

AGENDA
Board of Trustees Meeting
Tuesday, July 9, 2013 7:00 p.m.
Administration Building 1010 Oilfield Avenue

- | | | |
|-------|---|----------------|
| I. | Pledge of Allegiance | Brian Aklestad |
| II. | Approval of Minutes | Brian Aklestad |
| | 1. June 11, 2013 | |
| | 2. June 27,2013 | |
| III. | Public Comment | Brian Aklestad |
| IV. | Informational items | |
| | 1. Handicap and Bus Loading Zones | Jeanne Wigen |
| V. | Reports | |
| | 1. Superintendent | Matt Genger |
| | 2. Technology | John Hough |
| VI. | Personnel Action Items | Matt Genger |
| VII. | Action Items | |
| | 1. Clerk's Report | Melit Flynn |
| | a) Transportation Contracts | |
| | b) Student Attendance Agreements | |
| | 2. Adding Special Olympics to HS Athletics | Brian Aklestad |
| | 3. Second Reading/Adoption of Board Policy: 3121P, 3123, 3415, 3415P, 3416, 3600P, 3600, 5231, 5232, 7320 | Brian Aklestad |
| | 4. Negotiations | Brian Aklestad |
| VIII. | Correspondence | Brian Aklestad |
| IX. | Adjournment | |

Next School Board Meeting, Tuesday, August 13, 2013 at 7:00 p.m.
Administration Building 1010 Oilfield Avenue, Shelby, Montana

MINUTES
June 11, 2013

CALL TO ORDER

A regular meeting of the Board of Trustees, School District #14, Toole County, Montana, was held in the Board Room of the Administrative Offices at 1010 Oilfield Avenue. The meeting was called to order at 7:02 p.m. by Chairperson Brian Aklestad.

Members present were: Brian Aklestad, Rikki James, Felicia Midboe, Jay Hould, Mark Cross, Richard Jorata and Anna Fretheim. Member(s) absent: None. The superintendent and clerk were present throughout the entire proceedings. Visitors present were Peggy Taylor, Suzanne Hough, John Hough, Carla McNamara, Tracy Lords, Pru Lybeck, Marcia Heydon, Ron Gruber, Travis Clark, Julie Olsen, Sara Aikins White and Doug Richman.

The **Pledge of Allegiance** was recited.

APPROVAL OF MINUTES

Motions were made to approve the minutes on the following dates:

- May 14, 2013- regular board meeting, as amended
- May 17, 2013- special board meeting
- May 23, 2013- special board meeting
- May 30, 2013- special board meeting
- June 2, 2013- special board meeting

Motion: Mark Cross

Second: Rikki James - passed unanimously.

PUBLIC COMMENT

Comment on any Public Matter

None

Community Positive Comment on District Operations

Positive comments during the High School graduation was mentioned in a letter by Jerry Benjamin thanking the Board and the Superintendent for giving his dad, Harry Benjamin a High School diploma.

Brian Aklestad commented that both graduations went really well.

REPORTS

Elementary School

Peggy Taylor reported that the elementary students ended the year with a fantastic week of activities. She said that students who participated in Books Take You Places Give-away won a bike if they put their name in for a drawing. The Kiwanis Club sponsored this program again and one student from each grade won a bike. She told the Board that the Marathon Day went so well and she thanked the fire department, police department, ambulance crew, City of Shelby and our community sponsors for all their help. She also told the Board that the end of the year assembly was well attended and many students received awards.

High School Report

Shawn Clark presented his written report to the Board.

Superintendent's Report

The Superintendent reported that the Shelby Summer Food program will begin on Monday, June 17 and continue through Thursday, August 8. He said that Camrose already begun their program and that breakfast and lunch are served at both locations. He told the Board the changes for this summer include that there are no more specific times when breakfast needs to be served and so breakfast is served from 7:00 a.m. up to when lunch begins. He said these changes should open

the program up to more people and that all churches in our area will be notified and invited to bring their summer groups to both breakfast and lunch. This program is for anyone up to age 18.

PERSONNEL ACTION ITEMS

A motion was made to hire Brynn Moll as the High School Language Arts Teacher and Jay Gretten as the 7-12 Guidance Counselor, pending upon the results of their background check.

Motion: Mark Cross

Second: Jay Hould- passed unanimously.

A motion was made to hire the following District Instructional Aides:

Elizabeth O'Donnell	Maria Elena Lopez
Heidi Sisk	Marlene Dulmage
Julie Olsen	Terri Jo Baney
Linnet Doane	Sherry Weishaar
Lynn Pettigrew	Teri White
Mari Sanchez	Karen Watson
Mike Alford	Kim Ruff
Amber Sanchez	Jane Garsjo
Jane Shaffer	

Motion: Mark Cross

Second: Rikki James- passed unanimously.

A break was taken at 7:35 p.m. and reconvened at 7:40 p.m.

Recommendations for Extra-Curricular Contracts

Recommendations to hire extra-curricular coaches were tabled until the next meeting.

Summer Food Program

A motion was made to hire Maria Elena Lopez as the Summer Food Program coordinator.

Moiton: Rikki James

Second: Mark Cross- passed unanimously.

ACTION ITEMS

District Insurance Coverage

Travis Clark of Northern Montana Insurance Services presented to the Board a bid for the District's liability insurance for 2013-2014 school year with a 4.0 % increase. A motion was made to accept the bid from Northern Montana Insurance Services.

Motion: Mark Cross

Second: Jay Hould- passed unanimously.

Approval of Bills and Student Activity Accounts

A motion was made to approve the claims approval list and the monthly listing of Student Activities accounts as presented. The approved warrants were numbered 64990 through 65065. The student activity checks for this month were numbered 12028 through 12037. The claims approval list may be referenced in the claims approval file in the administration office and the Student Activities accounts may be referenced in the Student Activities file in the administration office.

Motion: Mark Cross

Second: Felicia Midboe- passed unanimously.

Clerk's Reports

Transportation contracts and student attendance agreements for 2013-2014 school year were presented to the board.

A motion was made to approve the following individual transportation contracts and student attendance agreements:

Individual Transportation Contracts

Melissa Aklestad Joe and Anna Fretheim
Ron Kinyon Melody Taylor

Motion: Mark Cross

Second: Felicia Midboe- passed unanimously.

Student Attendance Agreements

Melissa Aklestad-2 Melody Taylor-1

Motion: Rikki James

Second: Mark Cross- passed unanimously.

Final Reading of Policy #3350F and 3350

A motion was made to approve the final reading of policy #3350F and 3350 with the following amendments:

Amendment #1- Policy 3350- Testing Procedures, section 4

If testing is refused, the student will become ineligible of all the extracurricular activities for a twelve (12) month period beginning from the date of the refusal.

Amendment #2- Policy 3350- Testing Procedures, section 4

If the instance of a shy bladder, the individual will be allowed two (2) hours to produce a specimen. If one is not obtained, then extracurricular activities will be suspended until specimen is obtained.

Motion: Mark Cross

Second: Felicia Midboe- passed unanimously.

First Reading of Policies # 3121P, 3123, 3415, 3415P, 3416, 3600P, 3600, 5231, 5232 and 7320

A motion was made to approve the first reading of policies mentioned above.

Motion: Mark Cross

Second: Felicia Midboe- passed unanimously.

Disposal of Obsolete District Property

A motion was made to approve the disposal of obsolete district property with the stipulation that the Board will get a report on what was disposed and how it was disposed.

Motion: Rikki James

Second: Mark Cross- passed unanimously.

Correspondence

A letter from McKamey's family was read by Brian Aklestad.

NEXT MEETING OF THE BOARD

Regular Meeting, Tuesday, July 09, 2013 at 7:00 p.m.

Board Room, District Administration Office, 1010 Oilfield Avenue, Shelby, Montana

ADJOURNMENT

Chairperson Brian Aklestad adjourned the meeting at 9:00 p.m.

