource commitments.

V. System to Ensure Sustainability and Currency (see Section 8)

Sustain integrated technology that promotes efficient and effective instructional and operational processes without compromising the innovative capacity of future generations.

Current State/Gap	Recommendations
The Gap • A clear vision promoting innovative, efficient, and effective uses of technology, and includes technology as a design element throughout the District, is not evident. • An annual/periodic analysis and evaluation of District work to determine technological infrastructure needs, including an ongoing analysis of return on investment, is lacking. • The technological infrastructure is insufficient. • Documentation and alignment of processes and procedures is not systematic or ubiquitous. • A continual review and examination of the way business is done is necessary to promote sustainability.	**Closing the Gap** 1. Develop and implement a system of information technology governance. 2. Establish a multi-year sustainable funding model for the Technology and Information Systems Services Division. 3. Establish a system to encourage and nurture creativity and innovation.

The fiscal implications of the plan are listed in the following table:

	Component of the Plan	Non-Recurring Costs	Recurring Costs
Section 4	Teaching and Learning Environments	$58,200	$160,499,352
Section 5	Business of Education Systems and Services	$40,180,000	$194,658,000
Section 6	End-user Access and Support	$116,000	$128,816,353
Section 7	Infrastructure and Communication Systems	$100,000	$364,380,000
Section 8	System to Ensure Sustainability and Currency	N/A	Included in other sections

Where is the timeline?

The implementation timeline for the plan varies across the sections, and each section includes immediate action steps. Annual progress targets are established over the five years of the project, from 2012 – 2017.

The five components of this plan are interdependent. While appropriate divisions will assume responsibility for the various recommendations, coordinated oversight of all components across divisions will be the responsibility of the Technology Standards Committee, which will continue to meet quarterly to monitor progress and annually update the plan.

SECTION 2: The Vision – In the Context of 21st Century Innovations

A New Day in Clark County

It is a new day for schools in the Clark County School District. After decades of unprecedented expansion with thousands of new students flooding into southern Nevada, enrollment has stabilized due in large part to downturn of the economy. This has also created a statewide challenge of declining revenues. With these turns of events, the District is able to shift focus from growth in student population to growth in student achievement.

Focus on student achievement, especially in the progress of subgroups over time and the achievement gap between subgroups and their peers, has renewed interest in innovative interdisciplinary study of traditional subjects in the context of 21st century learning. When coupled with new Common Core State Standards, this translates into a new emphasis on 21st century skills including critical and creative thinking, communication and collaboration, cultural and global awareness, multimedia and research literacy, and self-directed learning.

According to a recent report released in 2011 by Gibson Consulting, the challenges that CCSD faces include:

- CCSD's overall student performance in math and reading is behind that of peer districts, as well as its own performance standards, and large achievement gaps still exist between student subgroups.
- Achievement gaps between African American students and White students in grades 3-8 have not substantively changed over the past six years.
- Achievement gaps between Hispanic and White students have improved (become smaller) over the past six years, but still remain large.
- High school proficiency exam rates have historically been lower in math and science than other subjects.
- Mean SAT and ACT scores and Advanced Placement test scores were comparable to peer districts, but participation rates for these tests at CCSD were substantially lower than in peer districts.
- Comparable districts have a higher percentage of English proficiency among their respective Limited English Proficient (LEP) populations than CCSD.

Students today are growing up in a society where personal devices are capable of connecting them to the world 24 hours a day, 7 days a week. Students learn with technology, in real-world contexts, doing things that matter. Students learn from high quality teaching, informed by data and information. Innovative uses of technology and digital resources engage students fully in exciting, interesting, rigorous, interdisciplinary, authentic studies.

Personalized, anywhere, anytime learning through effective uses of technology engages a diverse student population. Participatory and collaborative learning connect students with ideas and each other. Authentic, real-world work engages students in vibrant local and global communities of learners.

A Vision

The Board of Trustees has established a vision and mission for CCSD:

> *VISION: All students will graduate from high school having the knowledge, skills, attitudes, and values necessary to achieve academically, prosper economically, and contribute in a diverse global society.*
>
> *MISSION: To create an environment where students, parents, employees, and the community foster achievement.*

Through a plan created from the vision and mission statements, technology will be used to advance the following District goals for continuous improvement:

Goal 1: *All students, teachers, and staff will use appropriate technologies and communication networks identified through needs assessments, research, and/or demonstrated effectiveness to support increased student achievement.*

Goal 2: *Technology will be used to provide opportunities for high quality professional development via multiple modes of online and traditional instruction for all CCSD employees.*

Goal 3: *The use of technology will be expanded to enhance communication AND improve business processes for CCSD employees, stakeholders, and the community.*

Integrated Suite of Systems and Services

The U.S. Department of Education Strategic Plan for fiscal years 2007-12[2] discusses rigorous measures to analyze student growth on achievement tests based on historical data; to analyze tools, textbooks, and cluster schools to ascertain effectiveness; and to identify students at risk of dropping out of high school. Given this, plus the focus in the Race to the Top program on the use of growth models to determine teacher effectiveness, the District is responding by becoming more data-centric.

There is no question that technology plays a key role in today's society. The Technology Planning committee formally acknowledges that to achieve the District vision and mission, technology and the use of data must be embraced to inform teaching, learning, and the business of education. The potential of today's technology must be used to enable students to learn using the digital tools of the 21st century. Behind the scenes an integrated suite of technology and data systems must be used for efficiency, effectiveness, and seamless flow of data between systems, along with continuous improvement of the system for the purpose of improving student learning.

A comprehensive set of services will exist to meet the needs of all students including blended and online modalities, personalization the use of data to inform decisions, and new levels of student engagement in higher order thinking skills. Accomplishing these goals requires a streamlined and efficient suite of integrated systems and services, each of which is optimized individually, yet systemically. Thus, each of the systems and services both on the business side (e.g., student information, transportation, human resources, information technology, food services, etc.) and on the instructional side (e.g., assessment, curriculum and instruction,

professional development, etc.) will be optimized for efficiency and effectiveness as an individual system, and will be designed to link automatically where appropriate.

Communication, process and data governance, and key performance measures and indicators must be established across instructional and business areas to establish an efficient suite of systems and services dedicated to creating integrated learning environments where all students individually and collectively achieve the District vision. This will require systemic change.

The instructional systems will be based on the Common Core State Standards, Nevada State Academic Standards, Nevada State Technology Standards, and the knowledge base on how people best learn – in combination with the systemic use of data to inform decision making. Each of these critical elements is summarized below.

Common Core State Standards.[3] The Nevada State Board of Education adopted the Common Core State Standards (CCSS) in October of 2010 to ensure that Nevada students are college and career ready. These standards will become the foundation for curriculum design, instructional practice, and formative, interim, and summative assessments used at the state and local levels. The website, https://bighorn.doe.nv.gov/sites/CommonCore/default.aspx, offers transition documents, training materials, and updates pertinent to the Nevada CCSS. To read more about the State Standards Initiative, visit the website at: http://www.corestandards.org.

Nevada State Academic Standards. In response to state legislative mandates, the Nevada Council to Establish Academic Standards for Public Schools establishes high, measurable standards in the following areas: English language arts, mathematics, science, social studies, computer and technology education, health and physical education, the arts, career and technical education, English as a second language, foreign language, and information literacy. The state has established a schedule for transitioning to the Common Core State Standards and associated assessments by 2014.

Nevada State Technology Standards. In Nevada today there is a need for a rigorous self-examination of what is done in schools to prepare students to thrive in an increasingly digital and interconnected global society. The challenge is to transform the current education model with modern tools, strategies, and learning resources to prepare young learners for their futures. The Nevada Computer and Technology Standards address basic competence, and incorporate the skills and knowledge that students require to learn effectively and live productively in an increasingly digital society. See the Nevada Computer and Technology Standards at:

http://www.doe.nv.gov/Standards/ComputerTech/CompTechStandards.pdf/.

The State of Nevada has defined six standards, noting the intent that these standards would be integrated with the academic standards: creativity and innovation; communication and collaboration; research and information fluency; critical thinking, problem solving and decision making; digital citizenship; and technology operations and concepts.

Research on How Students Best Learn. The knowledge base of how students best learn is grounded in experimental, quasi-experimental, and large-scale correlational research. As with other fields, it is a knowledge base that is continually updated as new educational studies are released. The professional development in which educators in CCSD engage is grounded in such research.

Enterprise architecture is a discipline and management practice to align and maximize an organization's resources (people, processes, information, and technology) and relationships, both internal and external, to enable its evolution to a desired target state. The overall design of the integrated suite of systems and services for the business of education is grounded in the concepts of enterprise architecture and business intelligence. Business Intelligence is a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making.[4]

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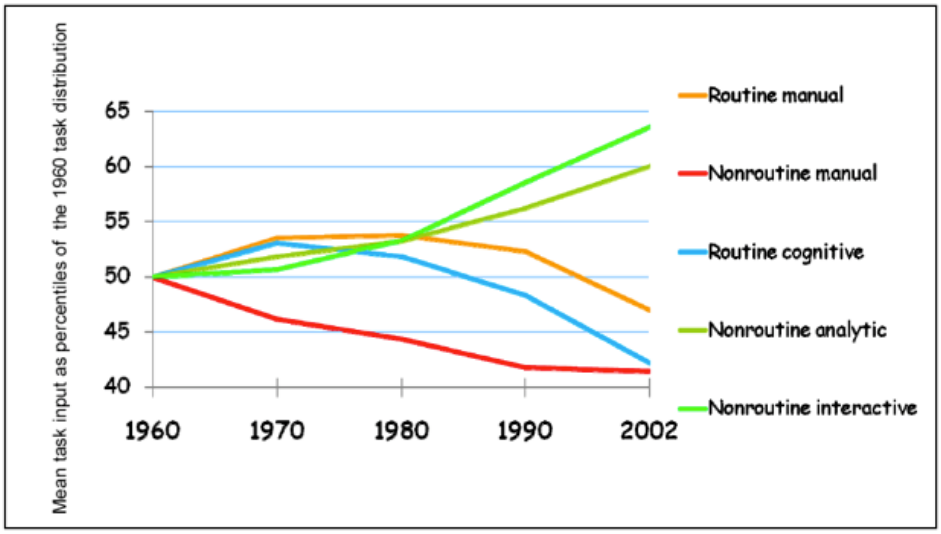
[1] Gibson Consulting Group. *Educational and operational efficiency study of the Clark County School District*. Austin, TX: Author.
[2] U. S. Department of Education. (2010). Draft National Education Technology Plan. Accessed 05/10/10 from http://www.ed.gov/sites/default/files/NETP-2010-final-report.pdf.
[3] National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). Common Core State Standards Nevada: Author. https://bighorn.doe.nv.gov/sites/CommonCore/default.aspx.
[4] Evelson, Boris - 21 November 2008. "Topic Overview: Business Intelligence". http://www.forrester.com/rb/Research/topic_overview_business_intelligence/q/id/39218/t/2.

SECTION 3: Innovations in Technology Are Essential to CCSD Reforms

A Digital, Knowledge-based Society

The skills students need to thrive in today's society are different than those in past decades. According to recent national and international reports[5,6,7] the skills students need to thrive in a competitive, global economy go beyond the basics of core subjects. Increasingly students need to do knowledge-based, non-routine work, which requires them to think, solve problems, and innovate (Figure 1). Recent economic reports find that workers today change jobs/careers on average nine or more times throughout their lives.[8] These realities translate into a need for our students to not only achieve academically, but to develop critical and creative thinking skills that enable them to adapt and continuously learn throughout their lives.

Figure 1: Trends in Routine and Non-routine Task Input in U.S. Occupations: 1960 to 2002



Source: Levy, F. (2010) How Technology Changes Demands for Human Skills. *OECD Education Working Paper*, No. 45, OECD Publishing. doi: 10.1787/5kmhds6czqzq-en.

Today the United States' competitive lead in the world economy is challenged. Evidence of this comes in a variety of recent international reports. For instance, in 2009, the latest rankings of economic innovation by the Organization of Economic Cooperation and Development (OECD) showed that the U.S. has dropped to sixth place in the world, following Singapore, Sweden, Luxembourg, Denmark, and South Korea. The U.S. has made the least progress of the 40 OECD nations/regions in improvement in international competitiveness and innovation.[9] Meanwhile economists have demonstrated that cognitive skills facilitate innovation and technology diffusion[10] which lead to economic viability. The key to economic viability is not years of schooling, but rather cognitive gains (as measured by mathematics and science achievement).[11] Countries that pay little attention to cognitive skills of the working class will experience a poverty trap (i.e., long-term income disparities). Current data suggest that advanced OECD economies (such as the U.S.) have invested

heavily in education, but are seeing a decline in cognitive skills, whereas Asian and South European countries have invested heavily in developing cognitive skills and are on the rise economically.

Closer to home, researchers from Stanford University have directly linked the economic viability – and standard of living – to the level of cognition addressed in U.S. schools.[12] According to the New Commission on the Skills of the American Workforce, "If we continue on our current course, and the number of nations outpacing us in the education race continues to grow at its current rate, the American standard of living will steadily fall relative to those nations, rich and poor, that are doing a better job."[13]

Taken together these reports underscore how K-12 education that is adaptive, innovative, and technologically-rich can contribute to the economic vitality of the nation.

Today's Students Nationally

Outside of school, 96% of 9-to-17-year olds embrace the culture of social networking, blogging, twittering, GPS mapping, or interactive gaming at some level.[14] These youth communicate in real time through texting, instant messaging, and sharing of media files. According to the National School Board Association, they typically spend about nine hours per week outside of school using social networking and ten hours watching television.[15] But the reality is that there are broad variations among youth across the country with respect to the type and frequency of such digital media use.[16] While a 2008 study by Pew Internet and Family Life reported that 97% of adolescents aged 12-17 play video games, the type of games varies considerably. A June 2009 Nielson publication reported that, while children and youth do use electronic media – in fact, use more than one medium simultaneously 23% of that time – they also enjoy reading books, magazines, and newspapers. Nielson found that 77% of U.S. teens have their own mobile phone, 83% text message, and 56% use picture messaging. Teens average 2,899 text messages per month, which is 15 times the average number of voice calls (191) they log each month. It would seem that email and voice are now considered the previous generation's mode of digital communication, not theirs.[17]

A New Ecology of Learning

The New Commission on the Skills of the American Workforce,[18] the OECD, and the U.S.-based Partnership for 21st Century Learning all drew the same conclusion. Today's education system in the U.S. was built for a past era. A new ecology of learning is needed to prepare students for a knowledge-based society. The term "ecology" as used here describes a self-organizing, complex adaptive system made up of elements that are dynamic and interdependent.

Today's students need to learn to reason analytically, collaborate in teams, think critically and creatively, evaluate information, and communicate effectively in multiple modes.[19] Students need to use a variety of media to solve problems, use technology appropriately and effectively as digital citizens, self-direct their learning, and adapt quickly to the complexity of today's societal challenges. They need an educational system that continually adapts and realigns to this complex, rapidly changing knowledge society.

The time is now. Today's price point on new technologies makes devices affordable and high-speed network access in schools universal. The possibility of personally-owned devices in classrooms opens the door to new ways to engage students in learning.

The Internet is integral to life in the 21st century. It has radically changed the way people live, work, play, and learn outside of schools. Increasingly, children and adolescents use technology to learn independently and in collaboration with others outside of school. In research on learning in this digital age, the MacArthur Foundation studied ways in which students use technology outside of school. They found that students do learn differently outside of school using a new ecology of learning, as noted in this excerpt.

> *"Youth also use the online world to explore interests and find information that goes beyond what they have access to at school or in their local community. Online groups enable youth to connect to peers who share specialized and niche interests of various kinds, whether that is online gaming, creative writing, video editing, or other artistic endeavors. In these interest-driven networks, youth may find new peers outside the boundaries of their local community. They can also find opportunities to publicize and distribute their work to online audiences, and to gain new forms of visibility and reputation."*
>
> *- Ito and Horst, 2008* [20]

This plan presents approaches to personalizing learning, which help create the **ecology of learning**.

- **Blended and Online Learning.** Students expand their learning through enrolling in virtual high schools and online courses joining online communities of interest, and accessing online supplemental resources. Blended learning represents systems of learning that combine face-to-face and virtual learning opportunities.

- **Data Transparency.** Teachers and families use technology to view the academic records of student progress over time. These often include digital portfolios of student work. Data from the portfolios are being made available to students, teachers, parents, and administrators through portals that additionally provide access to student information systems, data warehouses, and analytics for interpretation of those data.

- **Problem Solving, Simulations, Modeling, and Data Analysis Tools.** Teachers create learning environments where students use technology tools to look for, see, and define problems, gather and analyze data (e.g., charts, graphs, statistical analyses, etc.); define, model or simulate real world situations; and convey what they have learned using video, text, and sound. As a result, students more deeply understand concepts because they have the opportunity to apply them in real-world settings.

- **Student as Informed Consumer and Producer of Media**. Students demonstrate what and how they are learning through production of digital products (e.g., videos, podcasts, slide shows, simulations, posters, digital stories, animation productions, documents, contributions to collaborations, etc.). Today's student must be informed consumers, navigators, and critics of the overwhelming amount of information that is readily available. Students come to understand how to define and narrow searches using both browsers and topical databases, reach informed conclusions on the integrity and appropriateness of their findings, ensure balanced perspectives related to their investigations, and identify reliable sources.

- **Teaming, Collaborating, and Participation in Communities**. The research[21] is clear – students learn more when they work cooperatively and collaboratively. When teachers allow students to work in teams, students can interact effectively around evidence-based discussions, both in face-to-face situations and through technology (e.g., peer editing of work online; communities of interest that bring together students). Teamwork is used for specific purposes, such as language learning with native speakers, real-time online simulations/games, virtual worlds, and joint projects (e.g., interactive white boards, wikis, blogs, videos, slide shows, research, etc.).

- **Digital Content.** Students access high quality content, explanations, videos, learning objects, and experts anywhere, anytime.

- **Digital Citizenship.** Students are equipped with the competencies they need so they can safely and responsibly use the internet and other technology. Students have what is needed to go online safely. They know and display the kind of ethical behavior, "netiquette", and norms required for various online venues.

- **Personally owned devices:** The term "personally owned devices" (PODs*)* refers to student-owned or staff-owned technology devices, including cellular phones, smartphones, PDAs, MP3 players, iPod/iPhone type devices, and portable computers such as laptops, notebooks, tablets, and netbooks. Access to personal devices blurs the line between formal and informal learning and increases the likelihood that students will continue their study of academic topics beyond the school day.

By embracing this new ecology of learning, CCSD schools become even more student-centered. Learning becomes even more authentic and interest-driven. Students subsequently become more engaged.

Despite the many emerging examples nationally of this next generation ecology of learning, the daily use of technology in U.S. schools today is more the exception than the rule. The responsibility of educators to prepare CCSD students so they are ready to live, learn, work, and thrive in this highly technical and participatory world calls for new modes of thinking and innovative approaches. To that end, U.S. school systems are conspicuously out of sync with the culture of today's high tech society.[22]

Examples of the New Ecology of Learning

- *School of One, New York*

School of One is a pioneer in the emerging field of customized learning. It redesigns the classroom to integrate multiple modalities of instruction – live teacher-led lessons, software-based lessons, collaborative activities, virtual tutors, and individual practice – into the same learning space. The design allows School of One to effectively differentiate instruction based on each student's unique needs and learning styles. During class, teachers deliver instruction to groups of students who are all working on the same skill; before and after class, teachers analyze data and can adjust the daily student plans recommended by School of One's learning algorithm. All in all, School of One's technology streamlines numerous administrative tasks related to grading, assessments, and planning, allowing teachers to spend significantly more time preparing high-quality lessons, helping students to synthesize the material, and diagnosing individual misconceptions.