BUSINESS MANAGER/CLERK

CHAIRMAN OF THE BOARD

**MINUTES
June 27, 2013
SPECIAL MEETING**

CALL TO ORDER

A special meeting of the Board of Trustees, School District #14, Toole County, Montana, was held in the Board Room of the Administrative Offices at 1010 Oilfield Avenue. The meeting was called to order at 5:34 p.m. by Chairperson Brian Aklestad.

Members present were: Brian Aklestad, Rikki James, Felicia Midboe, and Mark Cross. Member(s) absent: Richard Jorata, Anna Fretheim and Jay Hould. The Superintendent and Clerk were present throughout the entire proceedings. Visitors present: Suzanne Hough, John Hough, Eve Jacobson, Carla McNamara and Sara Aikins White.

The **Pledge of Allegiance** was recited.

Public Comment

Carla McNamara asked the Board if the agendas for the board meetings are being posted. Mr. Genger told her that the agendas are posted on the school website and also by the front door of the Administration Building.

Action Items

Recommendations to Hire Coaches for Fall Extra-Curricular Activities

A motion was made to hire Pru Lybeck as the Speech and Drama Coach.

Motion: Mark Cross Second: Felicia Midboe- passed unanimously.

A motion was made to hire the following junior high coaches:

Football- Head Coach- Bill Hansell

Assistant Coaches- Eric Tokerud and Tom Reynolds

Girls Basketball- Head Coach- Melissa Aklestad

Motion: Mark Cross Second: Felicia Midboe- passed unanimously.

Other Classified Staff Salary Increases

The negotiation committee made a motion to give bonuses for the 2012-2013 school year to the following classified staff:

Janet Flesch- \$400.00 Dallas Stirling- \$400.00

John Hough- \$600.00 Ed Delzer- \$600.00

Carmelita Flynn- \$600.00

Second: Mark Cross- passed unanimously.

Bus Request- 4H Group

A motion was made to give permission to 4-H group the use of the district's school bus.

Motion: Mark Cross Second: Felicia Midboe- passed unanimously.

Next Meeting, Tuesday, July 9, 2013 at 7:00 p.m.

Board Room, District Administration Office, 1010 Oilfield Avenue, Shelby, Montana

ADJOURNMENT

The meeting was adjourned by Chairperson Brian Aklestad at 5:51 p.m.

BUSINESS MANAGER/CLERK

CHAIRPERSON OF THE BOARD

DRAFT

July Board Notes

1. Personnel Action Items: Recommendations for Special Education Aides: Miriam Watts and Brittany Blair. Both have their teaching credentials and student taught in Shelby this past year. Recommendation for Industrial Arts: Brian Benton. Brian taught IA last year in Dodson. Brian is also endorsed in Art.
2. Summer activity with Mike White and Karen Watson are painting the multi-purpose area in the High School. Custodians are busy with routine summer cleaning and maintenance. Summer Credit Recovery had 8 out of 10 students recover their failing credits with one student being able to graduate.

Shelby Technology Updates:

Ordered 31 NUC (really small profile) computers, 25 for the HS Computer lab and 6 for the VoAG computer lab. Both Mrs. O'Brien and Mr. Berg worked with them and were happy with their performance.

Discussing with 3 rivers on the replacement of the phone system, they quoted 41.9k for the phone system, the district would need to provide the network switches that would hook up the phones to the system.

Planning the change to the wireless so that the main school wireless authenticates off of the windows domain instead of using WPA to help secure it against unwanted devices. This change will also incorporate a guest network as well as an additional wireless network for any replacement phone system to allow wireless phones to be used with it as well.

We currently have 80 devices tagged for recycling this year with Apple, more will be added to the list once the HS and VoAg labs are replaced.

Staff members slated for computer upgrades (old computers out of warranty).

Principal Clark - requested a Apple laptop

Principal Taylor - requested a Microsoft Surface

Ms. Rewerts - replacing her laptop

I am researching increasing the bandwidth between the buildings (will require hardware changes).

The new website is active and the majority of the content has been migrated.

There was a technology committee meeting yesterday, present were Mr. Genger, Mr. Aklestad, Mr. Berg, Mr. Gruber, Mrs. Hough and myself. We discussed implementing a 1 to 1 program and agree that basing any decision without a clear idea of what the district's curriculum committee direction is not a good idea. We would very much like to sit down with that group and get a clearer picture.

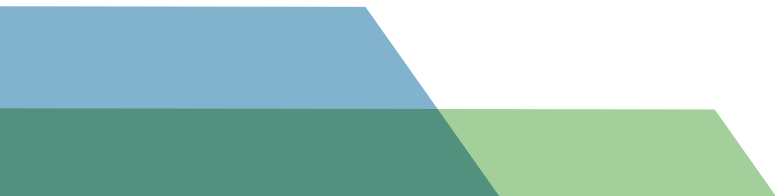
My wife and I have purchased an iPad2, a Chromebook and a Microsoft Surface Pro and have shared all 3 of them with numerous people within the district.

I was able to get another company to bid on the rewiring of the VoAg building, the quote is 4900.00 to rewire the building. This would move the patch panel and network switch out of the piano practice room upstairs into the storage room above those band rooms. It does not include any electrical work that would be needed or the 48 port patch panel that we will need.



**The Smarter Balanced Technology Strategy Framework and
System Requirements Specifications**

EXECUTIVE SUMMARY



The Smarter Balanced Technology Strategy Framework and System Requirements Specifications

The Smarter Balanced Technology Strategy Framework and System Requirements Specifications

This report presents a framework for collective technology planning among the Smarter Balanced Assessment Consortium member states. The plan emphasizes the critical need for technology to support student learning with the Smarter Balanced Assessment System minimum requirements as context and milestones. Key data was acquired and reviewed from a variety of sources including the Technology Readiness Tool and related survey information, state stakeholder discussions, Smarter Balanced advisory meetings and related research, and district interviews from across the Consortium.

Key Findings:

1. States implementing online, computer-adaptive assessments similar to the proposed Smarter Balanced Assessment System have done so effectively while adhering to tight budgetary provisions and implementation timelines.
2. Districts and educators within states that have made the transition to online, computer-adaptive tests find considerable value in the increased amount and specificity of performance data available, the expediency in which the data is accessible, and the cost-savings associated with online distribution and management of the assessment and the related data.
3. Much of the existing hardware devices currently deployed across school sites will effectively support the Smarter Balanced Assessment System; however, districts must focus on ensuring ample bandwidth provisions to support larger populations of students participating in testing through strategic scheduling and rotations throughout administration windows.

This report, as commissioned by the Smarter Balanced Assessment Consortium, provides minimum recommended hardware specifications and basic bandwidth calculations required to successfully administer the Smarter Balanced assessment solution. Districts are urged to review the following tables along with the full document, as well as reference the Smarter Balanced website (<http://www.smarterbalanced.org>) regularly for up-to-date information. Taken together, these materials, and the approaches contained within them, will help all districts strategically prepare for a full and successful implementation of the Smarter Balanced assessment.