Students take daily online quizzes that generate instant progress reports for students, parents, and teachers to access. Students who struggle repeatedly are flagged for intensive intervention, and those who demonstrate mastery are moved forward to new material. At the same time, curricular materials are evaluated on the basis of their effectiveness. As School of One grows to serve more students, the data get richer, the trends become more robust, and the daily scheduling algorithm gets smarter. Effective material is scheduled more frequently, and ineffective material is phased out.

- *High School of the Future, School District of Philadelphia*

There is a buzz of excitement in this High School of the Future – students have a strong voice here. Everyone has a laptop for learning, but the technology seems secondary to the learning that is going on. Take for example the "What If?" history project. The assignment is simple and compelling. Students are to examine how influential a single decision in history was on the American historical record over time. This is their opportunity to alter history by asking and answering the *What if* question. For example: *What if* the South won the U.S. Civil War? *What if* Harvey Milk had not been assassinated? Or, *What if* the French hadn't sold the U.S. the Louisiana Purchase? Students collect evidence as to what it would be like in present-day America, if that one change in the historical record had occurred. They seamlessly use technology to search for and review historical records, collaborate with classmates, or experts in history, create and post a weekly progress update for the team, and digitally produce their findings using a podcast, video, game, animation, slide show, GPS-locator, blog, wiki, or a host of other technology tools.

- *St. Mary's Elementary School, Edmonton, Alberta*

Grade 5 students at St. Mary's investigated wetlands by working in teams to create video games that simulated those environments. They used Kodu, a free-of-charge online development program specifically designed for children. Kodu provides a framework in which to design, develop, and program games on the Xbox and PC. Students start in a blank world where absolutely nothing exists, then begin by adding and customizing their land. For this project, their land had to include the unique type of plant life that is found in each type of wetland, along with the type of weather that would take place. Students also were expected to include waterways in their self-constructed world. Each type of wetland had its own features and types of life that it supported (e.g., animal life, type of water, type of weather, and the interactions that take place). Students also revisited and used digital resources that they had built from their Weather Watch unit. Students were primarily learning about wetlands, however by integrating their observations and research they were able to demonstrate their knowledge of the ecology of interactions within the wetlands in a way that allowed for creativity in science.

Technology Trends

The move to classrooms that are more technology-infused is fueled by certain trends.

- **Wireless mobile devices:** These devices provide 24-hours-a-day, 7-days-a-week access to ideas, resources, people, and communities. Devices fall into six basic categories, and all represent personally owned devices that may show up in classrooms: laptop computers, network computers and thin clients, smart phones/handhelds, tablet computers, eReaders and audio MP3 players. One of the key factors in mobile technology is the affordability of today's devices. The price point for fairly sophisticated and powerful devices is affordable for most families and schools.

- **Anywhere, anytime connectivity.** The concept of anywhere, anytime access is fundamental to the participatory culture in which students live today**.**

- **Cloud computing.** Increasingly, local networks are linking to a system of networks that include high capacity computing resources, storage in data farms, a range of computer applications, and opportunities for collaboration and connections. Three types of services associated with cloud computing[23] include single function end-user services, networking infrastructure, and computing resources not tied to a computing platform.

- **Online, collaborative environments.** Technology opens the door to virtual meeting places for community interactions. The types of environments include: ad hoc environments, social networking sites, and collaborative projects that enable schools and students to interact with one another around learning.

- **Web 2.0.** If Web 1.0 is characterized by static web pages, then Web 2.0 is characterized by interactivity, social networking where people are active participants and contributors through blogs, microblogs (Twitter), and sharing and broadcasting sites (YouTube, Flickr, Edmodo, etc.)

- **Web 3.0 (or the semantic Web).** The next generation of the Web is referred to as Web 3.0. Experts project that the next big breakthrough will be the smart use of artificial intelligence. Some envision a Web where all information and data are categorized and stored in ways that a computer can understand, enabling people to query using natural language, essentially enabling the Web 3.0 browser to act as a personal assistant. Others suggest that Web 3.0 will be more graphically and geographically capable. Regardless, most agree that the functionality and usability of search engines will dramatically improve. [24, 25]

Community Voices

In addition to reviewing trends in learning and technology, input from the larger school community was elicited through surveys and focus groups to inform the plan.

Methodology: From the fall of 2010 through the winter of 2011, data was collected from the broader community. Reports from surveys and focus groups helped inform the development of the CCSD Technology Plan.

The intent was three-fold: to ascertain the various groups' vision for 21st century learning and educational technology; to identify current practices; and to document challenges. Table 1 outlines the data collection by

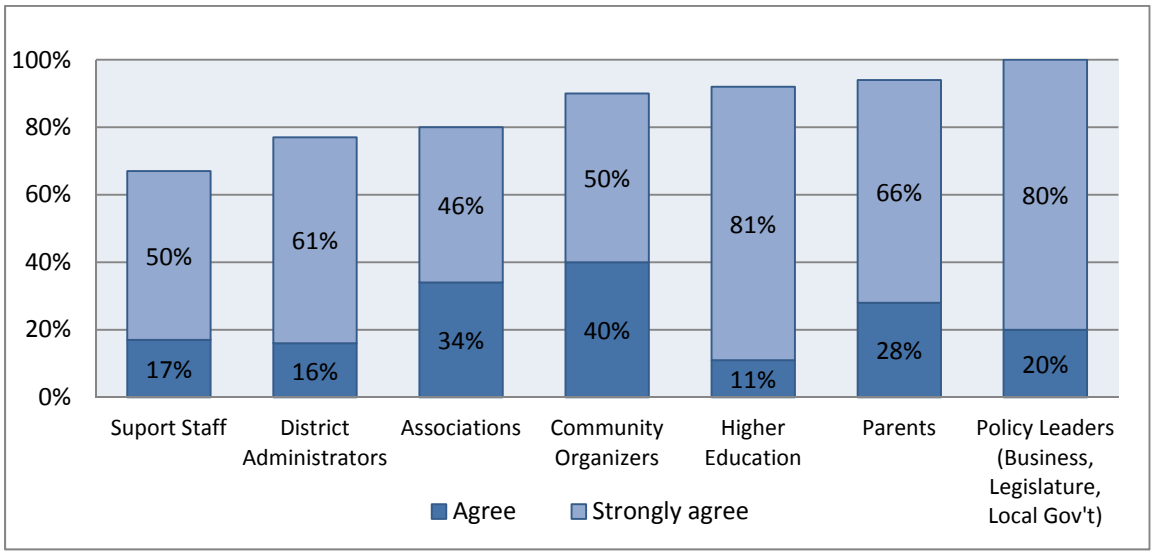
group. The students, teachers, and school administrators were surveyed through the national Speak Up survey conducted by Project Tomorrow. Survey data were collected directly from a random sample of schools stratified by level (i.e., elementary, middle, and high school) and by demographics (urban, rural, and suburban). The other groups were all surveyed online except for parents, who completed paper surveys during focus groups.

Table 1: Data Collection by Group

Group	Data Collection	Number of Respondents
Elementary Students	Speak Up Survey	2,372
Middle School Students	Speak Up Survey	1,765
High School Students	Speak Up Survey	2,131
Teachers	Speak Up Survey	57
School Administrators	Speak Up Survey	17
Parents	CCSD Focus Groups	127
District Administrators	CCSD Surveys	31
University/Higher Education	CCSD Surveys	26
Support Staff	CCSD Surveys	6
Community Organizers	CCSD Surveys	10
Legislators, Business, Local Government	CCSD Surveys	5
Associations	CCSD Surveys	76

Asked if students graduating today need different skills than students did a decade ago, stakeholders overwhelmingly indicated that they strongly agree. As Figure 2 indicates, over 65% of all stakeholders responded that they agreed or strongly agreed. The three groups with the highest percentage in the strongly agreed category were Higher Education (81%), Policy Leaders (80%), and Parents (66%).

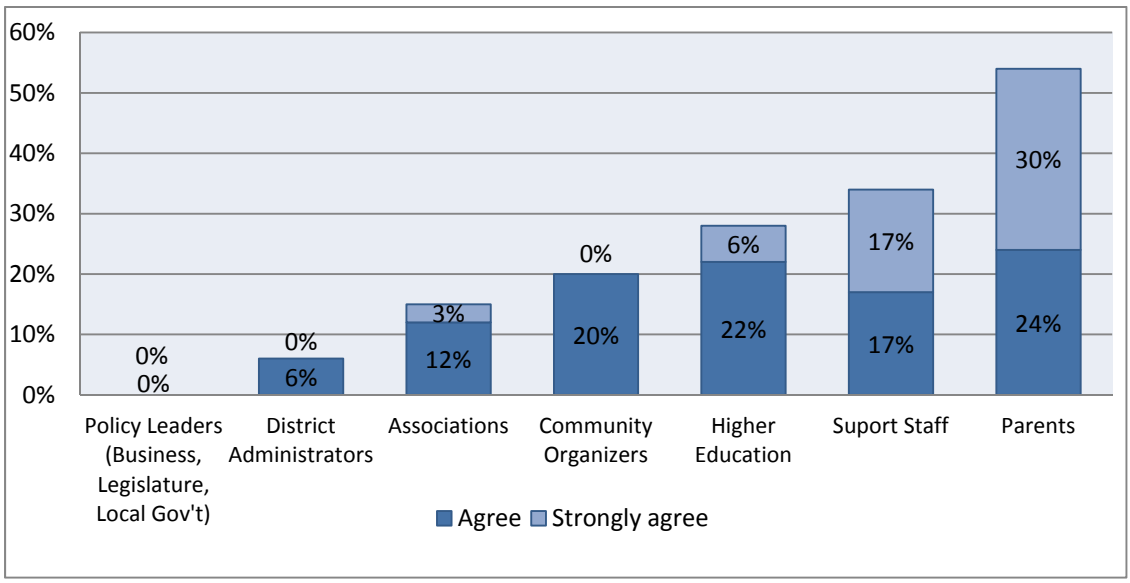
Figure 2: Students graduating today need different skills than students did a decade ago.



N = 76 Associations; 5 Business, Legislature, and Local Government; 10 Community Organizers; 31 District Administrators; 26 Higher Ed; 6 Support Staff; 127 Parents

Stakeholders were asked to what extent they agreed or disagreed with the statement "On average, today's CCSD graduate is leaving school ready to thrive in the 21st century." Many registered concerns. Few respondents agreed or strongly agreed to the statement (i.e.), less than a third of any group agreed or strongly agreed; not one policy leader agreed or strongly agreed; and only 6% of the district administrators agreed (Figure 3).

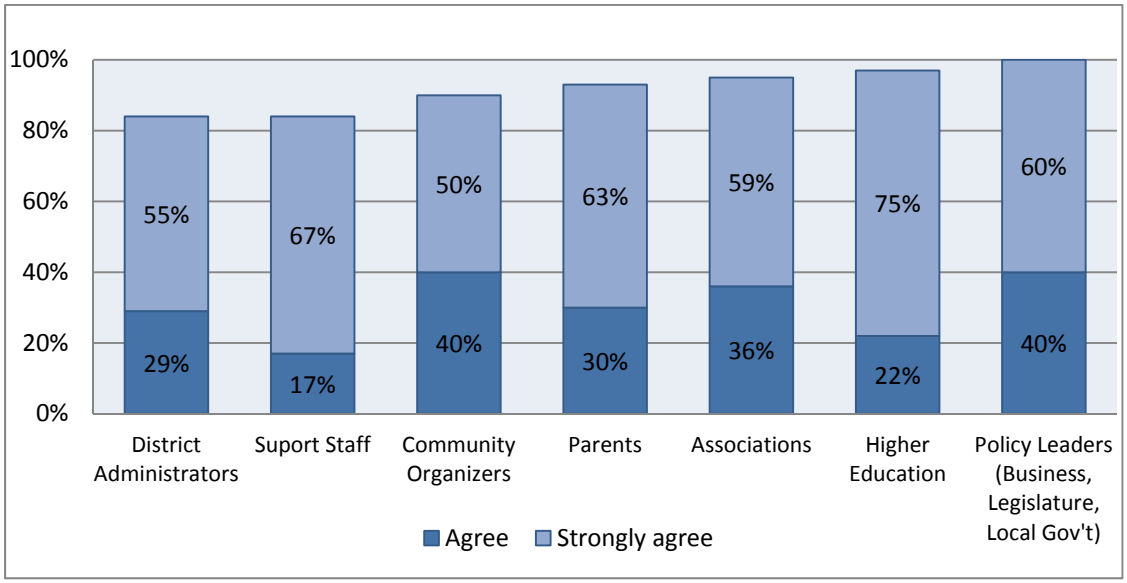
Figure 3: On average, today's CCSD graduate is leaving school ready to thrive in the 21st century – whether that means entering the workforce or entering a college or university.



N = 76 Associations; 5 Business, Legislature, & Local Government; 10 Community Organizers; 31 District Administrators; 26 Higher Ed; 6 Support Staff; 127 Parents

Meanwhile, a large majority (over 80%) of these stakeholders strongly agreed or agreed that the success of today's students is dependent on their effectiveness in using technology to access information, think critically, communicate, compose, analyze, and produce work (Figure 4).

Figure 4: The success of today's students is dependent on their effectiveness in using technology to access information, think critically, communicate, compose, analyze, and produce work.



N = 76 Associations; 5 Business, Legislature, & Local Government; 10 Community Organizers; 31 District Administrators; 26 Higher Ed; 6 Support Staff; 127 Parents

School leaders were asked about the many challenges they face in their school leadership roles. The following were identified as key challenges: achievement measured by standardized test scores (59%); closing the achievement gap (47%); using data to assess student achievement (41%); using data to evaluate teacher effectiveness (35%); staff morale/motivation (35%); and adequate funding (35%).

School leaders indicated several strategies had the greatest potential to enhance student achievement in their school or district. The top strategies identified by school administrators were: 1) enhancing teacher effectiveness through professional development or professional learning communities (47%); 2) leveraging technology more effectively to support the seamless integration of learning in and out of school (41%); and 3) extending learning opportunities for students through mobile learning initiatives (29%). Teachers agreed. They believed that those challenges identified by school administrators may be at least partially addressed through the effective use of technology.

When asked to select their top reasons for integrating technology into the teaching and learning process, the highest priorities across all groups surveyed (Figure 4) were identified as follows: (1) increasing academic achievement by increasing the effectiveness of teaching and learning, (2) engaging students in real-world applications of the academic concepts they are learning, (3) preparing students to use technology effectively (digital citizenry), (4) ensuring that students will be economically viable when they graduate, and (5) involving students more deeply in learning by using the tools they often use outside of school.

Overall, the above responses are indicative of a much-needed plan for transformational change.

CCSD Student Voices

The student surveys, conducted in the fall of 2010 and early winter 2011, serve as the impetus for this plan. The electronics CCSD students have available for personal use varies across the elementary, middle, and high school levels. The top two devices available to elementary students are (1) the video gaming system and (2) the hand-held game (see Table 2). Over 93% of elementary students, 84% of middle school students, and 92% of high school students said they had access to a home computer. Less than 8% reported their home computers had no Internet access, and the majority (54% elementary, 60% middle school, and 78% high school) indicated that the home computer had fast Internet access (i.e., DSL, cable, or broadband). The type of computer was fairly evenly split between laptops and desktops, with few students indicating personal use of tablet computers, netbooks, or mini-notebooks.

Table 2: Results from student Speak Up: Types of electronics available for personal use by level:

Device	Elementary School	Middle School	High School
Music or video device (e.g., MP3 player, iPod, or iPod Touch)	49%	66%	83%
Video gaming system (e.g., Xbox, PlayStation, Wii)	71%	71%	76%
Desktop computer	38%	56%	66%
Laptop computer	41%	50%	56%
Cell phone	27%	44%	52%
Hand-held game	60%	57%	49%
Smartphone or cell phone (with internet access)	21%	33%	45%
Handheld digital camera	n/a	29%	39%
Netbook or mini-notebook	n/a	9%	11%
Tablet computer (e.g., iPad)	6%	10%	9%
Digital reader (e.g., Kindle, Sony Digital)	5%	8%	8%

n/a – data not available, question not asked of elementary students.
N = Stratified sample of 2,372 elementary students, 1,765 middle school students, 2,131 high school students.

When students were asked for an indication of how they use technology for schoolwork, the top answers for middle and high school were (1) to complete writing assignments, (2) conduct internet searches, and (3) access class information. Elementary students agreed with the secondary students as to their top two uses, but differed on their third use – playing educational games (Table 3).

Table 3: Results from student Speak Up: Top three uses of technology in school by level:

Device	Elementary School	Middle School	High School
Complete writing assignments	45%	66%	70%
Conduct Internet research	44%	63%	68%
Access class information	n/a	53%	68%
Play educational games	48%		

n/a – data not available, question not asked of elementary students.
N(s) = Stratified sample of 2,372 elementary students, 1,765 middle school students, 2,131 high school students.

Secondary students also commented on the classes in which technology is used to enhance or increase learning. At the high school level, 47% identified English/language arts as such a class, 38% identified science, and 37% said mathematics. Those percentages dropped in middle school to 22% in English/language arts, 15% in science, and 19% in mathematics. When asked what would make science more interesting, engaging, and relevant for students, over 50% of middle school students and nearly 60% of high school students selected "conducting real research on topics that I am most interested in." Nearly half of middle and high school students also indicating that working with other students would improve science instruction.

When asked how they would use mobile devices (e.g., cell phones, smartphones, MP3 players) at school, the top three uses identified by elementary students were to (1) check grades (49%), (2) take notes (48%), and (3) conduct Internet searches (48%). The top school and personal uses of mobile devices identified by middle school and high school students were (1) accessing resources and productivity (e.g., checking grades, Internet research, taking notes, and using the calendar), (2) communications (e.g., IM, text messaging, online chat, and email discussion on homework), and (3) collaboration and teaming with their classmates and teacher (e.g., shared document creation in applications such as Google Apps and social networking).

Over a third of middle (33%) and high school (41%) students said they had not yet taken an online course, but they are interested. The impetus for their interest is fueled by a desire to earn college credit and to fit courses into their school schedules.

Two major barriers to technology use were identified by elementary students: (1) computers are not always available or easy to get to, and (2) they could not use their own cell phone, smart phone, or MP3 player. At the middle and high school levels, the major barriers cited were (1) websites they needed were blocked through school filters or firewalls, and (2) that they could not use their own cell phone, smart phone, or MP3 player.

Students were asked to pick elements they would include in their ultimate school. Every option included was selected by at least 24% of respondents for each level. The ability to access the Internet anywhere at school was the most commonly selected option for both middle school and high school (Table 4).

Table 4: Results from Speak Up data: Elements to be included in their ultimate school:

Element in Their Ultimate School	Middle School	High School
Ability to access the Internet anywhere at school	#1 (57%)	#1 (71%)
Ability to use my own mobile devices	#2 (50%)	#2 (62%)
Digital media tools (video, audio)	#3 (46%)	#3 (50%)
Online textbooks	38%	#4 (49%)
Computer projection devices	40%	#5 (47%)
Chat rooms to discuss topics with students while in class	#4 (46%)	46%
Games or virtual simulations	#5 (45%)	39%
Mobile computer for every student (such as: laptop, mini-notebook)	37%	#5 (47%)

n = 57 students from stratified sample.

In summary, the survey data supports a clear need to establish a next generation learning environment for instilling 21st century skills in today's learners to successfully meet tomorrow's challenges.