Hardware and Software Requirements Overview

Operating System	Minimum Smarter Balanced Requirements for Current Computers ^{1,2,3}	Recommended Smarter Balanced Minimum for New Purchases
Windows	Windows XP (service pack 3) Pentium 233 MHz processor 128 MB RAM 52 MB hard drive free space	Windows 7+ 1GHz processor 1GB RAM 80 GB hard drive or at least 1GB of hard drive space available
Mac OS X	Mac OS X 10.4.4 Macintosh computer with Intel x86 or PowerPC G3 (300 MHz) processor, 256 MB RAM, 200 MB hard drive free space	Mac OS X 10.7+ 1 GHz processor 1GB RAM 80 GB hard drive or at least 1GB of hard drive space available
Linux	Linux (Ubuntu 9-10, Fedora 6) Pentium II or AMD K6-III 233 MHz processor 64 MB RAM 52 MB hard drive free space	Linux (Ubuntu 11.10, Fedora 16) 1 GHz processor 1GB RAM 80 GB hard drive or at least 1GB of hard drive space available
iOS	iPads 2 running iOS6	iPads 3+ running iOS6
Android	Android-based tablets running Android 4.0+	Android-based tablets running Android 4.0+
Windows	Windows-based tablets running Windows 8+ (excluding Windows RT)	Windows-based tablets running Windows 8+ (excluding Windows RT)
Chrome OS	Chromebooks running Chrome OS (v19)+	Chromebooks running Chrome OS (v19)+

Minimum Computer Requirements

Minimum requirements represent a low compliance threshold. Districts should attempt to exceed these requirements as many machines operating at these levels could struggle with sufficient on-board memory and processing to run secure browsers as well as other simultaneous running programs accumulated on the device over time.

¹ The minimum Smarter Balanced requirements are generally equivalent to the minimum requirements of the associated eligible operating system. Users should refer to the minimum requirements of the operating system as a means of resolving any ambiguities in the minimum Smarter Balanced requirements.

² These guidelines do not supersede the minimum requirements of the operating systems.

³ All hardware choices should consider the individual needs of students. Some students may need hardware that exceeds these minimum guidelines, and some students may require qualitatively different hardware. Tablets may require the use of a mouse.

The Smarter Balanced Technology Strategy Framework and System Requirements Specifications

Additional Requirements Applicable across Operating Systems:

Device Requirements	Minimum Smarter Balanced Requirements for Current Computers	
Screen Size	10" class or larger 1024 x 768 resolution	
Headphones/earphones	Available to students for use during the English language arts test and for students who require text-to-speech features on the mathematics test	<i>Minimum Requirements for Other Devices</i>
Security	The device must have the administrative tools and capabilities to temporarily disable features, functionalities, and applications that could present a security risk during test administration.	Minimum requirements represent a low compliance threshold. Ultimately, districts should attempt to exceed these requirements as many machines operating at these levels could struggle with sufficient on-board memory and processing to run secure browsers as well as other simultaneous running programs accumulated on the device over time.
Keyboards	Mechanical keyboards must be available unless students use alternative input devices as part of their classroom instruction.	
Form Factors	No restriction as long as the device meets the other stated requirements. These forms include desktops, laptops, netbooks, virtual desktops and thin clients ⁴ , tablets (iPad, Windows, Chromebooks, and Android), and hybrid laptop/tablets.	
Network	Must connect to the Internet with approximately 10–20 Kbps available per student to be tested simultaneously	

⁴ The resources (e.g., memory and processors) available to each client need to be equivalent or greater to the requirements for standalone hardware.





Additionally, Smarter Balanced anticipates projected dates by which various operating systems will be deemed insufficient support for the Smarter Balanced Assessment System. The table on the next page shows anticipated Smarter Balanced end of support dates for various operating systems in use across districts.

Please refer to the full Smarter Balanced Technology Strategy Framework and Systems Requirements Specifications document on the Smarter Balanced website for a comprehensive reporting of all related information.

<http://www.smarterbalanced.org>.

The Smarter Balanced Technology Strategy Framework and System Requirements Specifications

Operating System (OS)	OS Release Date	Anticipated Smarter Balanced End of Support Date
Mac 10.4.4	January 2006	Spring 2015 ⁵
Mac 10.5	October 2007	Spring 2017
Mac 10.6	August 2009	Spring 2019
Mac 10.7 Mac 10.8	July 2011 July 2012	Spring 2021 Spring 2022
Windows XP (SP 3)	October 2008	Spring 2015 ⁵
Windows Vista	January 2007	Spring 2017
Windows 7 Windows 8	October 2009 October 2012	Spring 2020 Spring 2022
Windows Server 2003	April 2003	Spring 2015
Windows Server 2008	October 2009	Spring 2019
Linux (Fedora Core 6 (K12LTSP 4.2+))	November 2007	Spring 2017 ⁶
Linux Ubuntu 9-12	October 2009	Spring 2019 ⁶
iOS 6	June 2012	TBD ⁶
Android 4.x	October 2011	TBD ⁶
Windows 8	October 2012	TBD
Chrome OS	Rolling Release	TBD ⁶

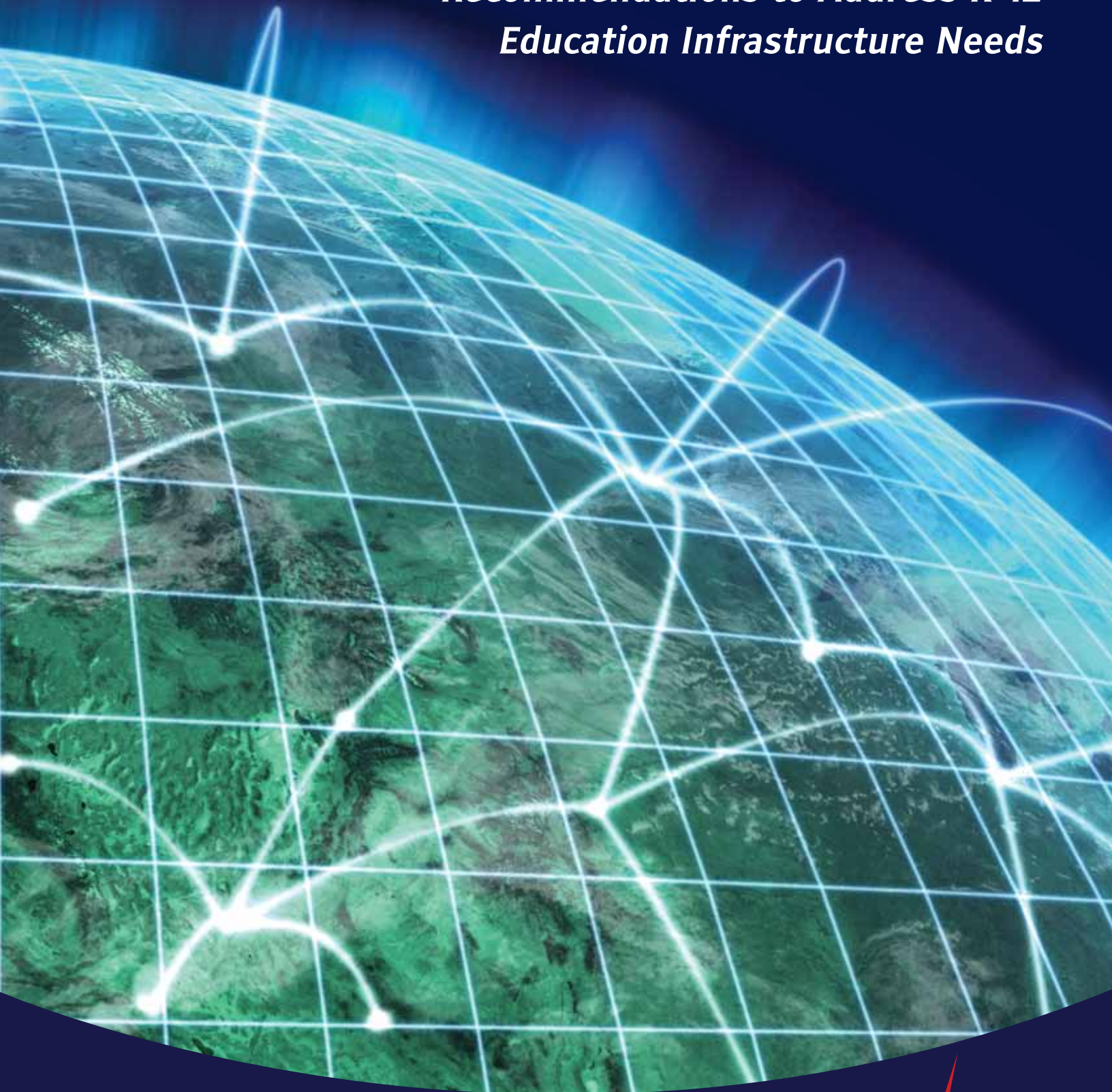
⁵ While the entire end of support plan will be reviewed annually with the Architecture Review Board, these particular OS versions will be emphasized and may require more detailed conversations.

⁶ This operating system may have a lower cost to update than do traditional operating systems and will be placed on an expedited end of support cycle until the new operating system version becomes incompatible with legacy hardware that is otherwise considered eligible by Smarter Balanced.



The Broadband Imperative:

*Recommendations to Address K-12
Education Infrastructure Needs*



www.setda.org



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About the State Educational Technology Directors Association

Founded in the fall of 2001, the State Educational Technology Directors Association (SETDA) is the principal association serving, supporting, and representing U.S. state and territorial educational technology leadership. SETDA works in partnership with like-minded individuals and organizations as a forum for inter-state collaboration, cooperation, and best practices. Our work is funded by state membership dues, private sector contributions, charitable foundations, and the federal government. <http://setda.org/>

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CREDITS & ACKNOWLEDGEMENTS

Building upon SETDA's 2008 report, "High-Speed Broadband Access for All: Breaking Through the Barriers," this report was launched during working sessions at the 2011 SETDA Leadership Summit in November 2011. Under the able direction of Christine Fox, SETDA Director of Educational Leadership and Research, this report is a product of input from SETDA's working group, comprised of SETDA state members and corporate sponsors (listed below) and policy and practitioner experts. John Waters provided the paper's draft and some research to support the paper's content. In addition to the working group, we would like to thank our external reviewers and contributors for their helpful comments and insights including John Bailey, Marie Bjerede, Peter Grunwald, Jeanne Hayes, Peter Kaplan, Steve Midgley, Linda Roberts, Teri Sanders, Bill Tucker, Jordan Usdan, and John Windhausen. Finally, the statements and views expressed herein are solely the responsibility of SETDA.

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THE BROADBAND IMPERATIVE: RECOMMENDATIONS TO ADDRESS K-12 EDUCATION INFRASTRUCTURE NEEDS

It is a simple fact that access to high-speed broadband is now as vital a component of K-12 school infrastructure as electricity, air conditioning, and heating. The same tools and resources that have transformed our personal, civic, and professional lives must be part of learning experiences intended to prepare today's students for college and careers. College students rely on technology for academic success and to improve personal productivity.¹ In the workplace, everyone from mechanics to accountants to physicians depends on technology to conduct their work, grow their businesses, and collaborate with their colleagues – both locally and globally.

With easy access to reliable, robust, and cost-effective broadband, we can ensure that each student's school experience mirrors evolving societal expectations for public education. Access permits students to create engaging text and multimedia projects such as videos, collaboratively conduct research with students on the other side of the state or the world, take online courses not available locally, and talk directly with authors and experts. Teachers can collaborate with colleagues, participate in professional development online, and immediately analyze the results from online assessments to personalize instruction for each student.

Moreover, thanks to the proliferation of low-cost laptops, tablets, eReaders, and smartphones—and the rise of state and district high-access and 1-to-1 programs—teaching and learning is no longer limited to the confines of a school building or a school day. In fact, out-of-school access to broadband by students and teachers is now arguably as important to the overall quality of the student learning experience as access at school.

Unfortunately, the scope of the nation's educational broadband needs is large and growing rapidly. While a 2010 Federal Communications Commission survey of E-Rate funded schools found that most had access to some form of broadband service, nearly 80% of respondents reported that their broadband connections were inadequate to meet their current needs. Outside of school, home broadband adoption rates have all but stalled since 2009, leveling off at roughly 65%.

Given that bandwidth availability determines which online content, applications, and functionality students and educators will be able to use effectively in the classroom, additional bandwidth will be required in many, if not most, K-12 districts in this country in the coming years. If we are serious as a nation about preparing all students for college and careers, a concerted national effort will be required to address both school-based bandwidth needs and out-of-school access for students and educators.

Given current trends and the real-world experiences of states and leading districts, SETDA offers four recommendations for policymakers and school leaders committed to charting a course for the future of K-12 education enabled by broadband:

Recommendation 1: Move to Address K-12 Broadband Infrastructure Needs

To reach the goal of sufficient broadband access for enhanced K-12 teaching and learning and improved school operations as outlined in this report, SETDA recommends that schools and districts meet the following *minimum* bandwidth targets between now and the 2017-18 school year:

Broadband Access for Teaching, Learning and School Operations	2014-15 School Year Target	2017-18 School Year Target
An external Internet connection to the Internet Service Provider (ISP)	At least 100 Mbps per 1,000 students/staff	At least 1 Gbps per 1,000 students/staff
Internal wide area network (WAN) connections from the district to each school and among schools within the district	At least 1 Gbps per 1,000 students/staff	At least 10 Gbps per 1,000 students/staff

Recommendation 2: Ensure Broadband Access for Students and Educators

To reach the goal of universal broadband access by students and educators outside of school as outlined in this report, SETDA recommends the federal government, states, and districts take responsibility for ensuring easy access to robust broadband connectivity outside of schools including, but not limited to, the home and publicly accessible institutions to libraries and community centers.

Recommendation 3: Build State Leadership

SETDA recommends all states provide direct leadership in the development and implementation of programs to provide adequate and equitable bandwidth to K-12 schools, homes, and publicly accessible institutions, such as libraries and community centers. State leadership could entail expanding broadband coverage via the implementation of cost-effective state broadband networks and working in partnership with school districts to leverage federal and public-private partnership programs in support of a state’s broadband needs.

Recommendation 4: Advocate for Federal Funding

SETDA recommends the federal government increase funding options to support a) states in implementing and maintaining high-speed broadband, statewide networks, b) districts and schools in increasing bandwidth capacity, c) communities in providing access points at anchor institutions including, but not limited, to libraries and community centers, and d) low-income families in providing home broadband access.

The Power of 24/7 Broadband Access

Sitting at the breakfast table, Sarah pulls out her laptop and logs onto her tenth grade biology class's wiki to see if her teacher has posted any comments regarding her group's latest project. She and three classmates have been collaborating to create a short multimedia presentation on the pollution levels in local creeks and streams. Her teacher has suggested downloading historical video clips from an open content site to add to the depth of their investigation. Soon her smartphone pings with an online calendar invitation to meet the group after school at the community center to refine their project. Jumping onto her personalized login page via the school's learning management system, she notices that her journalism teacher has posted the latest assignments and deadlines for the next edition of the school paper. Sarah is supposed to interview the basketball coach, but the team is traveling to the play-offs. She requests an online video chat while the coach is on the road so that she can meet Monday's deadline. She grabs her laptop and phone and dashes to catch the bus. First period is English and she doesn't want to miss the debate about students reading the original edition of Huckleberry Finn. During the debate, students will be chatting online about the debate and submitting questions to the moderator. After lunch, she sells tickets to this weekend's dance and frequently checks Twitter to see how many classmates are tweeting about the event. Later that day in math, after solving several sample questions from their digital geometry textbook, she takes an online formative assessment and then continues individualized practice based on the results of the assessment. At the end of the day, she adds her physical fitness stats from gym class into an app to help track her endurance progress and heads home to watch her teacher's latest Geometry video demonstration for homework.

Sarah's learning experience is more real than hypothetical for students attending schools where every student and teacher has ready access to technology and to robust broadband at school, at home, and throughout the community. For the rest of this nation's students, Sarah's technology-rich learning environment should be the furthest thing from hypothetical; since her day-in-the-life experience only mirrors the realities of ongoing shifts in our society.