The responsibility of educators is to ensure that today's students are ready to live, learn, work, and thrive in the high tech, global, highly participatory world. To that end, U.S. school systems are conspicuously out of sync with the culture of today's high tech society.[26]

While the more progressive educators are seizing this moment in history to launch a quiet Web 2.0 revolution in PreK-12 education, the majority have yet to act. A 2009 national survey[27] conducted by the Consortium on School Networking (CoSN) suggests that the majority of American school districts are at a crossroads with Web 2.0. While school district administrators clearly acknowledge the potential of Web 2.0 tools for learning, the majority of school districts have yet to turn that potential to their students' advantage. According to administrators who responded to the CoSN survey, the top three reasons for using Web 2.0 in school are (1) to keep students interested and engaged in school, (2) meet the needs of different kinds of learners, and (3) develop the critical thinking skills of students. To date that potential remains untapped. Instead, many school districts are checking student technologies (e.g., smart phones, cell phones, iPod touches) at the schoolhouse door.[28]

At the same time, Arne Duncan, the U.S. Secretary of Education, is calling for school districts to innovate using technology. At a national institute in early summer 2009, he said, "Technology presents a huge opportunity… good teachers can utilize new technology to accelerate learning and provide extended learning opportunities for students." He went on to say, "We must take advantage of this historic opportunity to use American Recovery and Reinvestment Act funds to bring broadband access and online learning to more communities."[29]

Nationally there is a call to action for smart, innovative, and informed leadership in 21st century learning in PreK-12 education. The combination of crisis and vision has served America well more than once in its 200-year history to help it grow and develop as a nation. A new crisis in the form of global economic downturn now faces the U.S., and the key question is whether U.S. policy leaders will create an informed, collective

vision for 21st century learning to turn that crisis into opportunity, and turn a new page in American education.

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AT A GLANCE

SECTION 4

Vision
Relevant, interactive learning and teaching is personalized, facilitated, and supported through the informed use of technology.

The Gap
CCSD does not yet fully integrate technology to support learning and achievement, as evidenced by:

- Surveys indicate that the community believes changes in teaching and learning is necessary.
- Surveys indicate that CCSD students are ready to use technology to learn.
- There is uneven integration of technology in learning across the district.
- Teacher exchanges on best practices are not yet widely used.
- There appears to be a lack of systemic vision, culture of innovation, and policies for leveraging technology for teaching and learning.
- Technology integration professional development is available but inconsistent.

Closing the Gap
Establish a new ecology of learning by:

1. Increasing appropriate student technology use at every level and every content area.
2. Providing systemic professional development paths that include accountability.
3. Providing streamlined and clear purchasing procedures, allowing flexibility for pilot projects.
4. Using appropriate technologies to efficiently collect, access, analyze, and share data for decision making.

SECTION 4: Teaching and Learning Environments

Introduction/Trends

CCSD classrooms are very diverse with respect to facilities, teacher strengths, leadership, culture, ethnicity, language, ability, student socio-economic status, and parent expectations. It is important that CCSD provides access to high quality, personalized learning opportunities for **all** students. The importance of good classroom teachers and strong building leaders, all of whom have access to resources for professional growth, is recognized.

This section highlights how technology can positively impact students in CCSD classrooms based upon a vision for teaching and learning. It identifies a target future state along with providing analysis and strategies for closing the gaps necessary for achieving that state.

Vision

Relevant, interactive learning and teaching is personalized, facilitated, and supported through the informed use of technology.

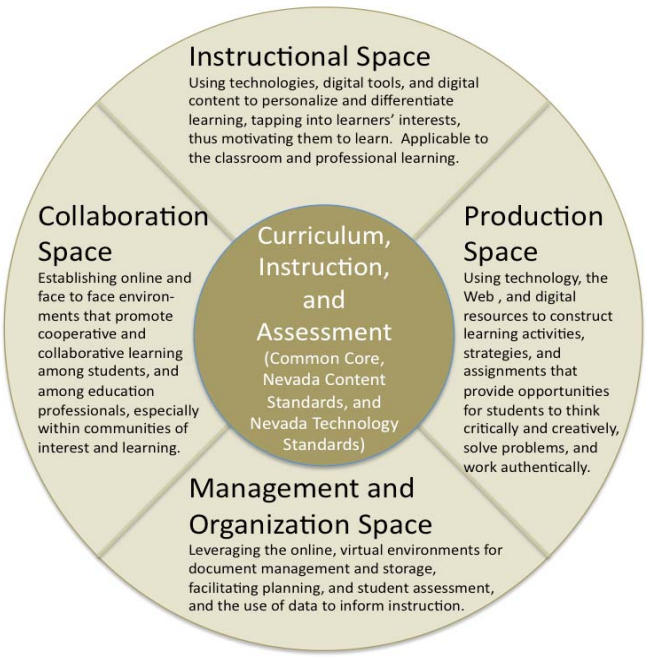
Target State

In order to achieve the vision for teaching and learning, classroom integration of technology is necessary. CCSD needs to provide teaching and learning environments that will increase personalization of learning, student engagement, and relevance. The shift to the use of technology to advance personalization of learning will ultimately increase both the level of students' academic performances and students' digital citizenship. The envisioned teaching and learning environment is not a prescriptive, one-size-fits-all model, but rather it is grounded in the concepts of student-centered, participatory, data-driven, authentic learning – learning that students find extremely engaging. As such, it will require extensive professional development that is aligned to support all teachers as they design learning experiences. The teaching and learning environments will leverage emerging trends in the use of technology to deepen learning. Learning experiences will be shaped as opportunities for individual and collaborative work, established (with student input) to create and develop products that connect academic learning with the real world.

The teaching and learning environment is conceptually a group of learning spaces or personalized, differentiated, active, and engaged learning. Entry into these learning spaces is predicated on student and teacher access to personal devices and other technologies, as well as high-speed Internet access, both inside and outside of school. The four learning spaces are: Instructional, Collaborative, Production, and Management/Organizational spaces. Instructional spaces are those in which content is provided, either face-

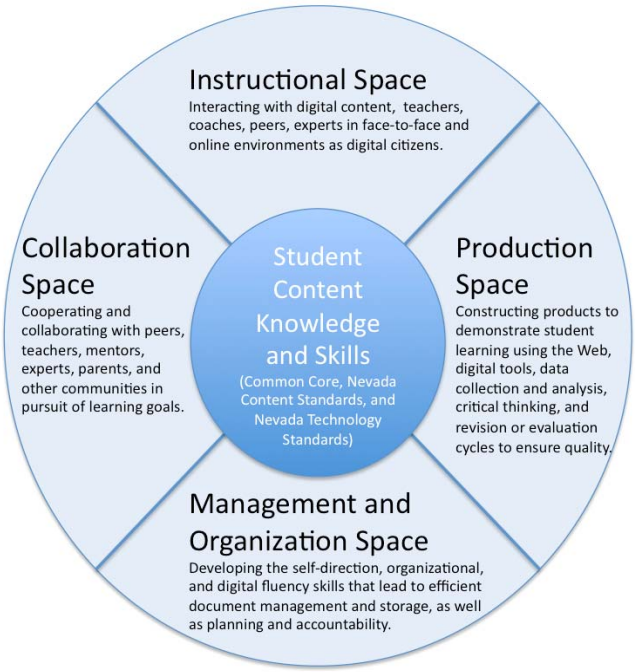
to-face or electronically. Collaborative spaces, again either face-to-face or electronic provide for interactions among teachers, students, and experts. Production spaces are those in which artifacts and products are created for sharing. Management and Organizational spaces allow for accessing, storing, and disseminating content, assessment, and data. In any learning experience, these four conceptual spaces are used to varying degrees. Technology can be used to provide any or all of these learning spaces in order to maximize learning. A model for classifying digital learning environment functions is diagramed in Figure 5. Student use is diagrammed in Figure 6.

Figure 5: Learning Spaces for Teachers and Other Educators



Ms. Rivers is an eighth grade English Language Arts teacher. During the third quarter, her students are working in groups of six to address a topic chosen by the students: "Should doctors or nurses be paid more money?" Several of her groups include students from other middle schools participating virtually in her class (Instructional Space). While Ms. Rivers is the teacher facilitator for this project, by her own admission, she knows little about medical professions. This often happens when the topics are student initiated and is not a problem since the project's assessment team includes experts from the medical field (Collaboration Space). She works with the students to generate the assignments and rubrics which are housed in the District's learning management system (LMS) (Instructional Space; Management and Organization Space). She is glad she has connected electronically on the District social networking site with some high school career and technical education teachers. These teachers provide her with access to some of their materials and resources, and they even help her students connect with professionals to interview and serve as experts in the assessment process (Collaboration Space). Students started their research with a videoconference interview, and the students have to summarize their notes online (Collaboration Space; Production Space). The highlight of the project will be a virtual symposium at which each group of six will present their position and evidence. The symposium will be posted on the District's online video streaming service, similar to YouTube, and any parent or expert who cannot access it live may watch a playback later at their leisure (Collaboration Space).

Figure 6: Learning Spaces for Students



Belinda is finishing eighth grade this year. Belinda is trying to decide what she wants her high school focus to be, either performing arts or an emphasis in a medical field. While dance has always been part of her life, currently she is working with four other students in her school and one from another middle school on a study of different medical careers. They decided to ask and answer the question of whether nurses or doctors should earn more money. As a group, they decided to interview nurses and doctors about their responsibilities. They will work on a presentation (Collaboration Space; Production Space), then present and defend their answers during an online symposium (Collaboration Space). The transcripts of all their interviews, data, charts, graphs, and summaries are organized online (Management and Organization Space). They are using a synchronous meeting tool and are comparing notes. Belinda signals to the group online that she has an idea to share. She activates her microphone and suggests that they pair up to organize the notes from each interview. All six students agree, and they break into virtual discussion rooms (Collaboration Space). Belinda works with Matt, and they quickly find three points from an interview with a doctor that they want to use. But they just can't see any pattern in the responses from another doctor. Matt signals to their instructor, Ms. Rivers, and she joins them in the discussion room, reminding them of the summarization skills they practiced last week (Instructional Space).

The Current State

The current state of CCSD's technology integration is being reviewed because research suggests that technology can positively contribute to increases in student motivation and engagement in deep learning through student-centered, personalized, and differentiated learning.[30, 31, 32] During the years that Clark County Schools were experiencing extraordinary growth, a tremendous number of innovative technology models, programs, and pilots were launched. This plan intends to build on those successes, as well as incorporate lessons learned.

An analysis of teachers' responses to the 2010-11 Speak Up survey indicates that much progress has been made in building the capacity for successful teaching and learning with technology. However, much of that progress is limited to specific programs, schools, or classrooms, and it has not yet been tested for effectiveness, or scaled to reach all students to ensure equity.

Examples of CCSD Technology:

- **Pockets of excellence**. Across the District there are examples of innovative uses of technology. However, CCSD does not have a repository for collecting information on what works in which situations (e.g., which students can succeed in which environments). Instead, each school's approach is *ad hoc* rather than standardized across the District.

- **Access and use of technology tools**. All CCSD classrooms have at least one Internet connected computer. Many classrooms have interactive whiteboards, student response systems, slates, document cameras, audio enhancement, calculators, and streaming video. A few classrooms have piloted the use of student-owned personal devices. Many teachers are using Web 2.0 tools for collaboration, blogging, access and use of individualization, supplementing, etc.

- **E-communication is used**. Websites and systems are used for communication. Examples include: InterAct email, my.ccsd.net, and ParentLink.

- **Many programs that leverage technology are in use today**. Over 80% of teachers indicated that the effective implementation of instructional technology is important to a student's success. While there is a multitude of school-based or commercial programs and technology tools used across the District, few have been evaluated for implementation fidelity or efficacy. It is very difficult to support and evaluate the plethora of tools or even to determine where they are being used.

The data from the 2010-11 Speak Up survey provides some insights from CCSD teachers as to the technologies and technology-based learning approaches that are currently in place in some CCSD classrooms as indicated below.

Teachers selected their top reasons for using technology. Those reasons, in priority order were:

1) Enhance students' academic success through increased motivation to learn (50%)
2) Development of student creativity (43%)
3) Opportunities to develop critical thinking and problem solving skills (33%)
4) Opportunities to apply knowledge to practical problems (31%)
5) Increased participation in class discussions or group activities (31%)

Teachers expressed how technology has improved their own effectiveness:

1) Increased organization (62%)
2) Productivity (52%)
3) Relevancy of lessons (46%)
4) Self-direction (37%)
5) Interactive lessons (33%)
6) Student-centered learning (33%)

Teachers from CCSD indicated the tools or technology-based learning strategies which hold the greatest potential for increasing academic achievement:

1) The ability to access the Internet anywhere, anytime (68%)
2) Document cameras (64%)
3) Computer projection (60%)
4) Adaptive learning software that adjusts levels of difficulty and content to address student needs (60%)
5) Digital media tools (59%)
6) Interactive white boards (54%)
7) Mobile computer for every student (49%)
8) Digital content (48%)

Additionally, teachers' responses revealed how technology is currently used in facilitating learning (Figure 7) along with the various types of digital content utilized (Figure 8).

Figure 7: How teachers use technology to facilitate student learning

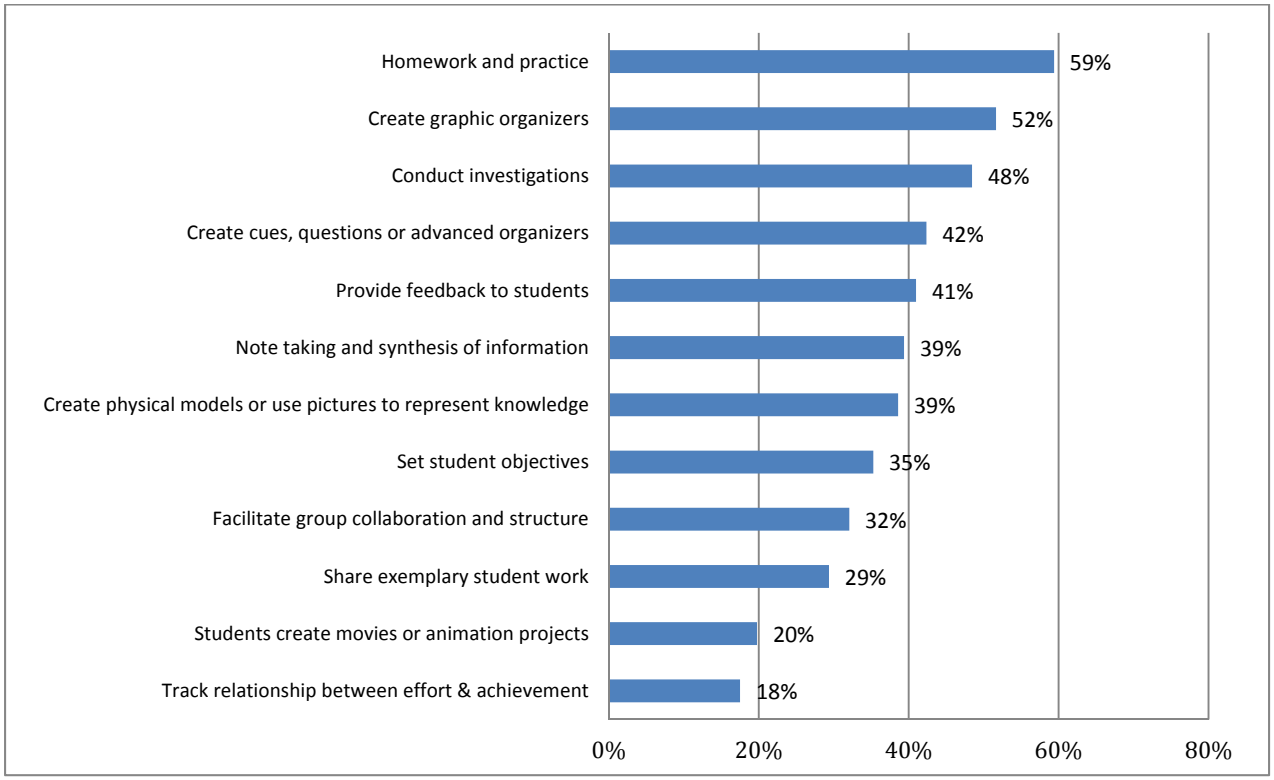
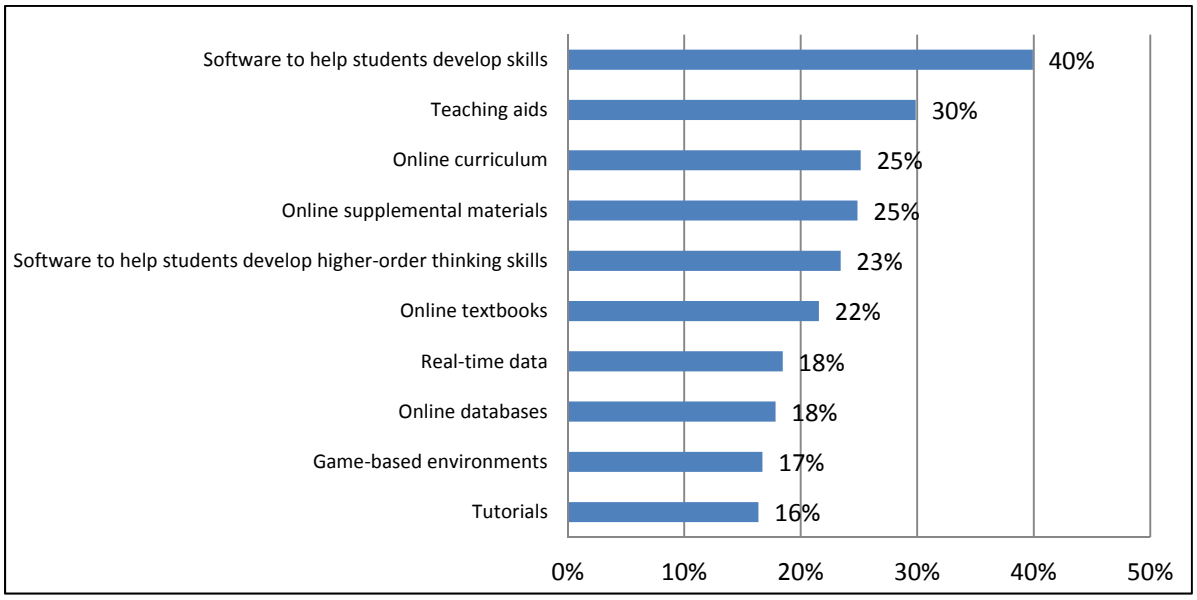
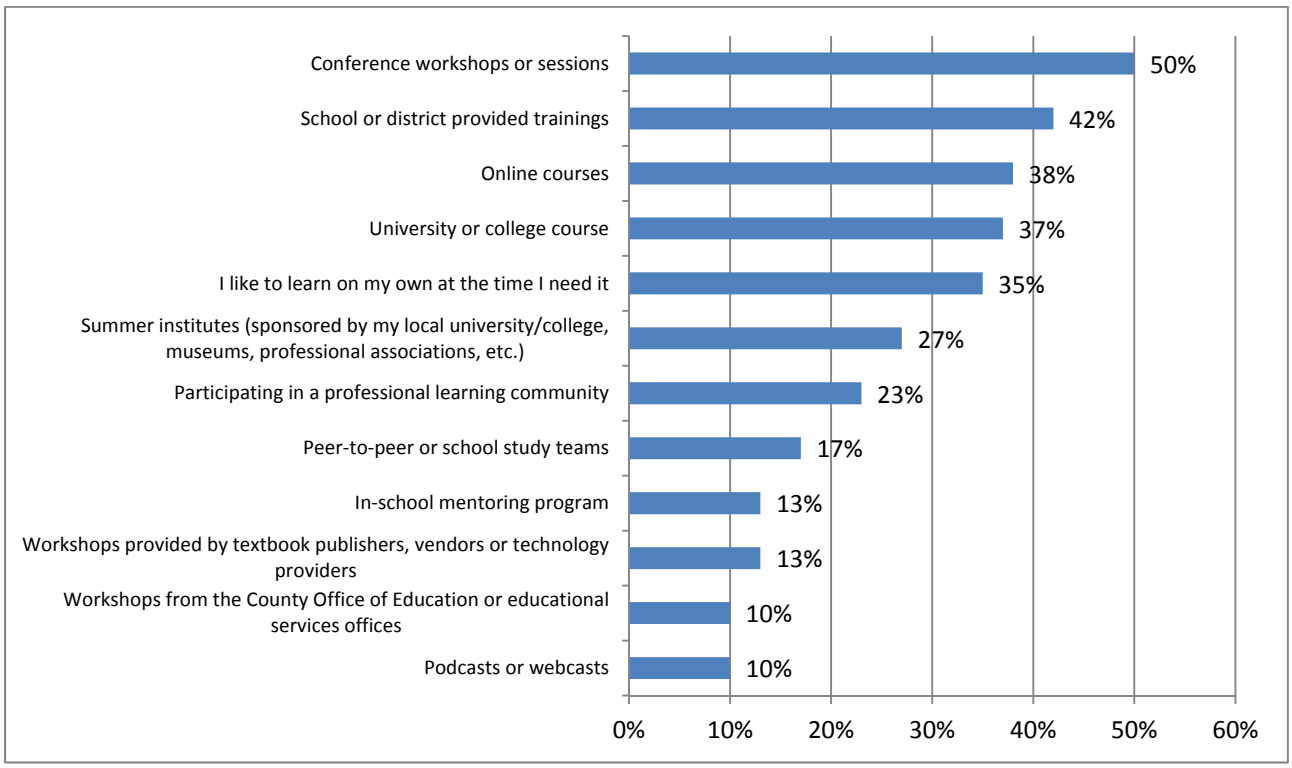