Over the past decade, the Internet has fundamentally transformed our lives. We shop, bank, and socialize online. We download music and books, and stream movies and TV shows in real time. Even the Super Bowl is now presented live over the Internet. The same tools and resources that have transformed our personal, civic and professional lives must be part of learning experiences intended to prepare today's students for college and careers.

An Internet connection is essential in the workplace; most professionals from mechanics to accountants to physicians depend on it to conduct their work, grow their businesses, and collaborate with their colleagues — both locally and globally.

Simply stated, broadband has become *the* enabling technology of modern learning environments. It is the medium through which educators are expanding the very boundaries of the classroom. A broadband Internet connection makes it possible for educators and students to access innovative tools and resources and to collaborate and interact with experts worldwide. It is now a basic requirement of learning environments that have become essential to educators, students, and administrators. Fast, always-on connections make it practical to tap into dynamic online content; to take advantage of evolving collaboration technologies; to provide self-directed and self-paced programs;

to support mobility with anywhere, anytime learning; to enable time-saving and cost-effective professional development opportunities; and to leverage the numerous advantages of content, applications, and services delivered over cloud-based computing systems.

This nearly ubiquitous connectivity is also beginning to transform our schools. More and more states, K-12 districts, and schools are providing students with learning experiences rooted in technologies that prepare them for postsecondary education and to compete in a global economy. Those experiences increasingly depend on a high-speed, broadband connection both at school and at home.

Most K-12 districts in the U.S. now provide their students and teachers with some level of Internet access, but too often the speeds of those connections fall short of what's appropriate for learning in a time where technology pervades all aspects of society. It is difficult to imagine a time when "high-speed Internet access" simply referred to systems that provided a faster connection than a 56 Kbps dial-up service. At those early connection speeds, downloading a good quality MP3 audio file (such as a typical pop song) would take about 15 minutes. Today, the top U.S. providers of broadband services advertise speeds to consumers ranging from just under 3 Mbps to 105 Mbps—which would deliver that same audio file in seconds.²



If we want our schools to make the most of rich, online curricular resources, online assessment tools, web-based collaboration systems, digital textbooks, and a host of evolving educational technologies that are quickly becoming essential in a globally competitive world, schools will need more bandwidth. If we truly want to ensure that our students become the innovators who will help the U.S. lead the world, it is imperative that we provide robust broadband access not only to every classroom, but also to every student's and teacher's home and wherever we expect learning to take place.

BROADBAND FOR EDUCATION: A NATIONAL ISSUE

The State Educational Technology Directors Association (SETDA) first looked at broadband in K-12 education in its 2008 report, “High-Speed Access for All Kids: Breaking through Barriers.”³ That paper identified a number of key issues facing the educational community that related to securing access to robust broadband. It made specific recommendations for school connectivity that set the bar for many states and districts.

Since that time, however, the demands on state and district network capacity have grown significantly. Increased use of streaming video in the classroom, for example, is taxing many K-12 networks, as is the burgeoning traffic generated by wirelessly connected laptops, tablet PCs, and smart phones. The requirements of online testing for the Common Core State Standards (CCSS), coming in the 2014-2015 school year, are going to strain network capacity further, as will continued adoption of a new generation of hosted applications and systems available in “the cloud.”

E-textbooks, many of which are now integrated with web-based rich media and simulations, are adding to the network load and requirements for greater bandwidth.⁴

In 2010, the Federal Communications Commission (FCC) foresaw the increased demand for broadband connectivity in K-12 education with the release of its National Broadband Plan.⁵ The Plan calls for a dramatic expansion of affordable high-speed connectivity across the country and throughout all aspects of the economy. Among the Plan’s K-12-related recommendations for minimum broadband standards in schools, it suggests providing schools more flexibility to

purchase lower-cost broadband solutions, and greater efforts to make overall broadband-related expenses more cost-efficient within the E-Rate program. The Plan also recommends providing 1 Gbps connections to community anchor institutions, such as hospitals, libraries, and schools, and sets a bandwidth target threshold for the home of 4 Mbps download and 1 Mbps upload.

Concurrently, the U.S. Department of Education (ED) published the National Educational Technology Plan (NETP) in 2010. Among the recommendations in that publication is a call for a “comprehensive infrastructure for learning” that includes “broadband access to the Internet

and adequate wireless connectivity both in and out of school” for all students and teachers.⁶

In fact, later that same year, the Digital Learning Council (co-chaired by Governors Jeb Bush and Bob Wise) in its landmark report, *Digital Learning Now!*, all but endorsed the

recommendations included in the federal plans by echoing the call for high-speed broadband Internet access for all public school teachers and students among its ten elements for digital learning.⁷

In 2011, the National Telecommunications & Information Administration (NTIA) unveiled the National Broadband Map, the first publicly available, nationwide, searchable database of broadband Internet availability.⁸ Presented in the form of a map of the U.S., this tool allows anyone to log onto the Internet, click on the map, and zero in on an area. The database includes more than 25 million searchable records that

The National Educational Technology Plan recommends a “comprehensive infrastructure for learning” that includes “broadband access to the Internet and adequate wireless connectivity both in and out of school.”

show where broadband service is available, the technology used to provide the service, the maximum advertised speeds, and the names of the service providers. At the time of its release, NTIA highlighted the fact that two-thirds of the nation's schools subscribed to speeds below 25 Mbps, dramatically lower than the 50 to 100 Mbps per 1,000 students recommended in SETDA's 2008 report.⁹

Since 2008 the federal government also has implemented new programs to help provide increased broadband access to unserved and underserved communities most in need. For instance, in 2009, as part of the American Recovery and Reinvestment Act (ARRA), the Broadband Technology Opportunities Program (BTOP) administered by the NTIA, provided \$4.7 billion in one-time grant funds to support the deployment of broadband infrastructure, to enhance broadband capacity at public computer centers, and to encourage "sustainable adoption of broadband service." More recently, in November 2011, the FCC approved the creation of the so-called Connect America Fund, which effectively transformed the commission's outdated universal service and inter-carrier compensations systems into a new service aimed at rural broadband users.¹⁰ The goal of the fund is to help seven million rural Americans connect to high-speed Internet and voice by 2016.

Finally, the launch of public-private partnerships is another way that the issue of broadband access for learning has been addressed since 2008. Several broadband services providers, for instance, have developed and launched



discount programs—such as Connect to Compete, Comcast's Internet Essentials, and Century Link's Internet Basics to help provide eligible low-income students with device and broadband access at home. Visit <http://setda.org/web/guest/homeinternetaccess> for additional details.

While public-private partnerships and federal leadership are helping to draw attention to this issue and to spur the deployment of broadband access to unserved and underserved areas of the country, recent initiatives and programs have in no way resolved the national issue of inadequate and inequitable broadband access for learning in K-12 schools and in homes.

Addressing Slow Connections at School

While the U.S. is moving in the right direction, it's also fair to say that we have a long way to go. The U.S. Department of Education's report, "Educational Technology in Public School Districts", indicated that although 100% of districts were connected to the Internet in the 2008-2009 school year, of the districts with a district network, only 12% had a connection to the ISP with a T3 or DSL3 (digital transmission of data and voice at a speed up to 45 Mbps). Of the schools, with a local area, school-level network, only 4% had a T3 or DSL3 connection. In addition, only 18% of schools on district networks had available wireless connections.¹¹

More recently, the Federal Communications Commission's (FCC) 2010 survey of E-Rate funded schools reported that 95% of respondents had some form of terrestrial broadband service to at least one facility, with 2% reporting a satellite connection, and 3% using dial up.¹² Nearly 80% of the respondents reported that their broadband connections were inadequate to meet their current needs. The primary reason: slow connection speeds. More than half of respondents reported connecting at 3 Mbps or greater; only 10% reported speeds of 100 Mbps or greater. Of note, 3 Mbps is actually slower than the FCC's *residential connection* recommendation.