Figure 8: Types of digital content currently being used in classrooms



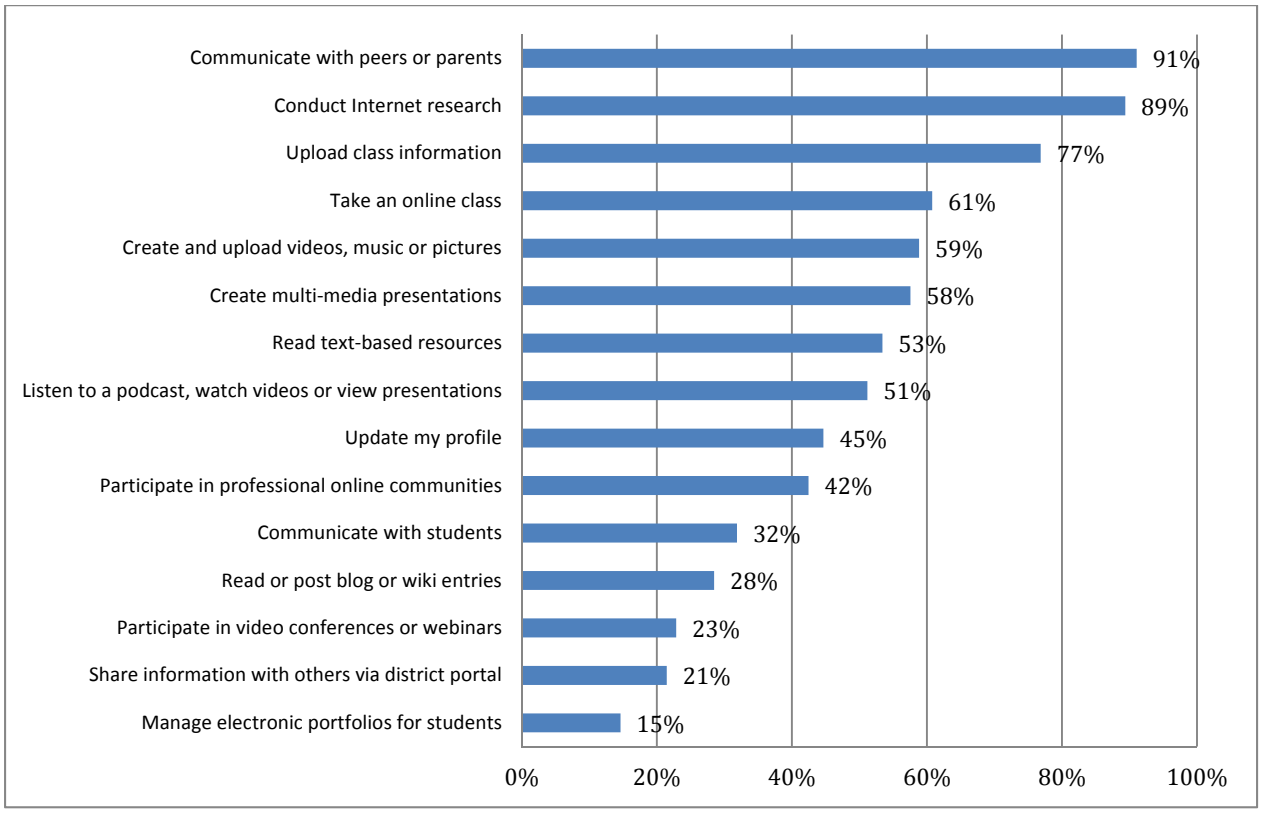
The top two methods of professional development preferred by teachers are: (1) conference workshops or sessions, and (2) school or district-provided training" (Figure 9).

Figure 9: Teacher preferences for participating in school or district-provided trainings



Teachers are using technology in the performance of many professional tasks as revealed in Figure 10.

Figure 10: Activities teachers regularly do using technology for professional tasks



In classrooms and schools across the District, CCSD staff continues to address achievement gaps, slow learning growth, and unsatisfactory proficiency rates. The personalization of learning is critical for addressing these concerns and can be made feasible through technologies. Professional development is integral to the growth of strong leaders and teachers who understand how technology can best be used for learning.

Gap Analysis

Technology is not yet fully integrated to support learning and achievement, as evidenced by the following realities.

- **Surveys indicate that the community believes changes in teaching and learning is necessary.** While the majority of stakeholders believe that today's graduates need to learn new and different skills, few say that today's CCSD graduates are leaving the District ready to thrive in society, either in a career or in college.

- **Surveys indicate that CCSD students are ready to use technology to learn**. CCSD students have indicated a readiness to learn in new, more authentic and active ways, using personal devices, the Web, and social media.

- **There is uneven integration of technology in learning across the District**. There are pockets of innovative and effective technology integration. However, evidence has not been systematically gathered to determine how widespread these practices are, their effectiveness of these practices, the scalability of those that prove effective and the barriers to scalability.

- **Teacher exchanges on best practices are not widely used**. While CCSD is building the systems for teacher exchanges aligned to the CCSS and best practices, a campaign to integrate the formal and informal use of such systems has been piloted, but it has not yet been thoroughly implemented. Sharing of best practices occurs through InterAct conferences, webinars, and teacher showcases. Separately, a wiki has been developed and provided for all teachers. Standards, curriculum resources, and testing information can be coordinated through the custom-built Curriculum Engine, which is growing beyond its infancy stage. However, there is no single point of entry for accessing all of these resources.

- **There appears to be a lack of systemic vision, culture of innovation, and policies for leveraging technology for teaching and learning**. Schools and teachers wanting to try innovative practices face hurdles of competing resources and time constraints, purchasing, and professional development. Great strides have been made in the past several years in using technology to bring virtual and specialized learning to students in the District, but many of those efforts have plateaued due to competing priorities within the District and a lack of vision of technology as a leveraging point across all systems to achieve efficiency, effectiveness, and informed decision making.

- **Professional development for technology integration is available but inconsistent**. Centrally, there are no positions funded to provide professional development for technology integration or for incorporating technology practices into various professional development opportunities. There is a wide variance in the site-based professional development provided by Educational Computing Strategists (ECS). Observations in this area were also noted in the Gibson Report, which found "according to CCSD central office estimates, Educational Computer Strategists (teachers located at schools to support instructional technology and the integration with effective teaching) spend a significant amount of their time on computer technical support activities."[33]

Closing the Gap: Recommendations

Vision: *Relevant, interactive learning and teaching is personalized, facilitated, and supported through the informed use of technology.*

The vision will be accomplished through the following recommendations.

Recommendation 1: Increase appropriate student technology use at every level and for every content area.

Action Steps:

- Communicate clear expectations for technology use and skills at every grade level and in content areas. In doing so "limit the number of core and supplementary instructional programs," as suggested in the Gibson Report. [34]

- Showcase and share practices and foster collaborations related to the use of technology.
- Provide seamless, online content and social networking (not just coursework) to support student achievement.
- Implement a secured social networking system for use by teachers and students.
- Study the feasibility of converting low enrollment Advanced Placement courses to CCSD's virtual learning model, as suggested in the Gibson Report.[35]
- Provide descriptions of technology-supported activities, tied to content standards and Response to Instruction strategies.
- Find outside-of-school access possibilities for students.
- Establish guidelines for assessing the efficacy of technology-supported models for learning.
- Establish an environment and community of practice through which innovative models for learning can be vetted, and through which the most effective models can be shared.

Recommendation 2: Provide systematic professional development paths for the appropriate use of technology for learning.

Action Steps:

- Use a system for conducting assessments of technology-related skills and pedagogical technology knowledge.
- Based on the needs-assessment data, determine the professional development and training requirements, including any prerequisite skills and sequential professional development series that might be required related to teaching and learning.
- Embed technology practices and standards into professional development provided by various divisions, departments, and schools.
- Allocate time for professional development that includes the integration of technology for student learning.
- Increase the amount of online professional development offered by various divisions, departments, and schools.
- Use research-based practices to identify and develop professional development, trainings, communities of interest, or other solutions. Adopt approaches to increase the effectiveness of professional development in improving teacher skills and practices, as suggested by the Gibson Report.[27]
- Develop and implement a marketing strategy around professional development related to technology.
- Coordinate professional development services to improve focus at the school level, reduce duplication of effort, and more effectively integrate funding streams to address District priorities, as suggested by the Gibson Report.[27]

Recommendation 3: Provide streamlined and clear purchasing procedures related to technologies and associated software and services, allowing flexibility for pilot projects.

Action Steps:

- Provide clear, consistent procedures and standards for procurement of technology-related products and services.

- Require purchase of new or updated technology tools to include a professional development component.
- Provide equitable technology equipment and software standards with some options for alternatives when warranted. Include school representation in setting those standards. Reduce the amount of non-standard purchases in the District and implement spending controls, as suggested by the Gibson Report.[27]
- Develop centralized software and hardware records.
- Implement clear procedures for procurement of non-standard technology-related equipment and software.
- Implement a pilot-project procedure that includes a knowledge base for researching and validating alignment with existing CCSD technology platforms, infrastructure, support and maintenance capabilities, and contributing stakeholders' evaluation.
- Develop a districtwide plan for equitable procurement and replacement of technology-related equipment and software.

Recommendation 4: Use appropriate technologies to efficiently collect, access, analyze, and share data for decision making.

Action Steps:

- Implement, manage, and support common screeners and diagnostic tools for student learning.
- Improve the data synchronization timing between various data repositories, and evaluate the necessity of their continued use throughout the District.
- Provide teacher and administrator professional development on understanding data and data analysis tools.
- Use technology to link student and class data with resources to improve student achievement.
- Integrate, manage, and support currently used data repositories.

Metrics: Return on Investment/Impact if Not Implemented

The return on investment will be measured by the increased engagement of students in deep learning, increases in relevancy of learning for students, increases in digital citizenship on the part of students, and increases in college and career readiness. These, in turn, will positively impact student achievement. Students, teachers, administrators, and our community will note positive improvements in the amount and quality of technology use during learning experiences.

The metrics used to gauge progress will include a scale of policy, procedure, compliance/performance, and effectiveness of implementation. The responsibility for measuring progress rests with the District's Technology Advisory Committee, with reports submitted annually to the District Superintendent and the leadership team.

Table 5: Metrics for Gauging Progress

	Policy: Is there a policy that governs the intent of the recommendation?	Principles/procedures: Have principles or procedures been established to implement the policy/intent of recommendation?	Implementation/ Performance: Are CCSD staff/divisions implementing the principles/procedures with fidelity?	Effectiveness of implementation: Is the implementation advancing the vision as intended?
Recommendation 1: Increase appropriate student technology use at every level and in every content area. (Intent: increase student learning by using technology to increase student engagement, motivation, personalization of learning, and authentic learning.)	Yes/No Extent to which policy addresses intent: 1 2 3 4	Yes/No Extent to which procedures address policy: 1 2 3 4	Yes/No Extent to which principles/procedures are being implemented with fidelity: 1 2 3 4	Yes/No Extent to which vision is advanced through implementation: 1 2 3 4
Evidence:				
Recommendation 2: Provide systematic professional development paths for the appropriate use of technology for learning. (Intent is to align professional development to District goals and school strategies, for continuous improvement, holding the system and the professional accountable.)	Yes/No Extent to which policy addresses intent: 1 2 3 4	Yes/No Extent to which procedures address policy: 1 2 3 4	Yes/No Extent to which principles/procedures are being implemented with fidelity: 1 2 3 4	Yes/No Extent to which vision is advanced through implementation: 1 2 3 4
Evidence:				
Recommendation 3: Provide streamlined and clear purchasing procedures related to technologies and associated software and services, allowing flexibility for pilot projects. (Intent: provide structure while allowing for innovation.)	Yes/No Extent to which policy addresses intent: 1 2 3 4	Yes/No Extent to which procedures address policy: 1 2 3 4	Yes/No Extent to which principles/procedures are being implemented with fidelity: 1 2 3 4	Yes/No Extent to which vision is advanced through implementation: 1 2 3 4
Evidence:				
Recommendation 4: Use appropriate technologies to efficiently collect, access, analyze, and share data for decision making.	Yes/No Extent to which policy addresses intent: 1 2 3 4	Yes/No Extent to which procedures address policy: 1 2 3 4	Yes/No Extent to which principles/procedures are being implemented with fidelity: 1 2 3 4	Yes/No Extent to which vision is advanced through implementation: 1 2 3 4
Evidence:				

Table 6: Budgets (Long-term and Short-term)

Section 4 Recommendation/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
Increase appropriate student technology use at every level and in every content area.	$0	$1,228,200	$1,228,200	$1,296,200	$1,296,200	$1,296,200	$6,345,000
Definition (Non-recurring costs)							
Definition (Recurring costs)	1. Task forces to determine technology-related activities in every content area, starting with CCSS: 600 hours; 2. 4 FTEs for LMS or content storage; 3. Purchase consistent online content for all teachers to use: $3500/site; 4. Devices and infrastructure - See section 6.						
Provide systematic professional development paths that include for the appropriate use of technology for learning.	$13,200	$3,290,000	$3,290,000	$3,290,000	$3,290,000	$3,290,000	$16,463,200
Definition (Non-recurring costs)	Task force (admin, teachers, support staff) to populate survey: 600 hours						
Definition (Recurring costs)	1. Staff time for survey twice a year (40 minutes); 2. Online version of most PD: 4 FTEs; 3. Early release for PD: Assistance; 4. Teacher and admin trainers to work within each content area PD: 30 FTEs						
Provide streamlined and clear purchasing procedures related to technologies and associated software and services, allowing flexibility for pilot projects.	$45,000	$0	$0	$0	$0	$0	$45,000
Definition (Non-recurring costs)	Task force to develop and disseminate procedures (15 people for 15 days = .5 FTE)						
Definition (Recurring costs)							
Use appropriate technologies to efficiently collect, access, analyze, and share data for decision making.		$18,418,667	$22,102,400	$26,522,880	$31,827,457	$38,192,948	$137,064,352
Definition (Non-recurring costs)							
Definition (Recurring costs)	1. Structured teacher planning time: 50 hours per 500 students per year; schools schedule. 2. Data input, testing, progress monitoring: 1 off-ratio teacher per 1500 students per year. 3. 2 FTEs for District population of data (immediate).						

[30] Lemke, C., & Fadel, C. (2009). Technology in Schools: What the Research Says: A 2009 Update. Commissioned by Cisco Systems. Produced by Metiri Group. Accessed on 01/17/12 from http://www.mendeley.com/research/technology-schools-research-says/

[31] Sivin-Kachala, J., & Bialo, E.R. (2000). 2000 research report on the effectiveness of technology in schools. *Technology, 1*(202), 1-136. Accessed 07/06/11 from http://www.mendeley.com/research/siias-2000-research-report-on-the-effectiveness-of-technology-in-schools/.

[32] Roschelle, J.M., Pea, R.D., Hoadley, C.M., Gordin, D.N., & Means, B.M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children*, 76-101. Accessed 09/01/11 from http://halshs.archives-ouvertes.fr/docs/00/19/06/10/PDF/A103_Roschelle_etal_01_Packard.pdf.
[33] Gibson Consulting Group. *Eductional and operational efficiency study of the Clark County School District*. Austin, TX: Author.
[34] Ibid.
[35] Ibid.

SECTION 5: Business of Education Systems and Services

Introduction/Trends

Business of Education systems and services are applications and processes that support the daily business needs of instruction and operations. School district technology functions are often classified as either instructional or business, with instructional systems used to support educational goals and objectives, and business systems used to support financial and operational goals and objectives. The CCSD Technology Plan aligns these two traditionally distinct functions into an integrated suite of systems and services to gain districtwide educational and operational efficiencies in support of improved instruction and increased student achievement.

In similar fashion to Section 4, this section highlights the vision used to influence the identification of a target future state along with the analysis and strategies for closing the gaps necessary to achieve that state.

Vision

An integrated, data-centric, service-oriented suite of systems and processes effectively and efficiently links the goals and functions of business to the aims of PreK-12 education.

Target State

The demand for school districts to collect, link, analyze, and transform data into information and knowledge, to improve the quality of decision making, and streamline business processes increases exponentially with every new technology that emerges. To meet that expectation, the capacity within CCSD will need to be developed and expanded.

All enterprises (e.g., companies, school districts, etc.) face the challenge of how to leverage information technologies in ways that improve and innovate business processes, business systems, and business intelligence. Specifically for schools districts, the challenge additionally includes how to leverage technologies to innovate teaching and learning.

Enterprises often allow their business processes to be defined by information technology (IT) structures. Research in this area finds that top-performing companies use a two-tiered approach in defining IT-based business systems. First, they start by defining how they will do business, including defining necessary levels of process integration and standardization, through that's known as an *operating model*. Second, given a well architected operating model, they then define the business

AT A GLANCE

SECTION 5

Vision
An integrated, data-centric, service-oriented suite of systems and processes effectively and efficiently links the goals and functions of business to the aims of PreK-12 education.

The Gap
- There is a lack of districtwide integration of operational and educational systems resulting in a lack of automated business intelligence.
- There is a lack of formal data policies that clearly define a limited number of recognized data sources results in ambiguity about who is the data owner and decision maker concerning data.
- A lack of confidence in the accuracy of the data results in a lack of clarity on the associated data requirements, which are critical for data accuracy.
- Canned reports are provided, but, in some cases are not as fully used.

Closing the Gap
1. Define/establish districtwide core business practices and systems.
2. Establish a process for digitizing, upgrading, and linking core business practices, prioritizing those of high need.
3. Define and establish an enterprise architecture, supported by a service-oriented organizational structure, for tight integration among core business of education systems.
4. Establish a system of governance for the enterprise architecture that is transparent, participatory, and focused on gaining educational and operational efficiencies, while also allowing local flexibility for innovation.
5. Establish procedures for data ownership, collection, and storage districtwide.
6. Establish business intelligence analysis and reporting capacity districtwide.
7. Establish a culture of data that promotes an awareness of available data, educator professional development and credentialing, and leadership in using data to inform decision making.

processes and infrastructure critical to their operations known as their enterprise architecture. *Enterprise architecture* is a term that has emerged as companies sought an organizing logic for core business processes supported through IT systems.[36]

Enterprise architecture shifts the focus from the IT system to the business processes. This is a breakthrough that is intended to be leveraged through this technology plan. Enterprise architecture provides a long-term view of the entity's business processes, systems, and technologies across all areas of the organization, so that investments and projects build organizationally global capabilities, rather than individual IT solutions isolated within departments. By efficiently digitizing core capabilities such as infrastructure services (employee recruiting and hiring, purchasing, payroll, etc.) and basic transaction processes (daily attendance, accounts payable, etc.) the District will become agile, efficient, and better able to use data strategically. Executed well, enterprise architecture will enable the District to digitize core capabilities and basic transactions within educational and business units, using common foundations to automate linkages across all groups.

An example is online student assessments. The division responsible for testing would be able to digitize the core capability of online testing, and would automate linkages to the student identification numbers, student records, class rosters, Annual Yearly Progress (AYP) reports, teacher evaluation systems, growth models, and so on. Doing so would mean that, once all students' online assessments are scored, the teacher, the student, and parents would have more timely access to the results; AYP reports would automatically be generated; make-up tests would automatically be scheduled; and the multiple dimensions of teacher evaluations – including growth data – would be systematized.

As mentioned earlier, the design process for business processes supported through IT is two-tiered: the operating model and the enterprise architecture. CCSD must define their operating model (Table 7). In order to design the enterprise architecture, the operating model determines the level of standardization and integration. Certain components exist within CCSD as the beginnings of an operating model with core capabilities and basic transaction processes, but more work and deliberate definition is needed.

Table 7: CCSD Operating Model – A Suite of Systems and Services

Core Capabilities	Employee recruiting and hiring, purchasing, finance, accounting, payroll, student assessments, etc.
Basic Transaction Processes	Daily attendance, recording of grades, purchasing, accounts payable, accounts receivable, etc.

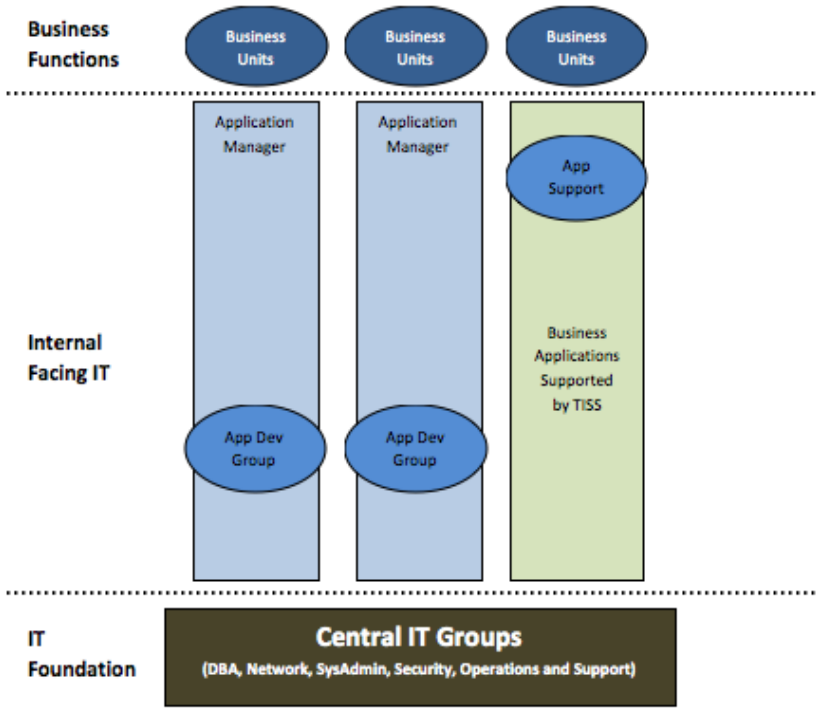
A key element of enterprise architecture is "*business intelligence*," which defines a broad category of applications and technologies for gathering, storing, analyzing, and providing access to timely and relevant data to help enterprise users make better business decisions. Business intelligence enables more effective strategic, tactical, and operational insights and allows for well-informed decision-making. A critical component of the enterprise architecture is business intelligence. The suite of systems and services, when digitized and integrated through information technology systems, will provide a strongly linked and multi-faceted business intelligence (BI) system. At the foundational level, the suite requires a robust information technology infrastructure as a backbone upon which to link systems and data, a horizontal service-oriented architecture (SOA) to link separate systems across functional domains, and the business analytics and

reporting structures that can efficiently and easily consume such linkages. But a BI system is only as strong as the knowledge and expertise of an informed staff who take ownership of business processes, datasets, tools, analytics, and reports to interpret data appropriately and to inform key school-based and district-based decision making.

Forward-thinking strategies will be required of each CCSD unit and school as a high-quality enterprise architecture is established. This will require clarity on how each unit or school operates as a component of the overall interrelated organization and the intentional digitalization of all operations in ways that build on the basic IT foundation, linking across units and schools to automate procedures as necessary and appropriate. A systematic review of the Business/IT portfolio is required to identify where upgrades from legacy systems and processes are needed to ensure appropriate linkages. Most importantly, a strong governance system is required to provide oversight of investments in technology acquisitions and integration into current infrastructure, as well as the managing of a policy agenda that advances the efficiency, effectiveness, and integration across systems.

The model in Figure 11, while not designed to explicitly depict CCSD structures, accurately represents the current organizational relationship between business and IT in the District. Dedicated IT application development groups support data and development requests from their constituent business owners – in this case the divisions within CCSD. However, to date their support has typically resulted in systems that are mostly stand-alone and systems that are neither well integrated or linked.

Figure 11: Business/IT Organizational Model Representing Current CCSD Situation

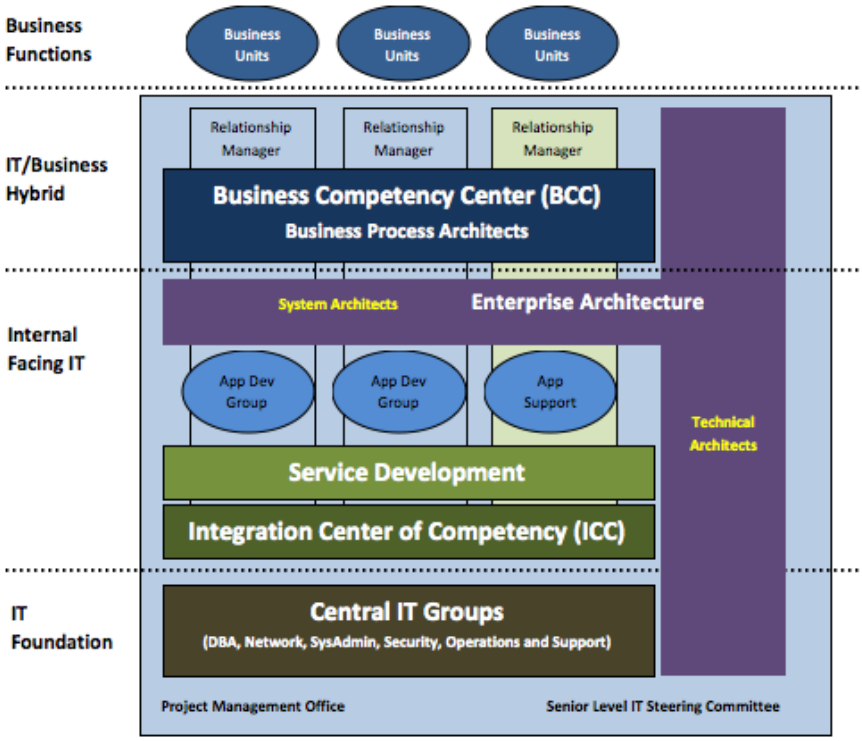


Based on graphic from: TIBCO. (n.a.). *TIBCO Service-Oriented IT Organizational Structure Best Practices: An Introduction.* Palo Alto, CA. p. 4.

The model in Figure 12 depicts the target state envisioned for CCSD. It represents a service-oriented (SO) organizational structure that shifts enterprise architecture from primarily an independent business process and technical focus to an integrated, cooperative, cross-organizational enterprise view with the intent of improving business process designs for tighter integration spanning multiple functional boundaries. A strategic objective in this plan is to target an SO organization to support enterprise architecture design and provide accountability to the system of governance described in Section 8.[37]

According to Gartner research, many organizations that implement large-scale integrated business systems do not realize that the traditional IT organizational structure is ill-suited for the high level of business owner involvement that is critical to overall application success. Gartner recommends establishment of a business application competency center (BACC), also referred to in Figure 12 as a business solution competency center (BSCC), that integrates traditional IT application support services with three key business-led services: super users, business process analysts, and application change control. As part of the SO organizational structure, the BSCC will oversee business process improvement (BPI) efforts as part of their overall business process management (BPM) responsibilities. BPM enables the improvement of business performance and business agility — which can lead to the growth or transformation of business.[38]

Figure 12: Proposed CCSD Service-Oriented (SO) Business/IT Organizational Model



Based on graphic from: TIBCO. (n.a.). *TIBCO Service-Oriented IT Organizational Structure Best Practices: An Introduction.* Palo Alto, CA. p. 4.

The District must shift the focus away from independent business processes and their resulting siloed IT solutions towards integrated, cross-organizational business processes and services through a service oriented

organizational mode. Based on currently established operating procedures, CCSD must clearly define and operationalize enterprise architecture. This, combined with IT infrastructure standards, will establish a foundation built for improved data collection, storage, analysis, access, and business intelligence reporting.

Current State

In response to decades of rapid, large population expansion in Southern Nevada, CCSD has managed growth through a building program that constructed (on average) one school per month. Service departments, likewise, expanded capacity to service students and school staff by implementing IT solutions to meet their specific needs. Individually, these applications work well, but together hinder efforts to coordinate business processes. This has resulted in a lack of integration, fragmented data, multiple sources of official data, and difficulty linking data for business intelligence analytics and reporting.

The District, as a whole, has followed a path of defining a strategic direction, designing solutions to support various instructional and business initiatives, and implementing solutions through delivered applications, data, and infrastructure – the net result being independent solutions and the creation of silos, as conceptualized in Figure 11. As noted in the Gibson Report, one of the cumulative effects of organizational silos is the lack of information on program effectiveness due to the lack of systematic tracking of information required to determine if specific student programs and interventions are actually having the intended effect. Furthermore, "the District's data are fragmented and often duplicated among computer applications, departments and business processes, residing on diverse data platforms (or on paper forms) and managed by different staff with varying skill levels."[39]

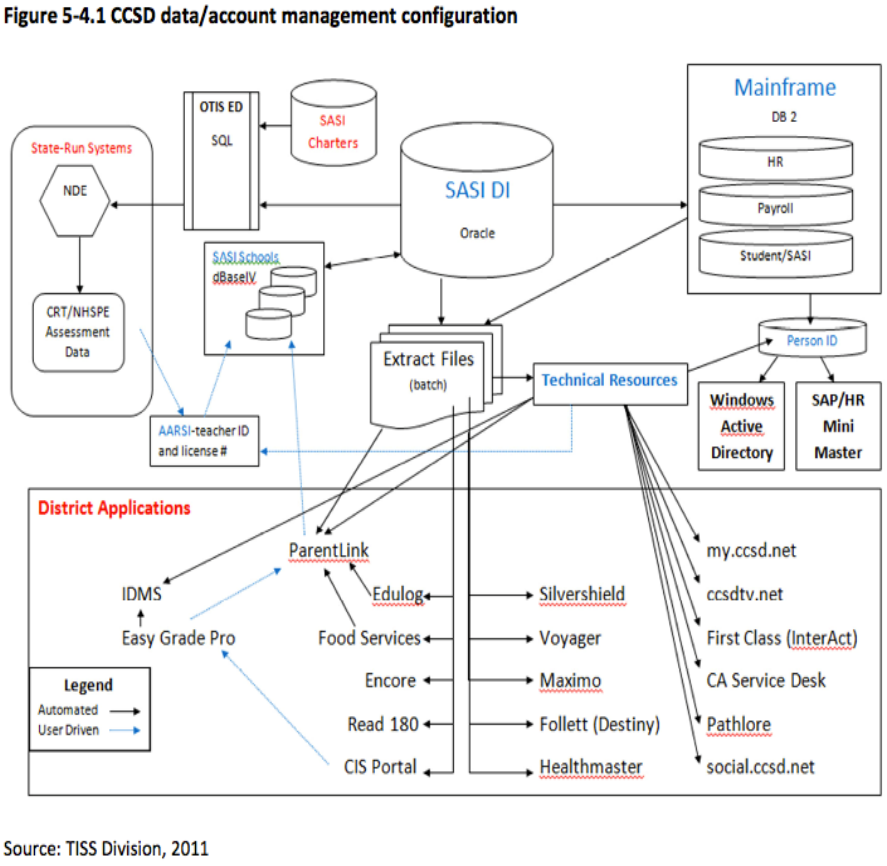
Meanwhile, the U.S. Department of Education Strategic Plan for fiscal years 2007-12[40] discusses rigorous measures to analyze student growth on achievement tests based on historical data; analysis of tools, textbooks, and cluster schools to ascertain effectiveness; and establishment of measures to predict future dropouts. Given these measures, plus the focus in the Race to the Top program on the use of growth models to determine teacher effectiveness, the District is now compelled to respond by becoming more data centric. Program/intervention participation data by student is currently not tracked, and only a few programs are tracked at the school level, and, according to the Gibson Report, "The District cannot successfully implement a performance management system with this number of assessments." [41]

Most school districts have found it necessary to establish, at minimum, a student information system, a data warehouse, and a longitudinal data system to comply with the federal requirements in the No Child Left Behind law to account for subgroup proficiency on achievement tests. Now that these requirements are well established, districts are taking the next logical step to extrapolate their efforts by connecting elements across the enterprise system to inform all decision making. As they do so, they are finding it necessary to create linkages across instructional and business systems within their districts. In the case of a district running disparate legacy systems, they're finding it necessary to "kludge"[*] instructional and operational systems to coerce data relationships and reports. Figure 13 represents the current status of the CCSD data and account

[*] Kludge: A software or hardware configuration that, while inelegant, inefficient, clumsy, or patched together, succeeds in solving a specific problem or performing a particular task.

management linkages that have been created out of necessity to help inform decision making. This high-level thumbnail is but a glimpse into a more complex labyrinth of interfaces, reports, and data feeds that overlay an infrastructure of various bodies of data (including student information), hardware platforms, databases, and home-grown applications cobbled together to form today's business of education systems and services. To further illustrate, the Gibson Report finds that, "The information systems supporting the Human Resources Division (for online applications, applicant tracking, and employee management) are decades old, functionally obsolete, and are not integrated with the District's finance systems." [42]

Figure 13: Clark County School District Data/Account Management Configuration



Source: TISS Division, 2011

Gap Analysis

The gap in the business of education in CCSD is the lack of Districtwide integration of operational and educational systems, which results in a lack of automated business intelligence. The following list represents evidence of the gap:

- **System of Governance**. There is a lack of a system of governance to provide guidance, prioritization, communication, collaboration, cost/benefit analysis, training, etc., with respect to business/IT solutions.

- **Enterprise Architecture**. There is a lack of cohesive enterprise architecture, evidenced by siloed system implementations, lack of integration among systems, and resistance to change.
- **Change Management**. A formal process of change management is needed – a systematic plan for managing change for large scale governance and system implementations.
- **Data Silos**. Data systems are siloed, not integrated. Some data systems have reached full capacity and cannot be expanded to meet current need. Staff must perform work-arounds to facilitate legacy systems. CCSD staff has to enter data multiple times across multiple systems, introducing risk of error.
- **Fragmented Data**. Data is fragmented and often repeated in variation.
- **Student Information System**. SASI, the current CCSD student information system, has reached end-of-life and end-of-support and does not integrate with other mission critical data systems.
- **HR/Payroll**. The District lacks an integrated Human Capital Management (HCM) system, or core HR transactional functionality, enabling service automation delivery.
- **Finance.** There is a lack of SAP HR and Payroll modules integrated with Finance and Procurement, which would allow for ease in budget planning for projected staffing, determining vacancies, vacancy savings reports, position-budget control, integrated payroll, and integrated time and attendance recording. The District's account codes are not configured to track expenditures against stated goals, targeted programs, or spending priorities.
- **Business Ownership**. Business owners are assumed due to perceived roles and not formally defined or organizationally recognized.
- **Data Governance**. The District lacks formal data policies to identify and govern business process management, data owners, and decision making rules about all aspects of the data.
- **Data Standards**. The District lacks confidence in the accuracy of the data due to multiple sources and a lack of clarity on the associated data requirements.
- **Automated Reports**. Automated reports are provided, but in some cases are not used.

Long-term and Short-term Strategies to Attain the Vision

Short-term strategies for this plan include integration of an HCM system with the finance and procurement systems. Currently, the finance and procurement systems are integrated through an SAP Enterprise Resource Planning (ERP) solution, but Human Resources and Payroll (often referred to herein as HCM) remain on an independent, legacy suite of applications. Within HR, only Licensed Personnel and Substitute Services are integrated with Payroll; remaining departments rely on manual processes. In an effort to support end-to-end processes from hire to pay, the legacy HCM system is hard-wired to the financial system through custom developed, non-real-time links. Ideally, HCM (including all HR departments) could be integrated with finance and procurement with the same ERP solution. Similarly, the legacy HCM system is isolated from the student information system (SIS) making it difficult to match a teacher's license to what's taught in the classroom, and to link student achievement to teacher hiring and/or performance.

Another strategy will be clearly defined business processes for all data, requiring the identification of data systems currently in place, associated data sets and data elements, data sources, and business owners. Once

data-related business processes are defined, policies must be established to identify a single source of truth and to govern use of the source in both instructional and operational business practices.

In addition, identified data sources could be more readily integrated into other systems through a data warehouse, with data dictionaries systematically defined by each data owner. Timelines for data collection can be established, data subscribers identified, and communication and professional development of data management standards developed and deployed to ensure appropriate central and distributed use by internal and external data subscribers.

In the long-term, the goal is to establish a system of governance that embraces a culture of communication and ongoing change, and defines an SOA model that's better structured to execute against enterprise architecture operating models established by CCSD for integration between the business of education and IT. A strong foundation will help pave the way to gain districtwide educational and operational efficiencies and improve business intelligence in support of students being ready by exit.

Closing the Gap: Recommendations

Vision: An integrated, data-centric, service-oriented suite of systems and processes effectively and efficiently links the goals and functions of business to the aims of PreK-12 education.

This vision will be accomplished through the following recommendations.

Recommendation 1: Define/establish districtwide core business practices and systems.

Action Steps:

- Document current business practices and systems.
- Define and identify the core business of education systems and services.
- Define and document data collection processes and timelines.
- Define access roles and responsibilities.
- Establish procedures for managing system change/modifications.

Recommendation 2: Establish a process for digitizing, upgrading, and linking core business practices, prioritizing those of high need. Examples include the Student Information System (SIS) which has reached end-of-life, and Human Capital Management which is currently partially realized on a legacy system.