To help tackle the problem of K-12 broadband access, states and districts have employed a variety of strategies. For instance, some states have deployed state broadband networks. These networks provide significant advantages for K-12 schools and districts, including the ability to aggregate purchasing power and enable dynamic routing, which reduces the need for expenditures for so-called commodity Internet services (i.e., commercially available connections to the

Internet). A state network can save significant time, personnel resources, and costs as each school or district would otherwise have to conduct a competitive procurement process individually. This approach can provide a base level of connectivity service while allowing for the uniform deployment of state sponsored applications and services. State networks also allow members to purchase additional services and to exercise local control of their level of service. Finally, a state network can provide consistent levels of safety and security over the network to comply with federal and state requirements such as content filtering.¹³

A state network can save significant time, personnel resources, and costs...

Below are several examples of state networks that currently provide cost-effective, robust broadband connections for schools. Included are network plans for expansion based on current levels of use and predictions for increases in demand.

- The Utah Education Network (UEN) is a partnership of public and higher education institutions with local telecommunications providers that connects all of the state's schools to the Internet through a statewide network. A high-capacity backbone connects all of the colleges and universities in the state through middle-mile fiber segments. Ninety percent of the state's K-12 schools connect either directly to that backbone, or indirectly through the colleges and universities. All public colleges and universities connect at 1 Gbps or faster. Most public high schools and middle schools connect at similar speeds. By the end of 2012, the state expects to finish upgrading the Internet connections of 158 elementary and charter schools, 60 public libraries, and 55 Head Start centers to provide 45 Mbps connections. <http://uen.org/>

- In Maine, a collaboration of several state institutions created NetworkMaine, a consortium made up of the Maine Department of Education, Maine State Library, Maine Office of Information Technology, and the University of Maine System. The network provides broadband connectivity to more than 900 schools and libraries, including many island locations off the coast, at no cost to the school or library. Connection speeds range from a minimum of 10 Mbps to a high of 1 Gbps in some locations. The University of Maine System aims to provide 10 Gbps connectivity to all its universities through an expansion of the Maine Research and Education Network (MaineREN) project by the end of 2012. <http://networkmaine.net/about/>

Students videoconference with book authors and the district sponsors annual competitions in student film creation and production.

- The Idaho legislature created the Idaho Education Network in 2009 and private sector service providers have delivered Internet bandwidth improvements from 100% to 1,000% more capacity per student, enabling all K-12 students access to online classes offered by Idaho's higher education institutions. <http://ien.idaho.gov/>
- Network Nebraska provides 212 school districts, 15 intermediate service agencies, 17 higher education institutions, and more than 350,000 K-20 students with communications networks that support Internet2, a statewide synchronous videoconferencing service, and e-learning courses. The state's Educational Service Units (ESUs) purchasing consortium aggregates, shares, and manages common clouds of Internet access across dozens of school districts. For example, 92 districts in the northeast part of the state cooperatively purchase 1,000 Mbps/month of Internet. This

allows the ESU managers to manage the peaks and bursts of Internet demand across a region. <http://networknebraska.net/>

- For additional information on state high speed broadband networks please visit: <http://www.setda.org/web/guest/statenetworks>

In addition, leading school districts across the country are working to upgrade their broadband access to better meet the demands of teachers and students.

- Several California districts offer examples of the bandwidth speeds needed to make the most of media-rich learning options for students through the state-funded program, the K-12 High Speed Network, which supports aggregation points in each of California's 58 counties, mostly located at County Offices of Education (COE). Corcoran Joint Unified School District in Kings County, California—with its agricultural-based economy and high-minority populations—has deployed a 1-to-1 program. Kings County Office of Education connects via a 1 Gbps circuit to the all-education California Research and Education Network (CalREN). Corcoran's eight schools' connections range from a 100 Mbps to a 1 Gbps connection to the COE. In addition, California's Elk Grove schools are connected from 10 Mbps to 1 Gbps to the district office, which in turn connects to the Sacramento County Office of Education. The Sacramento COE is served by a 10 Gbps fiber connection to CalREN. In addition to using their bandwidth to permit students to videoconference with book authors, they also sponsor annual competitions in student film creation and production to support the attainment of 21st century skills.<http://k12hsn.org/>, <http://cenic.org/calren/>
- In 2010, Arizona's Florence Unified School District boosted its existing 45 Mbps DS-3 connection to a 100 Mbps Ethernet connection. To get to that speed, the district installed an optical fiber connection in one of its suburban

schools. It utilized a licensed wireless wide area network (WAN) to connect all of its buildings to this connection. But the district quickly found that speed to be insufficient, and a month later increased it to 1 Gbps. Florence Unified reports that the district is now able to provide students and teachers with ample bandwidth to access all of the necessary digital content. The results of the access: increased assessment scores and improved teaching practices, the district reports, which would not have been possible without its governing board and administration's commitment to network infrastructure. <http://fusdaz.org/>

The above states and districts provide examples of how leadership at the state and district level can enable the management and upgrades needed to achieve adequate bandwidth for K-12 learning environments.

Making Out-of-School Access a Priority for Learning

Home access to broadband is arguably as important to the overall quality of the learning experience as access at school—and it is a key strategy in extending learning time. Connected students are able to get homework help and submit their assignments online. They can use the connection to collaborate with fellow students after school, access research materials, develop multimedia projects, and use advanced features of digital textbooks. Without broadband in the home, 1-to-1 programs can lose a great deal of their effectiveness. Perhaps the Digital Textbook Collaborative said it best in its 2012 report, “Digital Textbook Playbook,” “While schools must be connected in order to create a successful digital learning environment, digital learning cannot only happen at school. To accomplish truly ubiquitous learning, students must be able to connect outside the school walls.”¹⁴

In the National Broadband Plan, home access to a high-speed Internet connection is described as “critical to maximizing utilization,” and there's no doubt that Internet use is on the rise. Researchers

at the Pew Internet and American Life Project found that between 2000 and 2011 the percentage of American adults with access to the Internet from home via a broadband connection rose from fewer than 5% to 62%.¹⁵ However, adoption rates have leveled off since 2009 at roughly 65% according to the TechNet report “Broadband Adoption in 2012”.¹⁶ This plateau in home broadband adoption reflects, in part, a percentage of the population that is older, less educated, and in general less inclined to adopt information technology. But that group also includes people who simply cannot afford a broadband connection.

To accomplish truly ubiquitous learning, students must be able to connect outside the school walls.

Schools and districts are also recognizing the need for access outside of school and in some cases are working to provide access before and after school and off campus. For example, Louisiana's Northwood High School, a rural school of about 800 students in Rapides Parish School District in Alexandria redesigned its curriculum and implemented a 1-to-1 netbook program with a variety of online resources, including advanced placement opportunities, distance learning classes, and subscription-based services. A cornerstone of the new plan was the establishment of on- and off-campus, wireless hotspots that allowed students to access Internet resources before, during, and after school. The off-campus hotspots were installed at community centers and on the nearby Native American reservation.¹⁷ In Missouri, after a tornado destroyed five schools in the Joplin Schools district in May 2011, the district decided to fast-forward its planned technology upgrades.¹⁸ Under the auspices of its 21st Century Vision team, and with the help of a \$1 million donation from the United Arab Emirates, the district implemented a 1-to-1 initiative for all 2,200 high school students, rebuilt and upgraded its network to provide 100 Mbps bandwidth to the high schools, as well as eight new hotspots outside of class for students to use after school hours.

TRENDS DRIVING THE NEED FOR MORE BROADBAND IN EDUCATION

In a 2012 market study, the Telecommunications Industry Association (TIA) found that smartphones, tablets, cloud services, and digital video are already “placing unprecedented demands on the broadband network.”¹⁹ TIA concluded that “global Internet traffic will quadruple by 2015, and in the next five years, mobile broadband usage will be 35 times what it is now.”

For decades, technology has been slowly and steadily integrated into K-12 education, with computers, software, and an ever expanding range of Internet-ready devices designed to provide easy access to rich digital and online curricular resources. Current trends make it clear, however, that the pace of change is rapidly accelerating and that broadband has become a core-enabling infrastructure for learning and modern school operations. This section takes a brief look at some of the current trends in education with the understanding that while they are examined in isolation in this paper, in fact many school districts are incorporating a variety of these trends to increase efficiency and provide students with learning experiences rooted in technologies that prepare them to compete in a global economy.

Shift to Digital and Online Tools and Services

As more and more educators turn to online resources and capabilities, the strain on district networks increases. The growing popularity of online learning tools and web-based content (including rich media such as videos), the arrival of interactive digital textbooks, the advent of online assessments, and the increasing dependence on the web for professional development all contribute to the rapidly increasing flow of digital traffic demanding more bandwidth.



Video Streaming

One of the most bandwidth intensive activities is streaming education content via videos. Since SETDA’s 2008 report, the amount of video that is being streamed to the classroom over the Internet has increased dramatically. In their 2010 teacher survey, PBS and Grunwald Associates found that the percentage of teachers reporting that they stream or download video content in the classroom increased from 55% in 2007 to 76% in 2010.²⁰ Most of those teachers (78%) also reported bandwidth associated problems when they streamed video—skipping, pausing, or constant buffering—indicating, as the report states, that their “computing devices or technology infrastructure, or both, do not yet have the capacity to handle teachers’ increasingly Internet-dependent instructional activity.”

Video files are much bigger than text, graphics, or audio files, and therefore take more bandwidth on the network. To get a sense of how much bandwidth is required for streaming video to the classroom, we looked to the providers of consumer services, which is where such technologies tend to be proven before they find their way into education. According to consumer technologies manufacturer LG Electronics, one provider of televisions, “instant streaming” of a Netflix movie to a network-ready device requires a

minimum bandwidth of 1.5 Mbps to play an uninterrupted video. A network with at least 3 Mbps or higher available bandwidth will provide the best video and audio quality during playback for standard definition content, LG says on its website.²¹ For High Definition (HD) content playback, 5 Mbps or higher is required.

Cable television and Internet services provider Comcast offers a chart on its website showing examples of download speeds for different video quality levels, from a 4 GB HD movie (5 minutes at 105 Mbps; 1.5 hours at 6 Mbps) to a standard definition TV show (20 seconds at 105 Mbps; 7 minutes at 6 Mbps).²² These example broadband requirements and download speeds are for single consumers; however, they provide important data for technology specialists planning for broadband demand increases. For example, if six classrooms in the same building are all showing HD movies, leaders must plan for adequate broadband coverage for all six classrooms to stream a video concurrently.

Downloading Content

Traditionally, one of the most basic Internet-connected activities in which students and teachers engage is downloading information from webpages. Downloading content may include text, presentation files, videos, music, or books. Connection speeds greatly impact the user experience when downloading content. Assuming

for this example that there is only one user of the network connection, as you might find in a home, and no other network traffic, downloading a 1 MB digital book at 200 Kbps takes about 40 seconds; increase the network capacity to at least 3 Mbps and the same textbook can be downloaded in just over 1 second. Assuming there is no other traffic, networks that have met the National Broadband Plan's suggested home speed threshold of a minimum download speed of 4 Mbps could download a 4 MB song file in just over 5 seconds and a 6 GB movie file in just over 2 hours. On a 10 Mbps connection, that book, song, and movie could be downloaded in 0.3 seconds, 1.3 seconds, and 33 minutes, respectively.²³ Of course, in schools, leaders must consider not only the connection speed but also the number of concurrent users.

Digital Textbooks

E-textbooks and other digital educational content, including a range of open educational resources, are fast becoming significant factors in the broadband-in-K-12 equation. In the FCC's 2010 survey of E-Rate funded schools cited earlier, 56% of respondents expected to implement or expand their usage of digital textbooks in the next two to three years.²⁴ Policymakers at all levels are seeing the

power of digital content to engage students and encourage deeper learning, and are changing policies to encourage more and greater use of digital content. At the state level, policymakers in

Florida's Clearwater High Replaces Paper Textbooks with E-Textbook

In 2011, Clearwater High School in Pinellas County, Florida handed out Amazon's Kindle e-book readers, instead of textbooks to its students. More than 2,000 students received the devices loaded with e-textbooks tailored to their individual class schedules. The devices were also bundled with more than 100 novels, and provided access via the district network to local newspapers. Another feature allowed students to go online and check their grades, get assignments, and even take tests with the devices. The school expected the "Kindalization" of Clearwater High to boost reading and improve study habits.

That same year, the Florida Board of Education rolled out a proposal to adopt digital-only textbooks by the 2015-16 school year and spend at least 50% of their textbook budget on digital materials by that time.

<http://clearwaterhighschool.com/>

approximately a third of the states have changed the definition of textbooks to include digital content or have otherwise made the purchase and distribution of instructional materials more flexible and inclusive of digital resources. At the federal level, the NETP has numerous references to digital content and open educational resources, as does the FCC's National Broadband Plan.^{25 26}

In fact, in February 2012, U.S. Secretary of Education Arne Duncan and Federal Communications Commission Chairman Julius Genachowski challenged schools and companies to get digital textbooks in students' hands within five years.²⁷ That same month, the Digital Textbook Collaborative released a 67-page report ("Digital Textbook Playbook") with the aim of helping K-12 school educators "plan for the transition to a rich, interactive, and personalized digital learning environment. Central to the report is the idea that schools need to provide "robust and persistent connectivity to the digital content."²⁸

E-textbooks contribute to the demand for bandwidth because they incorporate online content and services, including online tutorials, multimedia, simulations, social tools, and a wide range of web-based educational resources. In addition, in some cases, students can highlight resources and build a digital notebook. This new e-textbook environment effectively packs more information into textbooks and other learning vehicles, and increases the demand for broadband access.

The new assessment systems will almost certainly increase bandwidth traffic for all K-12 districts.

Online Assessment

States have led the way in the administration of online assessments. Thirty-three states currently offer some form of online testing. Oregon and Virginia initiated the charge in 2001, followed by



Texas in 2002. Delaware, Hawaii, Nebraska, South Dakota, and Washington launched statewide online testing during the 2010-2011 school year.

States implementing online testing require schools to offer a "fast" Internet connection, but have tended to be circumspect in providing more detailed guidelines on what "fast" means. The reason for this may be the great variability on the number of students being tested as well as the nature of the assessment itself. More students being tested simultaneously increases Internet bandwidth demands. Exams that require a great deal of interactivity will also require greater capacity.²⁹

Regardless of the bandwidth and connectivity theoretically available, states recommend that schools test their capacity for the particular exams and number of students that will be assessed. The online assessment system should be responsive and not cause additional stressors to the student.

On the national level, 42 states, the District of Columbia, and the Virgin Islands have formally adopted the state-led Common Core State Standards (CCSS), developed by the Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center), and are in various stages of implementing them in their state education systems.³⁰

ED has allotted \$350 million from the Race to the Top ³¹ competition to fund five state assessment consortia based on the Common Core Standards: the Partnership for the Assessment of Readiness for College and Careers (PARCC) and the SMARTER Balanced Assessment Consortium (SBAC), both of which are developing CCSS-aligned assessments in English language arts/literacy and mathematics; Dynamic Learning Maps (DLM), an alternative assessment system for students with significant cognitive disabilities that maps a student's learning throughout the year; the National Center and State Collaborative (NCSC), a multi-state comprehensive assessment system for students with significant cognitive disabilities; and Assessment Services Supporting ELs through Technology Systems (ASSETS), a state-led consortium aiming to provide innovative and comprehensive assessment tools for English learners.