Action Steps:

- Assess and prioritize the core business practices for digitization and upgrades.
- Establish a process for assessing the state of prioritized core business practices, evaluating options, ensuring linkages, identifying funding sources, and selecting solutions and implementation vendors.
- Use the Student Information System replacement and then Human Capital Management as pilots in establishing the process.
    - Procure and implement a student information system (Gibson Report 5-4.2).
    - Implement integrated systems and streamline processes in HR (Gibson Report 5-3.1).
    - Improve the ability of HR to support an efficient process for attracting and retaining highly talented staff (Gibson Report 5-3.2).
    - Reduce the amount of paper produced, routed and stored in and on behalf of HR (Gibson Report 5-3.3).

Recommendation 3: Define and establish an enterprise architecture, supported by a service-oriented organizational structure, for tight integration among core business of education systems (e.g., data warehouse, student information system, instructional and assessment systems, analytics, etc.)

Action Steps:

- Adopt a model and associated policies to support CCSD enterprise architecture.
- Create and implement an enterprise data management framework (Gibson Report 5-4.1).
- Define requirements an integrated, longitudinal data system and establish processes for acquiring an integrated, longitudinal system.
- Use the upgrading of the student information system (SIS) as the pilot in establishing the process.
- Procure and implement a robust and integrated SIS (Gibson Report 5-4.2).
- Fully implement the Human Resource and Payroll modules of SAP (Gibson Report 5-4.3).
- Develop and implement short-cycle formative assessments (Gibson Report 3-2.2).
- Enhance transparency and usefulness of the budget document by presenting budgets at functional and school levels, and by providing explanations of major budget and staffing variances (Gibson 4.5).

Recommendation 4: Establish a system of governance for the enterprise architecture that is transparent, participatory, and focused on gaining educational and operational efficiencies, while also allowing local flexibility for innovation.

Action Steps:

- Identify a model of Business/IT governance.
- Design and build the system of governance for CCSD.
- Establish policies and procedures.
- Improve the monitoring of customer service and satisfaction (Gibson 5-1.1).

Recommendation 5: Establish procedures for data ownership, collection, and storage districtwide.

Action Steps:

- Identify all data systems, data elements, and the business owners of the data.
- Document and validate original data sources and validate the collection processes.
- Establish a data warehouse as the single source of all data elements.
- Develop a data dictionary and define where data are stored.
- Assign account codes to specific programs, interventions, and District priorities to demonstrate the alignment to spending and to support a Return on Investment (Gibson Report 4.2).
- Train staff to maintain and use the data warehouse.

Recommendation 6: Establish business intelligence analysis and reporting capacity districtwide.

Action Steps:

- Enact a policy establishing the data warehouse as the single source of all data elements.
- Develop standard reports for common data requests.
- Establish a process by which users can create and access ad hoc reports.
- Enhance program evaluation capacity to support calculation of Return on Investment (ROI) in academic programs and interventions.
- Incorporate efficiency measurement into the budget process, so that the justification for spending levels will be more transparent (Gibson Report 4.4).

Recommendation 7: Establish a culture of data that promotes an awareness of available data, educator professional development, and leadership in using data to inform decision making.

Action Steps:

- Develop and implement a districtwide decision-making framework (Gibson Report 5-1.2).
- Build the capacity of CCSD leadership to use the enterprise architecture in decision making.

- Establish data cultures at the district and school levels.
- Fully utilize the capabilities of INFORM and require districtwide use (Gibson Report 3-2.3).
- Offer professional development for data-informed decision making at all levels.
- Develop cross-functional teams to better coordinate programs and services (Gibson Report 3-1.1).
- Develop criteria to identify and select instructional and operational software programs (Gibson Report 5-4.4).[43]

Metrics: Return on Investment/Impact if Not Implemented

The return on investment for these recommendations is represented by gains in increased potential for data-informed decision making, reduction of redundancies in data collection, business process efficiencies, and timely access to data and reports. The importance of accurate, reliable, and timely data-centric work cannot be over emphasized. It is paramount to the mission of the District. The replacement of an antiquated, distributed system with a suite of integrated systems that builds off a centralized IT infrastructure will result in:

- Real-time (or near real-time) access to data
- Integrated linking across business and instructional systems
- Reduction in redundant transactions and data
- Improved customer service
- Less down time for schools
- Cost savings through the elimination of some third-party applications
- Increased levels of business intelligence for data-informed decision making and prioritization of needs and projects
- Streamlining of work – reducing indirect labor costs
- Increased access to linked datasets for decision making
- Greater end-user satisfaction

Table 8 below identifies the type of instrument that will be used to measure each of the anticipated outcomes.

Table 8: Metrics for Gauging Progress

	Perceptions of users	Division reports on results	Online analysis of transactions	Perceptions of leadership on ease of data access and management for data-driven decision making
Real-time (or near real-time) access to data	✓		✓	✓
Integrated linking across business and instructional systems	✓	✓	✓	✓
Reduction in redundant transactions and data	✓		✓	
Improved customer service	✓	✓	✓	✓
Less down time for schools	✓	✓	✓	
Cost savings through the elimination of some third-party applications		✓		
Increased levels of business intelligence for data-informed decision making and prioritization of needs and projects		✓	✓	✓
Streamlining of work – reducing indirect labor costs		✓	✓	✓
Increased access to linked datasets for decision making		✓	✓	✓
Greater end-user satisfaction	✓	✓	✓	✓

If issues in this plan are not addressed, the continued risk of failure in mission critical systems increases over time. Schools and divisions/departments will continue to experience redundancies, data delays, expensive third party solutions, and may not be fully or accurately informed as mission critical decisions are made. Maintenance and support costs for out-of-date legacy systems will increase and end-user experience will be marginalized. Furthermore, confidence in data will be compromised due to difficulty in assuring accuracy and timeliness, and there will be continued under-utilization of the data and analytics.

Budgets (Long-term and Short-term)

Cost estimates for this section include the following:

1. Implement a new student information system to replace the current system: Schools Administrative Student Information (SASI).
   Cost Estimate: Approximately $6-15 million for the software only[43] minimum $500,000 annually for maintenance, and $5 to $10 million for implementation.
2. Implement a Human Capital Management system.
   Cost Estimate: $250,000 for assessing current situation, $250,000 for exploring options, and $10-16 million for solution/implementation.
3. Implement a data warehouse and business intelligence reporting capacity districtwide.
   Cost Estimates: Approximately $6 million for solution, implementation, staffing, and ongoing maintenance.

Table 9: Budget for Business of Education Systems and Services

Section 5 Recommendation/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
Payroll		$5,620,000	$5,900,000	$6,200,000	$6,500,000	$6,830,000	$31,050,000
Materials and Services		$3,910,000	$4,110,000	$4,310,000	$4,530,000	$4,760,000	$21,620,000
Capital Equipment		$3,100,000	$3,410,000	$3,750,000	$4,130,000	$4,540,000	$18,930,000
Total General Maintenance and Operations		$12,630,000	$13,420,000	$14,260,000	$15,160,000	$16,130,000	$71,600,000
Define/establish districtwide core business practices and systems.	$200,000	$25,000	$25,000	$0	$0	$0	$250,000
Definition (Non-recurring costs)	Consulting services.						
Definition (Recurring costs)	Consulting services for plan maintenance and refinement.						
Establish a process for digitizing, upgrading, and linking core business practices, and prioritize those of high need, for example Human Capital Management, which is currently on a legacy system.							
(A) Implement integrated systems and streamline processes in HR (Gibson Report 5-3.1), interim solution until 5.3 complete (included in the $20,000,000 from HCM implementation, Recommendation #3).	$300,000	$25,000	$25,000	$0	$0	$0	$350,000
(B) Improve the ability of HR to support an efficient process for attracting and retaining highly talented staff (Gibson Report 5-3.2), interim solution until 5.3 complete.	$150,000	$30,000	$30,000	$30,000	$30,000	$30,000	$300,000
(C) Reduce the amount of paper produced, routed and stored in and on behalf of HR (Gibson Report 5-3.3), ongoing.	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$300,000
Definition (Non-recurring costs)	Software and/or hosted services, consulting services for business process re-engineering and technical development.						
Definition (Recurring costs)	Annual maintenance and support, consulting services for technical development.						
Define and establish an enterprise architecture, supported by a service-oriented organizational structure, for tight integration among core business of education systems (e.g., data warehouse, student information system, instructional and assessment systems, analytics, etc.)							
(A) Create and implement an enterprise data management framework (Gibson Report 5-4.1); design an integrated, longitudinal data system and establish processes for acquiring an integrated, longitudinal system.	$5,030,000	$1,387,000	$1,642,000	$1,725,000	$1,815,000	$1,905,000	$8,474,000
(B) Procure and implement a robust and integrated SIS (Gibson Report 5-4.2).	$23,000,000	TBD	TBD	TBD	TBD	TBD	$23,000,000

Section 5 Recommendation/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
(C) Fully implement the Human Resource and Payroll modules of SAP (Gibson Report 5-4.3).	$10,000,000	TBD	TBD	TBD	TBD	TBD	$10,000,000
(D) Implement an Identity Management system and processes.	$100,000	$542,000	$455,000	$478,000	$500,00	$527,000	$2,502,000
Definition (Non-recurring costs)	Consulting services, software, and toolsets for system implementation.						
Definition (Recurring costs)	TBD						
Establish a system of governance for the enterprise architecture that is transparent, participatory, and focused on gaining educational and operational efficiencies, while also allowing local flexibility for innovation.	$100,000	$150,000	$150,000	$0	$0	$0	$400,000
Definition (Non-recurring costs)	Consulting services.						
Definition (Recurring costs)	Consulting services for plan maintenance and refinement.						
Establish procedures for data ownership, collection, and storage districtwide (covered by Recommendation 5.3)							
Definition (Non-recurring costs)							
Definition (Recurring costs)							
Establish business intelligence analysis and reporting capacity districtwide (training, staff member, consulting, e.g.)	$1,250,000	$750,000	$1,190,000	$1,250,000	$1,312,000	$1,380,000	$5,882,000
Definition (Non-recurring costs)	Hardware, software, consulting services, training, maintenance and support.						
Definition (Recurring costs)	Hardware, software, technical services, training, maintenance, and staff to support.						
Establish a culture that promotes an awareness of available data, educator professional development, and leadership in using data to inform decision making (covered by recommendation 5.6)							
Definition (Non-recurring costs)							
Definition (Recurring costs)							

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[42] Ibid.
[43] Ibid.

SECTION 6: End-user Access and Support

Introduction/Trends

The learning environment of the future may not be bound by wires or physical walls or by specific types of technology. However, it will have to continue to support the need for students to know how to access the technology and the data and information required to continue learning in the 21st century. This section will address: (1) physical access to modern technology (hardware and software); (2) knowledge of how to use technology, and (3) the ability to access information and data as needed.

This section describes the vision for end-user access and support, a desired target state, current state, gaps between them, and the strategies recommended to achieve the target state

Vision

Students and educators have ready access to tools required for learning, teaching, and operational efficiency.

Target State

CCSD envisions an environment in which all learners have access to a device when they require it, and that the needs determine the type of tool.

Changes in technology tools are progressing at a breakneck pace, and the types of devices and software used for instruction and business have reflected those changes. The consumer aspect of technology has entered both learning and business environments as users demand to use personally owned devices (PODs) for work and educational use. It appears that for many districts, the only way to achieve ubiquity of access is through PODs. In some cases the districts establish technical specifications that student devices must meet; in other cases the students simply bring whatever device they have available. Ideally students would have access to the Internet in school and beyond.

Technology users expect to have access to technology tools whenever they need them, whether they are at home, at school, in the field, or at a coffee shop. Cloud technologies are increasingly offering such access, and, in many school districts, desktop virtualization allows students and teachers access to robust hardware and software while removing the barriers that personally owned computing equipment may present. For instance, students may complete a processor-intensive multimedia presentation on a home computer by accessing industry-standard video editing software housed on a CCSD server available 24 hours a day.

AT A GLANCE

SECTION 6

Vision
Students and educators have ready access to tools required for learning, teaching, and operational efficiency.

The Gap

- No standardized method for oversight of technology access and deployment across the District.
- Students have access to instructional software only at the school sites.
- No coordinated, comprehensive, collaborative process for identifying, selecting, purchasing, deploying, and supporting end-user tools.
- Policies restrict students from using mobile devices in school.
- Limited focus on developing school networks to support students' use of personally owned devices.
- No gauge of the technical expertise or knowledge of CCSD employees.
- Uneven site-based technology support.

Closing the Gap

1. Build the capacity of teachers, administrators, and other staff through professional development designed to address the knowledge gaps related to effective use of technology among those audiences.
2. Enhance access to systems and devices to promote productivity and learning.
3. Adopt hardware and software standards to meet instructional and business needs.
4. Adopt comprehensive deployment and technical support for hardware and software managed through the Technology and Information Systems Services Division.

The following scenarios exemplify what students and staff may enjoy in the target environment:

- A newly appointed principal shows up on day one of her assignment and automatically has access to basic CCSD systems she needs for her job. She is provided a schedule of trainings that need to be completed prior to gaining full access.

- A teacher is having his students conduct research for an English project. In order to achieve ubiquitous access, students are permitted to bring personally owned devices (PODs) that meet pre-determined technical specifications. Each student is able to complete their research during class on a District-issued, or personal, supported device.

- An office manager is asked to create hundreds of certificates for a particular group (straight As, debate team, etc.). She is able to complete this task in less than ten minutes due to effective software, training and/or knowledge of where the information may be obtained.

- A project-based learning initiative requires office hours after the normal school day. District controlled access to online meeting spaces allows teachers or peer tutors to conveniently offer assistance on long-term projects and allows students to work collaboratively.

- A user who needs assistance in resolving an IP conflict for a network printer activates an on-line chat session to request service from a technician.

- A principal wants to learn how to effectively display the data provided to him through a spreadsheet. He accesses an on-demand training, which assists him in creating growth charts and highlighting high performing/low growth student scores.

- A student needs to complete a CADD design project that she began in school. She has her files on her own laptop, which she has been working on at school, but she needs to access the program available on CCSD servers. She is able to log into a virtualized session to access the software and complete her project. She is further able to drop it into an online drop box for the teacher to evaluate.

As outlined in Figure 14, the configurations for technology use include: students at home, teachers or tutors after hours, classroom use, and parent/community use.

Figure 14: Configurations for Technology Use

Current State

The Clark County School District covers nearly 8,000 square miles and serves students in schools with enrollment from as small as 10 students to as large as 3,000 students. The diversity in school size is reflected by the wide variation of devices and software used across this broad expanse. Technology is currently not equitable throughout the district, with some schools having large numbers of new laptop and desktop computers, ceiling mounted projectors, audio enhancement systems, and wide offerings of software, while others have a small or limited amount of the same. Variety is also evidenced in the skills of staff, with some having well-developed skills for using technology in teaching or in the business of the district, and others having low-level skills.

Currently, physical access to modern technology (hardware and software) is characterized as follows:

Tools

- CCSD schools use a variety of technology tools, such as computer centers and labs, wireless laptop carts, classroom response systems, interactive whiteboards, and mobile learning devices (such as iPods and tablets), but the quantity and type of tools vary from site to site.
- Graphing calculators are included in the equipment list for new secondary schools and are widely used in the District.
- Many students have a personally owned device, but CCSD policy prevents those students from using the device in the classroom. So, if the student is using the device during school they may be abusing the District policy. In most classrooms, teachers have access to desktops as do administrators, but the latter typically has a secondary device, which is mobile.

Technical Support

- Technical support for these various tools is spread across multiple support organizations.
- Provisions of Wi-Fi support for personally owned devices in schools is currently under development, but typical configurations for class access is still in labs or from mobile carts.
- Schools are able to purchase computer hardware that falls outside the adopted standards.
- Technology purchases and project implementations are often managed outside the Technology Division Standards for new schools. Technology purchases can include: a classroom multimedia computer, projector, classroom voice amplification systems, digital media network, phone, and multi-media ready instructional wall for each classroom, at least one computer lab per school, and student computers in each library. Efforts are made to provide the same type of learning environment in existing schools with uneven results.

Currency and Sustainability

- Through bond funds, schools receive a computer allotment to replace 50-60% of their existing computers. In order to maximize the number of computers available to students, many schools hold on to equipment that is no longer supported centrally.
- Schools keep the older non-supported technology and have Educational Computing Strategists provide the technical support.

Access to Networks and the Internet

- Wireless is currently available during the school day for teacher and student use on school-owned devices.
- CCSD is partnering with the Las Vegas Urban League to provide community access through their 31 centers, located throughout the valley.
- Wi-Fi for personally owned devices in school is currently under development, but typical Wi-Fi configurations for classroom access are still in labs or mobile carts.

Online Learning and Testing

- The District is currently piloting systems that would provide collaborative learning environments and document exchanges, management, and storage.

- State-mandated testing for writing knowledge and skills has been implemented in the 2011-2012 school year with fifth and eighth graders.

Currently, support in building employee capacity related to the effective use of technology includes:

- Training offered through a multitude of methods (e.g., blended learning), for personal and professional growth.
    - Professional Development Education (PDE)
    - Graduate level courses offered through Vegas PBS
    - Business and productivity courses for all staff (e.g., word processing, spreadsheets, student information systems, and technical applications, etc.)
- Technology integration training (e.g., training for all middle school Educational Computer Strategists on managing iPod carts, training on classroom response systems, content-specific classes on effective technology use, etc.).
- A unified help desk in place to provide service to schools and departments for technology-related problems.
- Educational Computer Strategists spend a significant amount of their time on computer technical support activities.[44]
- Training in the use of technology tools is offered either through pullout classes or on site by the Educational Computing Strategist.

Currently the ability to obtain information and data as needed is characterized as follows:

- Access to some data and information is restricted to business hours only on a computer connected to a district network.
- The INFORM data system is coming online for data access and will be available 24 hours per day, 7 days per week for teachers and administrators.
- The Nevada Growth Model provides yearly growth results for students.

Gap Analysis

The gaps with user access and support are identified as follows:

- No standardized method for oversight of technology access and deployment across the district.
- Students have access to instructional software only at school sites.
- No coordinated, comprehensive, collaborative process for identifying, selecting, purchasing, deploying and supporting end-user tools.
- Policies restrict students from using mobile devices in school.
- Limited focus on developing school networks to support students' use of personally owned devices.
- No gauge of the technical expertise or knowledge of CCSD employees.
- Uneven site-based technology support.

Closing the Gap: Recommendations

***Vision**: Students and educators have ready access to tools required for learning, teaching, and operational efficiency.*

The vision will be accomplished through the following recommendations.

Recommendation 1: Build the capacity of all teachers, administrators, and other staff through professional development designed to address knowledge gaps related to effective uses of technology among those audiences.

Action Steps:

- Create an assessment for all employees to determine their job-specific proficiency with technology use.
- Create tiered instruction based on levels of proficiency.
- Establish a well-communicated mechanism for disseminating best practices through multiple approaches.
- Adopt practices to increase the effectiveness of professional development in improving teacher skills and practices (Gibson Report 3-3.2).
- Communicate through a variety of methods to make all employees aware of technology tools available to them.
- Require technology training for all employees instead of allowing training to be optional.

Recommendation 2: Enhance access to systems and devices to promote productivity and learning.

Action Steps:

- Establish a policy on personally owned and non-standard devices to allow them on campuses and to address technology gaps (e.g., provision of device for students who don't have a POD, etc.).
- Provide users with easy, secure access to necessary applications.
- Extend secure Web-based and device-based remote access to appropriate resources with varying levels of access depending on business needs, educator needs, legal requirements, and productivity benefits.
- Leverage existing community facilities with connectivity.
- Explore providing CCSD with wireless access for both parents and students.
- Facilitate an online community or support framework for users who bring unsupported devices into CCSD.

Recommendation 3: Adopt hardware and software standards to meet instructional and business needs.

Action Steps:

- Determine minimum hardware specifications by developing an aggregate list of applications currently used throughout the District.
- Identify software and hardware configurations that can be supported.
- Fund appropriate levels of technology for each school and department.
- Regularly review the hardware and software standards and modify them as necessary.

- Develop criteria to identify and select instructional and operational software programs (Gibson Report 5-4.4).

Recommendation 4: Adopt comprehensive deployment and technical support for hardware and software managed through the Technology and Information Systems Services Division.

Action Steps:

- Using standards developed for hardware and software configurations, establish and publish support methods that will be adopted.
- Design methods for evaluating new hardware and software to be adopted.
- Secure funding for systematic technology deployment and replacement, which includes new technologies that support CCSD's mission.
- Fund school-based technical support (Gibson Report 5-4.5).[45]

Metrics: Return on Investment/Impact if Not Implemented

This plan outlines capacity to readily access the tools necessary for learning, teaching, and operational efficiency (Table 10). Risks to accomplishing this objective are real if the recommendations above are not implemented. Benefits of this plan include an increase in demonstrated employee skill levels with an overall decrease in the number of hardware/software support calls received. Comprehensive and standardized levels of support for classroom technology will be provided through increases in focused technical support, coupled with the expansion of the support offered by centrally deployed technicians. The return on investment in the form of productivity, efficiency, and focused job functions is imperative to ensure students are ready by exit.

Table 10: Metrics for Gauging Progress

	District Records/Artifacts	Objective Assessments	Perception of Users	Leadership Perception
Assessment of Technology Competency	✓	✓		
Is Tiered Training Being Offered?	✓			✓
Mandatory Professional Development	✓	✓	✓	✓
Policy change to allow PODs on campus	✓			
User Provisioning	✓			✓
CCSD Wi-Fi Feasibility	✓	✓	✓	✓
Identified Supported Software/Hardware	✓			✓
Design Method to Evaluate and Adopt Software/Hardware	✓	✓	✓	✓
Publish Support Structure	✓			

Table 11: Budget for End-user Access and Support

Section 6 Recommendations/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
Build the capacity of all staff through professional development designed to address knowledge gaps related to effective uses of technology among those audiences.	$0	$0	$0	$0	$0	$0	$0
Definition (Non-recurring costs)	Development of assessment; develop tiered instructional proficiencies; develop change management plan						
Definition (Recurring costs)	Delivery of instruction; software maintenance						
Create an assessment for all employees to determine their job-specific proficiency using technology.	$6,000	$6,000					
Create tiered instruction based on levels of proficiency.	$12,000	$12,000	$3,120	$3,120	$3,120	$3,120	$12,480
Establish a well-communicated mechanism for disseminating best practices through multiple approaches.	$6,000	$6,000					
Adopt practices to increase the effectiveness of professional development in improving teacher skills and practices (Gibson Report 3-3.2).	$0	$0	$0	$0	$0	$0	$0
Communicate through a variety of methods to make all employees aware of technology tools available to them.	$0	$0	$0	$0	$0	$0	$0
Require technology training for all employees, instead of allowing training to be optional.	$0	$0	$0	$0	$0	$0	$0
Enhance access to systems and devices to promote productivity and learning.	$0	$0	$0	$0	$0	$0	$0
Definition (Non-recurring costs)	Creating connections with community facilities; communicating with local broadband providers						
Definition (Recurring costs)	Deploying desktop virtualization to allow remote access; continue connections with community facilities; update support framework for user-owned devices						
Establish a policy on personally owned and non-standard devices to allow them on campuses and to address technology gaps (e.g., provision of device for students who don't have a POD, etc.).	$0	$0	$0	$0	$0	$0	$0
Provide users easy, secure access to necessary applications.	TBD						

Section 6 Recommendations/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
Extend secure Web-based and device-based remote access to appropriate resources with varying levels access depending on business needs, educator needs, legal requirements, and productivity benefits.	$0	$1,622,180	$16,518,144	$21,287,931	$26,051,089	$30,820,876	$96,300,220
Leverage existing community facilities with connectivity.	$2,400	$2,400	$1,560	$1,560	$1,560	$1,560	$6,240
Explore providing CCSD wireless access or endpoints for both parents and students.	$7,200	$7,200	$0	$0	$0	$0	$0
Facilitate online community or support framework for users who bring unsupported devices into CCSD.	$2,400	$2,400	$1,560	$1,560	$1,560	$1,560	$6,240
Adopt hardware and software standards to meet instructional and business needs.	$0	$0	$0	$0	$0	$0	$0
Definition (Non-recurring costs)	Staff to aggregate list of applications; staff to develop criteria to select software programs						
Definition (Recurring costs)							
Aggregate a list of applications used in district currently to determine minimum hardware specifications.	$48,000	$0	$0	$0	$0	$0	$0
Identify software and hardware configurations that can be supported.	$0	$0	$0	$0	$0	$0	$0
Fund appropriate levels of technology for each school and department.	TBD						
Regularly review the hardware and software standards and modify them as necessary.	$0	$0	$0	$0	$0	$0	$0
Develop criteria to identify and select instructional and operational software programs (Gibson Report 5-4.4).	$32,000	$0	$0	$0	$0	$0	$0
Adopt comprehensive deployment and technical support for hardware and software managed through the Technology and Information Systems Services Division.	$0	$0	$0	$0	$0	$0	$0
Definition (Non-recurring costs)							
Definition (Recurring costs)	Funds for school-support technicians						
Using standards developed for hardware and software configurations, establish and publish support methods that will be	$0	$0	$0	$0	$0	$0	$0

Section 6 Recommendations/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
adopted.							
Design methods for evaluating new hardware and software to be adopted.	$0	$0	$0	$0	$0	$0	$0
Secure funding for systematic technology deployment and replacement that includes new technologies that support CCSD's mission.							
Fund school-based technical support (Gibson Report 5-4.5).		$6,491,035	$6,491,035	$6,491,035	$6,491,034.6	$6,491,034	$32,455,174

[44] Gibson Consulting Group. *Educational and operational efficiency study of the Clark County School District*. Austin, TX: Author.
[45] Ibid.

SECTION 7: Infrastructure and Communications Systems

Introduction/Trends

Infrastructure and communication systems encompass the information technology systems, including the local area networks (LANs), wide area networks (WANs), media broadcasts, and telephone systems that support the schools and District departments. This includes both data communications and telecommunications (telephony) systems.

This section describes a vision for infrastructure and communication systems, a desired target state along with gaps identified from current state, and recommended strategies to achieve the target state

Vision

Safe, secure, high speed infrastructure and communication systems will meet or exceed the capacity requirements for new teaching and learning environments; and an integrated business environment will support new designs in teaching and learning.

Target State

The architects of the plan envision infrastructure and communication systems that are designed to incrementally upgrade to meet the evolutionary and changing needs of teaching, learning, and the business of education. Furthermore, those systems will rely on a core fiber backbone with full redundancy. Equity of access is provided by utilizing by the type of network that best serves the needs of all locations of the District. To support innovation at schools within the District, a sufficiently adaptable, systematic process for routinely upgrading on a regularly scheduled timetable is envisioned. The infrastructure and communication systems teams will be an integral part of the policy governance body that reviews issues from all perspectives prior to acting.

Current State

Currently the infrastructure and communication systems are a combination of systems.

A Gigabit (Gb/s) wide area network (WAN) connects metropolitan-area schools in the District. This WAN provides data, video streaming, and voice and video conferencing services. The WAN provides sufficient bandwidth to allow the use of current applications.

- Leased Fiber/Gigabit WAN. The Gigabit WAN environment, at its core, is leased-dark fiber. See Figure 15.
- Schools outside the metropolitan-area are provided bandwidth through various available services.
- Some segments of the current WAN are slated for decommissioning (i.e., frame relay).

AT A GLANCE

SECTION 7

Vision
Safe, secure, high-speed infrastructure and communication systems will meet or exceed the capacity requirements of new teaching and learning environments; and an integrated business environment will support new designs in teaching and learning.

The Gap
- CCSD lacks clearly documented standards and a process for updating the standards.
- There are missing detailed assessments of all classrooms (and non-classroom spaces) comparing what is present (as-built) to the standards.
- There are topology gaps in bandwidth requirements, upgrades, identification of emergency services, and alignment to the teaching and learning vision.
- There is no systematic approach to decision making related to the implementation plan, schedule, cycle that synchronizes deployment, or readiness/needs of the schools.

Closing the Gap
1. Technology standards for infrastructure and communications systems must be developed, adopted, communicated, and approved by the Technology Governance Committee.
2. Design and implement a technology conditions assessment process.
3. Develop and implement project standards to inform prioritization schedules and resource commitments.

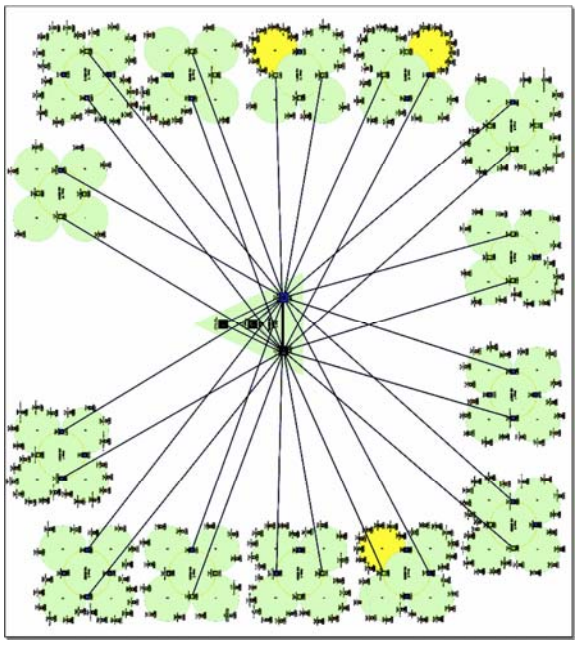
Every school has filtered access to the Internet. The District is compliant with the requirements of the Children's Internet Protection Act (CIPA).

- Over 300 schools currently have access to video streaming/video on demand (VOD) programs and services, which provide over 450,000 instructional resources annually to CCSD students, teachers, and staff.
- There are over 9,500 Wi-Fi access points installed in schools, and approximately 220 schools have some wireless connectivity in their buildings.

More than 32,000 telephones are supported via the WAN.

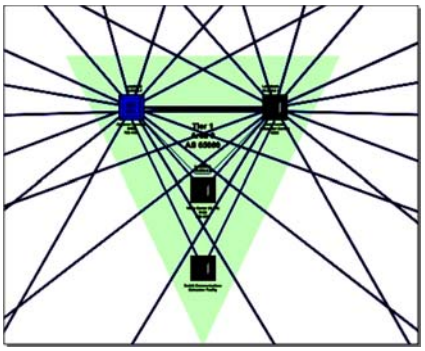
- All classrooms have a phone, and all classroom teachers have a voice mailbox. Eighty-five percent of teachers surveyed agreed that "having a phone in the classroom enhances communication with parents/guardians."
- Enhanced 911 services are enabled for metropolitan-area schools. This allows CCSD Police to monitor all emergency 911 calls made using District phones and to receive supplemental information (e.g., building and room numbers).

Figure 15: Current Gigabit WAN Topology



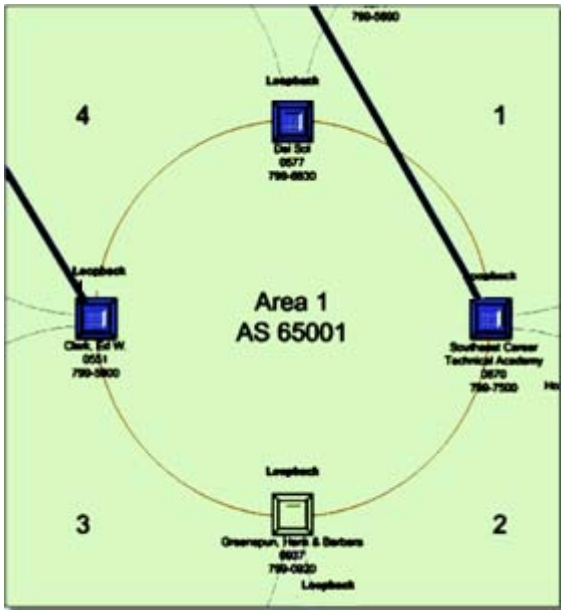
Leased Fiber/Gigabit WAN. The Gigabit WAN environment, at its core, is leased-dark fiber. The District has been leasing this fiber from Cox Business Services for over ten years. WAN routers are installed at each site; all WAN routers for the Gigabit network have been purchased from Brocade Networks (formerly known as Foundry Networks), utilizing their Big-Iron/MLX and Fast-Iron/FESX line of layer-3 switches. The vast majority of fiber is provided under lease from Cox Business Services. At locations where two District locations are adjacent, the fiber interconnecting the two locations may be owned and supported by the District.

Figure 16: Tier 1 of the WAN



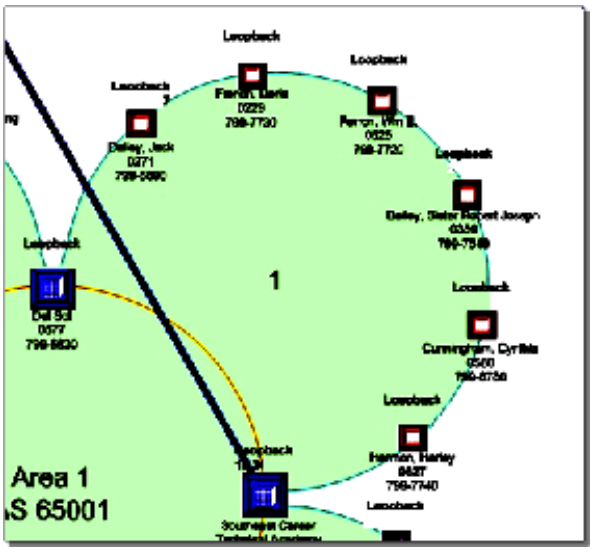
The CCSD Gigabit WAN is formed in Tiers. Tier-1 is the core, composed of two central locations: the Education Center Complex (known as "EdCenter") and Cimarron-Memorial HS (CMHS) (Figure 16). Additional service provider locations are connected via 10 Gb/s Ethernet to each of these two Tier-1 locations. These "service provider" locations are VegasPBS and ViaWest Data Center.

Figure 17: Tier 2 of the WAN



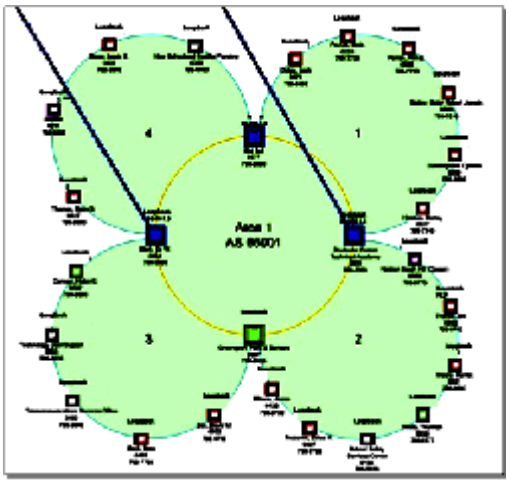
Tier-2 is the core distribution tier (Figure 17). There are 14 Tier-2 rings. Each ring is composed of four sites. Two sites (opposites in the ring) connect back to one of the Tier-1 locations (EdCenter or CMHS). These connections are a combination of 1 Gb/s Ethernet and 10 Gb/s Ethernet.

Figure 18: Tier 3 of the WAN



Tier-3 is the edge tier, called a "leaf" (Figure 18). Each Tier-3 leaf is a string of no more than seven sites, all interconnected via 1 Gb/s Ethernet, terminating with a Tier-2 site on each end. Occasional exceptions exist, allowing an eighth site in the leaf.

Figure 19: Areas of the LA

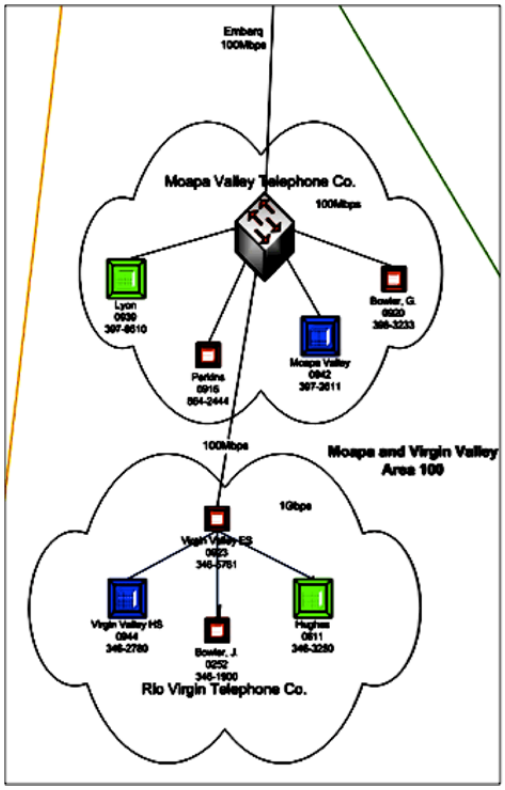


A Tier-2 ring and its 4 Tier-3 leafs are called an Area (Figure 19). There are 14 areas. Each area, internally, uses OSPF (Open Shortest Path First) as a routing protocol (Figure 20). Each area is interconnected to the Tier-1 locations via the BGP (Border Gateway Protocol) routing protocol.

Multicast is routed throughout this network. PIM-Sparse-Mode is used to interconnect sites, with two locations designated as rendezvous points (typically the EdCenter and Cimarron-Memorial High School, although this may change as the need arises).

Within each location, PIM-Dense-Mode is utilized. Wherever Gigabit WAN service has not been deemed necessary, or because of the unavailability or cost of the necessary network infrastructure, alternative network topologies have been utilized.

Figure 20: X-WAN



Eight schools in the Moapa Valley/Mesquite area are interconnected in what the District calls the "X-WAN" network (Figure 20). In this situation, there is a single 100 Mb/s connection utilizing CenturyLink from the network core to a location within the Moapa Valley Telephone area. At the Moapa Valley hub, four schools are interconnected with point-to-point 100 megabit (Mb/s) Ethernet connections. There is a 100 Mb/s "meet-me" connection from Moapa Valley to Virgin Valley Elementary School in Mesquite. There are fiber connections from Virgin Valley ES to the three other Mesquite-area schools, operated at 1 Gb/s. All eight schools share the single 100 Mb/s connection back to Las Vegas, using OSPF as a routing protocol. There is no rate-limiting or bandwidth allocation on this connection.

Not shown on the drawing: a fifth site in the Moapa Valley area has been added, the Moapa Educational Support Center.

3G Network

At Lundy Elementary School, located in Mt. Charleston, there is a 3G cellular bridge, which provides the school with connectivity to the Internet via Sprint. A site-to-site VPN tunnel is established from the school back to the CCSD network core. At no time are workstations at the school allowed direct or unfiltered access to the Internet over this 3G connection.

Frame Relay/Multiprotocol Label Switching (MPLS)

All other locations utilize either Frame Relay services (up to T-1 speeds) or MPLS services (up to 10 Mb/s speeds) from CenturyLink for connectivity back to the District network core.

Edison Schools

There are six schools operated by Edison Learning. These schools have a District funded and supported frame relay connection to the District network for the exchange of student information only. Only a few desktops within the school are connected to the CCSD network. The schools operate their own WAN connections and the majority of desktops connect to the Edison Learning network. The only access these desktops have to CCSD resources is over the Internet. All of these are 500 kilobits (Kb/s) CIR, T-1 Port Speed Frame Relay connections from CenturyLink.

Charter Schools

There are approximately a dozen charter schools in Clark County. These schools have a site-funded, but District supported, frame relay connection to the District network for the exchange of student information only. The schools are blocked from all other District resources.

Note: Agassi Academy is connected via an Ethernet connection from Cox Business Services. All others are on Frame Relay from CenturyLink. In all of the above, the connections are funded by the individual charter school.

Gap Analysis

The gaps in infrastructure and data systems are:

- CCSD lacks clearly documented standards for IT projects (e.g., deploying wireless access in schools, migrating to new operating systems, etc.) and a process for updating such standards.
- There are missing detailed assessments of the technology and infrastructure of all classrooms (and non-classroom spaces) comparing what is present (as-built) to the standards.
- There are topology gaps in bandwidth requirements, upgrades, identification of emergency services, and alignment to the teaching and learning vision (e.g., data residing on diverse data platforms).
- There is no systematic approach to decision making related to the implementation plan, schedule, cycle that synchronizes deployment, and readiness/needs of the schools.

Closing the Gap: Recommendations

Vision: *Safe, secure, high speed infrastructure and communication systems will meet or exceed the capacity requirements of new teaching and learning environments; and an integrated business environment will support new designs in teaching and learning.*

The following recommendations will address the gaps and advance the vision.

Recommendation 1: Technology standards for infrastructure and communication systems must be developed, adopted, communicated, and approved by the Technology Governance Committee, based on the recommendations of a Technology Standards Committee.

Action Steps:

- Establish a standing Technology Standards Committee that develops and maintains the technology standards, and sponsors their submission to the Technology Governance Committee for approval and communication.

- Establish a process through which the periodic reviews, by Technology Standards Committee, of the technology standards include:
    - An alignment to the technology needs articulated by students, teachers, and administrators.
    - School representatives' formal input based on role or function.
    - Department/Division formal input based on role or function.
- Require that a member of the Technology Standards Committee serve as a sponsor for each change or addition to the technology standards. The sponsor will develop a justification (including a total cost of ownership analysis) for any proposed changes in the technology standards, which will then be submitted to the Technology Governance Committee for consideration.
- Create a position of Technology Buyer to assist with technology purchasing in the District (Gibson Report 5-2.3).

Recommendation 2: Design and implement a technology conditions assessment process.

Action Steps:

- Design a detailed technology conditions survey of all schools, classrooms, and non-school facilities, documenting all of the technology components (e.g., drop counts, projectors, etc.).
- Conduct an initial assessment of all schools using the survey.
- Develop a database and record the results in that database.
- Identify a department responsible for conducting the survey, the ownership of the data, and maintaining the currency of that data.

Recommendation 3: Develop and implement project standards to inform prioritization schedules and resource commitments.

Action Steps:

- Establish cross-functional teams to better coordinate programs and services (Gibson 3-1.1)[46].
- Develop a long-term technology upgrade schedule based on the standards.
- Develop all short-term work prioritization schedules based on a comparison between identified school needs analysis and established technology standards.
- Establish procedures by which the upgrade schedule can be modified based on identified school needs analyses, including specific requests by schools implementing innovative technology-based learning and teaching programs.

Table 12: Metrics for Gauging Progress

	Policy: Is there a policy that governs the intent of the recommendation?	Principles/procedures: Have principles or procedures been established to implement the policy/intent of recommendation?	Implementation/ Performance: Are CCSD staff/divisions implementing the principles/procedures with fidelity?	Effectiveness of implementation: Is the implementation advancing the vision as intended?
Recommendation 1: Technology standards for infrastructure and communication systems must be developed, adopted, communicated, and approved by the Technology Governance Committee, based on the recommendations of a Technology Standards Committee.	**Yes/No** **Extent to which policy addresses intent:** **1 2 3 4**	**Yes/No** **Extent to which procedures address policy:** **1 2 3 4**	**Yes/No** **Extent to which principles/procedures are being implemented with fidelity:** **1 2 3 4**	**Yes/No** **Extent to which vision is advanced through implementation:** **1 2 3 4**
Evidence:				
Recommendation 2: Design and implement a technology conditions assessment process.	**Yes/No** **Extent to which policy addresses intent:** **1 2 3 4**	**Yes/No** **Extent to which procedures address policy:** **1 2 3 4**	**Yes/No** **Extent to which principles/procedures are being implemented with fidelity:** **1 2 3 4**	**Yes/No** **Extent to which vision is advanced through implementation:** **1 2 3 4**
Evidence:				
Recommendation 3: Develop and implement project standards to inform prioritization schedules and resource commitments.	**Yes/No** **Extent to which policy addresses intent:** **1 2 3 4**	**Yes/No** **Extent to which procedures address policy:** **1 2 3 4**	**Yes/No** **Extent to which principles/procedures are being implemented with fidelity:** **1 2 3 4**	**Yes/No** **Extent to which vision is advanced through implementation:** **1 2 3 4**
Evidence:				

Table 13: Budgets (Long-term and Short-term)

Section 7 Recommendation/Actions	Total Non-Recurring Costs (2011-16)	Total Recurring Costs					
		2011-12	2012-13	2013-14	2014-15	2015-16	Subtotal Recurring Costs (2011-16)
Payroll		$4,100,000	$4,300,000	$4,500,000	$4,700,000	$4,900,000	$22,500,000
Materials and Services		$11,200,000	$11,600,000	$12,000,000	$12,400,000	$12,800,000	$60,000,000
Capital Equipment		$10,600,000	$11,000,000	$11,400,000	$11,800,000	$12,200,000	$57,000,000
Construction		$15,800,000	$16,300,000	$16,800,000	$17,400,000	$18,000,000	$84,300,000
Total General Maintenance and Operations		**$41,700,000**	**$43,200,000**	**$44,700,000**	**$46,300,000**	**$47,900,000**	**$223,800,000**
Technology Standards for infrastructure and communication systems should be developed, approved, and communicated by the Technology Governance Committee, based on the recommendations of a Technology Standards Committee.	N/A						$0
Definition (Non-recurring costs)							
Definition (Recurring costs)	This item is to establish a committee utilizing existing staff. No additional employees or other expenditures are envisioned.						
Design and implement a technology conditions assessment process.	$100,000	$320,000	$360,000	$400,000	$0	$0	$1,180,000
Definition (Non-recurring costs)							
Definition (Recurring costs)							
Develop and implement project standards to inform work prioritization schedules and resource commitments.	N/A						$0
Definition (Non-recurring costs)							
Definition (Recurring costs)	This item is to develop and document standards utilizing existing staff. No additional employees or other expenditures are envisioned.						

[46] Gibson Consulting Group. *Educational and operational efficiency study of the Clark County School District*. Austin, TX: Author.

AT A GLANCE

SECTION 8

Vision
Sustain integrated technology that promotes efficient and effective instructional and operational processes without compromising the innovative capacity of future generations.

The Gap

- A clear vision promoting innovative, efficient, and effective uses of technology, and includes technology as a design element throughout the District, is not evident.
- An annual/periodic analysis and evaluation of District work to determine technological infrastructure needs, including an ongoing analysis of return on investment, is lacking.
- The technological infrastructure is insufficient.
- Documentation and alignment of processes and procedures is not systematic or ubiquitous.
- A continual review and examination of the way business is done is necessary to promote sustainability.

Closing the Gap

1. Develop and implement a system of information technology governance.
2. Establish a multi-year sustainable funding model for the Technology and Information Systems Services Division.
3. Establish a system to encourage and nurture creativity and innovation.
4. Design and implement a technology conditions assessment process.
5. Develop and implement project standards to inform prioritization schedules and resource commitments.

SECTION 8: System to Ensure Sustainability and Currency

Introduction/Trends

A system of leadership, governance, and oversight is necessary to promote and ensure the sustainability and currency of technology in the District. This system advances the continuous improvement of academic achievement within the constraints of resources and processes that are either currently available or deemed to be within reach.

This section includes a vision for a system that ensures sustainability and currency, between the current and target state and finally, the strategies recommended for closing the gap.

Vision

Sustain integrated technology that promotes efficient and effective instructional and operational processes without compromising the innovative capacity of future generations.

Target State

Sustainability and currency of information technology is dependent on three major components: an adequate funding model that ensures basic levels of support for existing systems and accounts for the inevitability of systems becoming obsolete; a system of technology governance that ensures decision making, data, and procedures for all aspects of information technology systems and support are documented, supported, and reviewed; and a culture that encourages and nurtures creativity and innovation while ensuring that innovations are aligned to CCSD business goals.

Establishing a Sustainable Model for Funding Information Technology

To ensure technology sustainability, there must be a long-range planning process. This planning must include the fiscal responsibility for sustaining basic systems, replacing outdated and obsolete technologies, and providing for reliable sources of revenue.

David Smallen and Jack McCredie investigate design principles, strategies and building blocks, and sure ways to fail in funding technology in their article, "Getting Beyond Budget Dust to Sustainable Models for Funding Information Technology."[47] The design principles critical to a sustainable funding model include:

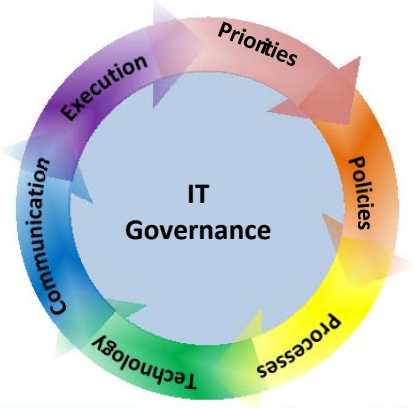
- Align IT resources with institutional priorities
- Integrate IT with the management culture
- Promote efficient use of institutional resources
- Support institutional technology standards
- Promote effective management of IT resources
- Facilitate generating additional resources for IT
- Ensure reasonable transaction costs for funding mechanisms
- Build a fair and equitable funding process

Though the article is written with the perspective of funding technology at a college or university, most of the concepts translate to K-12 technology. Smallen and McCredie discuss the reliance of IT organizations on *budget dust*, or temporarily available funds that are not expected to be available on an ongoing basis. They argue that IT departments' reliance on funding of this nature makes it impossible to prosper, let alone sustain, current levels of innovation and support.

Developing and Implementing a System of Information Technology Governance

In a recent global study of IT governance covering 21 countries, 10 industries, and both large and small enterprises, 95% of respondents indicated that they consider IT governance important. Those countries and industries that have governance activities in place identified the alignment of IT functionality with business needs as the most common driver for operational activities. Frameworks such as Control Objectives for Information and related Technology (COBIT™), Information Technology Infrastructure Library (ITIL), and International Organization for Standardization (ISO), can help institutions with an assessment of the current state of information technology and a road map to implement an IT governance structure.

Figure 21



K-12 districts are continuing to rely on business practices to ensure responsible return of investment on tax dollars utilized to fund technology systems and projects. Thus, a framework to align business and technology functions, to encourage and ease collaboration across functions, and to identify the responsibility and authority of individuals within combined operations and projects is

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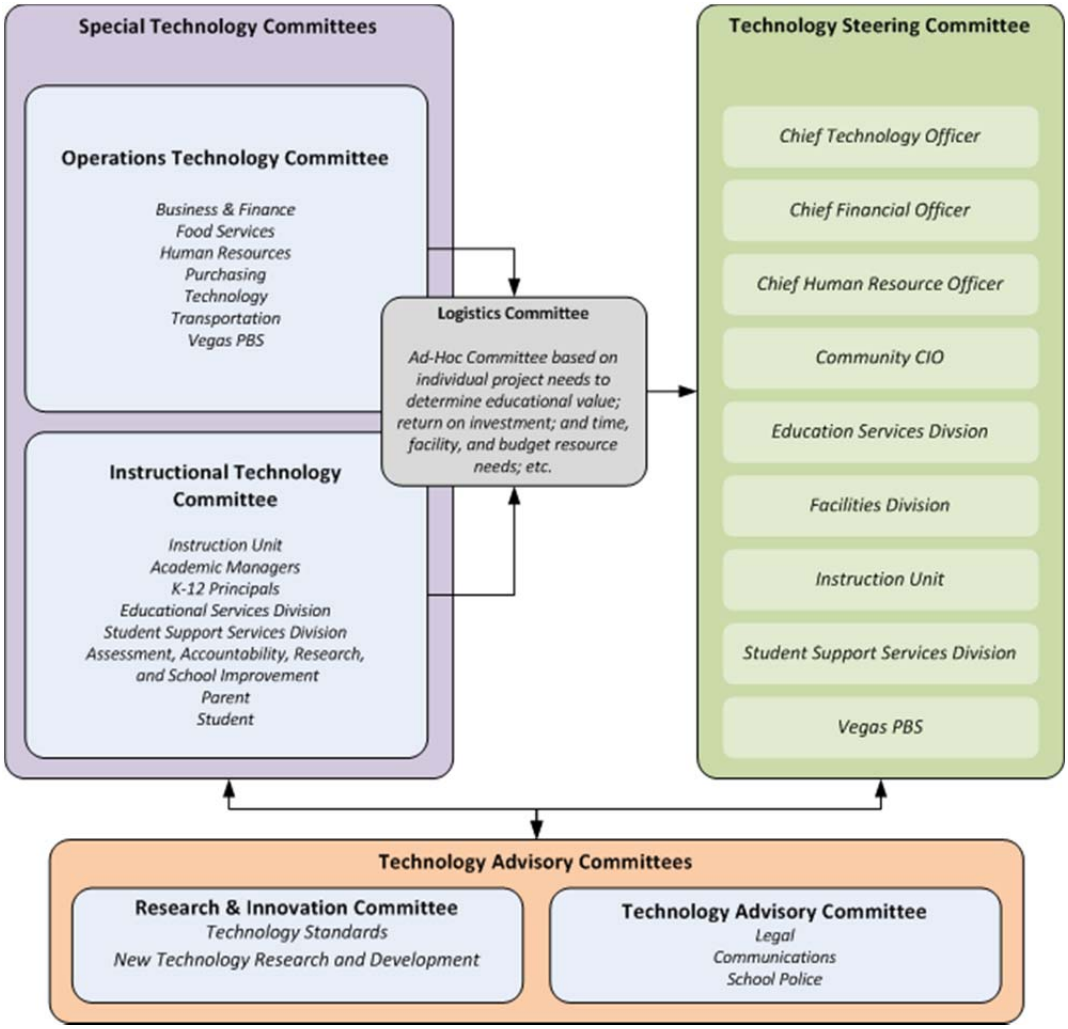
necessary. The framework must allow for the ability to manage IT-related risks, manage resources appropriately according to district initiatives, and measure and react on performance, achievement, and compliance.

Participation by various levels of District leadership in the IT governance process is critical. The Board of Trustees already demands adequate maintenance, risk management, and maximization of assets in the adopted Board Governance policies. Executive and cabinet-level management must be involved to ensure the alignment of IT goals to strategic objectives of the District aligned to student achievement. The Chief Technology Officer and Technology Leadership department heads, and business unit directors must have an understanding of the benefits and risks of IT within business goals, and must ensure security and reliability of services and support across the District. Department heads and business unit directors must not only assume the responsibility of operating within established technology frameworks and processes, but must sponsor investments and provide subject matter expertise (Figure 22).

Figure 22: IT Governance Participation



Encouraging and Nurturing Creativity and Innovation

To ensure innovation, an information technology system that leverages the multitude of human capital already working to meet the District's goals is envisioned. In addition to the procurement of current technology resources through appropriate funding and purchasing models, creativity and innovation must be encouraged and driven to ensure alignment to business goals. Only by taking advantage of the creativity and innovation of staff will CCSD be able to maintain technology currency.

In his article, "Harnessing Creativity and Innovation in the Workplace,"[48] Olivier Serrat provides useable definitions of creativity and innovation:

> *Creativity is the mental and social process—fuelled by conscious or unconscious insight—of generating ideas, concepts, and associations. Innovation is the successful exploitation of new ideas: it is a profitable outcome of the creative process, which involves generating and applying in a specific context products, services, procedures, and processes that are desirable and viable.*

Recruiting, hiring and supporting employees with appropriate levels of knowledge must be combined with an environment that motivates them toward creative thinking and problem solving to foster creative processes. Even further, Serrat contends that organizations that mean to foster performance and change should identify and value "scouts" and give them the leeway and resources to search in distant places for innovations.

Alignment to Business Goals

Dr. Jerry Smith, CTO of Symphony Solutions and adjunct university professor, identified four core processes to creating a reliable stream of innovations without breaking the engineering process. They include identifying innovation opportunities, managing the portfolio of innovation projects, designing and developing new products and services, and launching new products and services.[49] These four processes can be utilized as the basis for a system of governance that will ensure alignment to District goals through the coordination and prioritization of human, business, and technology resources.

Current State

Many successes have been achieved toward maintaining currency in technology.

- A repurpose and replacement program has provided updated computers for CCSD school labs and libraries where the computers are at least five years old. As bond funding is available, schools are eligible to participate in the repurpose and replacement program. Historically, elementary schools (2011-2012) received an average of 107 computers, middle schools received 190, and high schools received 334.
- A profile document that outlines District levels of support for hardware is updated annually by the User Support Services Department.

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- The District strives to be at least at the national average for the ratio of students to computers. The current national ratio is 3.8, Nevada's statewide ratio is 4.7 students per computer, and the ratio for CCSD is 4.9.[50]
- Research is being done on new and emerging Web 2.0 technologies for improved communication and collaboration.
- This CCSD Technology Plan is being extended to encompass current and emerging initiatives.

Several attempts at aligning technology initiatives to District goals have been made.

- Collaborations have been built with groups that purchase technology such as Title I, Student Support Services Division, Facilities Division, and Instruction Unit. Continued efforts are needed.
- The Human Resources Division has collaborated with Technology and Information Systems Services (TISS) and Assessment, Accountability, Research, and School Improvement (AARSI) to develop and enhance human resources technology programs to include licensure, staff, surplus/reassignment, and reduction-in-force processes.
- The TISS Division is working with various divisions to automate paper processes.
- School technology plans have been reviewed on an annual basis.
- A stronger connection between the CCSD Technology Plan and the School Improvement Plans (SIP) is being built.

However, a long-term IT road map for future successes and implementations has not been established. As described in the Gartner analysis, "CCSD's budget development activities occur before the annual academic planning processes instead of after. Because of this sequencing, the budget process does not have the opportunity to strategically meet student needs."[51]

The Gap

- A clear vision, which promotes innovative, efficient, and effective uses of technology, which includes technology as a design element throughout the District, is not evident.
- An annual/periodic analysis and evaluation of District work to determine technological infrastructure needs, which include an ongoing analysis of return on investment, is lacking.
- The technological infrastructure is insufficient.
- Documentation and alignment of processes and procedures is not systematic or systemic.
- A continual review and examination of the way business is done is necessary to promote sustainability.

Closing the Gap

- Develop and implement a system of information technology governance.
- Establish a multi-year sustainable funding model for the Technology and Information Systems Services Division.
- Establish a system to encourage and nurture creativity and innovation.

[47] Smallen, D., & McCredie, J. (2003). Getting beyond budget dust to sustainable models for funding information technology. *Educause Review, 38*(2), 42-50.
[48] Serrat, O. (2009). Harnessing creativity and innovation in the workplace. *Knowledge Solutions, 61*(1-11).
[49] Smith, Jerry. (2009). How to Manage Innovation as RandD Expands Globally. Accessed on 11/14/11 from http://www.eweek.com/c/a/Application-Development/How-to-Manage-Innovation-as-RD-Expands-Globally/.
[50] Education Week, 2010
[51] Phelan, P. (2009). Best practices for transitioning ERP/Business Application Support from "Build' to "Run." Gartner Report. ID# G00166999. Accessed on 10/10/11 from http://www.gartner.com/id=938412.

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