SETDA believes that online administration of assessments is the key to the success of the next generation of CCSS-aligned assessment systems.

Metropolitan Nashville Upgrades Broadband and Online Assessment

In 2006, Metropolitan Nashville Public Schools (MNPS), an urban district in the Middle Tennessee area serving 79,000 PK-12 students, began deploying a broadband network to facilitate online testing, improve student data utilization, and position the district for future innovations.

MNPS implemented the connectivity upgrade through managed network services over several years based on demand and funding availability. With its infrastructure upgrade, the district's current deployment leverages approximately 196 Mbps per student. The district reports a 150% increase in broadband service consumption over the past two years, a trend MNPS expects to continue and slightly increase over the next five years. MNPS developed a partnership with ENA, its service provider, and a plan of growth utilizing Metro Ethernet based carrier services for the next five years.

Among other things, the increased bandwidth has made it possible for the district's educators to utilize online testing tools that provide real-time data to measure growth and accurately predict student proficiency on high-stakes exams, and to develop appropriate interventions.

<http://mnps.org/site234.aspx>

Online administration will make it possible for the first time in public education to realize the economies of scale and cost savings necessary to

begin to deploy a truly transformative student assessment system.

The new assessment systems developed by the consortia will be implemented starting with the 2014-15 school year, and the assessments will be delivered online. The systems will almost certainly increase bandwidth traffic for all K-12 districts. PARCC and SBAC plan to release final guidance related to bandwidth requirements for the new online assessments by fall 2013.

In addition, states are encouraging schools and districts to conduct ongoing, online formative assessments for learning to be used to inform instruction throughout the learning process. This ongoing formative assessment process requires frequent testing and evaluation to help teachers plan

for instruction based upon individual student needs and also increased bandwidth demands.

Online Learning for Students and Teachers

Online learning continues to expand the demand for broadband in K-12. In a report published by the International Association for K-12 Online Learning (iNACOL), more than 1.5 million K-12 students were engaged in some form of online learning opportunities that supplement traditional classroom-based courses or blended learning programs that combine traditional classroom-based learning with online learning assets during the 2009-2010 school year.³² At the end of 2010, supplemental or full-time online learning programs were available in at least 48 of 50 states, plus the District of Columbia.

Online courses also provide access to advanced placement courses in areas where they are not available locally. They offer opportunities for credit recovery, allowing students to stay on target for graduation.

Broadband is fast becoming essential to educators who want to make the most of the available online resources for professional development.

In the 2011 survey conducted by Project Tomorrow for its annual Speak Up National Research Project, Project Tomorrow researchers reported that about a third of responding middle

school and high school students said they were currently taking at least one online class.³³ The

Alabama Promotes Distance Learning

Alabama's Connecting Classrooms, Educators, and Students Statewide (ACCESS) distance learning program serves students in grades 6 to 12 statewide by delivering instruction via the web and interactive videoconferencing.

In 2011, ACCESS provided 39,129 student enrollments in courses needed to meet graduation requirements and 5,123 additional enrollments in non-credit remediation modules for the state high school graduation exam. In 2007, the average freshman graduation rate was 67%, up from 62% in 2002. Ongoing evaluation indicates continued positive success rates. These results were only possible because Alabama supported the program with the infrastructure to provide adequate bandwidth at all high schools.

<http://accessdl.state.al.us/>

Speak Up survey, which was facilitated through schools and districts that voluntarily registered to participate (not a random sampling), indicated that 46% of students in grades 6 to 12 who had not taken an online class said they would like to do so—that's an increase of 95% in interest of middle school students in online learning since 2007. The survey also found that more than 40% of students now designate online classes as an "essential component of their learning experience." Obviously, with more students engaged in online learning, and at

this growth rate, schools will need to increase their bandwidth capability concomitantly.

Educators are not strangers to online learning either. Broadband is fast becoming essential to educators who want to make the most of the available online resources for professional development, including online courses, education repositories, professional learning communities, and communities of practice. Online professional development trends seem to be the preference for teachers. In a recent Speak Up survey, researchers found that 52% of teacher participants indicated that they have taken an online class for their own professional development, which was a 100% increase over the previous year. Another 18% indicated that they have taken a blended online professional development class. Thirty percent



say that a fully online class is their preferred approach for professional development now; in 2006 only 7% of teachers said they preferred online professional development. Almost two-thirds of district administrators and just over half of school site administrators surveyed say they have participated in an online professional development class.

Access to online professional development resources is particularly important to rural areas, where access to effective modes of professional development is often limited. These resources are essential tools for educators seeking certification and recertification, because they provide access to courses not available locally, and they permit busy teachers to work with one another anytime, anywhere. According to ED's "Educational Technology in U.S. Public Schools: Fall 2008" report, 59% of schools offered online professional development, provided by the school or district, through their district networks.³⁴ As teachers opt to participate in online professional development courses and online communities of practice they also impact the amount of broadband required. Many online courses include video streaming and videoconferencing; online communities of practice often include a multitude of resources available for download and online collaboration tools.

Texas Expands Online Professional Development Offerings

Launched in 2011, Project Share is a collection of Web 2.0 tools and applications that provides high-quality professional development in an interactive and engaging learning environment. Project Share leverages existing and new professional development resources for K-12 teachers across the state and builds professional learning communities where educators can collaborate and participate in online learning opportunities by taking online courses, communicating with experts, accessing dynamic digital content, and providing each other with feedback. Partners of the program include The New York Times Knowledge Network, McDonald Observatory StarDate, PBS Digital Learning Library, and Texas PBS. As of the April 2011, over 882,000 Texas K-12 educators and students had established accounts to access online courses, content repositories, Web 2.0 tools, and secure, private connections with other online learners.

<http://projectsharetexas.org/>

Device Explosion

It is no exaggeration to characterize the increasing presence of a range of computing devices in K-12 environments as an “explosion.” Laptops, netbooks, the new species of tablets, and an incredibly powerful new generation of handhelds are all adding to the strain on district networks. This device explosion is driven by two key factors. The first is a desire for K-12 students to have the same capabilities that college students and virtually all workers have—their own device. This has created a growth of 1-to-1 programs, including those that take advantage of student-owned devices, also known as Bring Your Own Device, or BYOD. A second is the consumer world where there has been an unprecedented growth of tablets and smartphones. As families and students become more dependent upon and comfortable with these devices, they begin to imagine the power they can bring to education.

High Access and 1-to-1 Programs

Since 2008, interest in programs that provide individual students with their own devices has continued to grow throughout the country. The states have led this trend in multiple ways including implementing 1-to-1 programs. Since 2001, for example, the Maine Learning Technology Initiative (MLTI) has provided 1-to-1 laptop computers to all middle school students, teachers, and

administrators, and 45% of high school students, as well as providing professional development for teachers. Research has found an increase in student achievement and engagement, and an increase

in teacher use of the technology tools.³⁵ North Carolina’s IMPACT program is another example. The research-based 1-to-1 program supports technology-rich learning environments in which students have shown an increase in math performance when compared to a control group.³⁶

The State of Idaho is investing \$13 million each year in its Students Come First program, which focuses on “advanced classroom technology, including hardware and necessary professional development.”³⁷ Some states are designing district grant program competitions focused on high access and 1-to-1 programs. The

Rhode Island Department of Elementary and Secondary Education, for example, is currently awarding grants to support schools that “create a technology-rich learning environment that fundamentally rethinks and restructures teaching and learning” with a range of technology-based programs including 1-to-1 computing.

Henrico’s Long-Running Laptop Program Relies on High-Speed Connection

Virginia’s Henrico County Public Schools maintains one of the largest and longest running 1-to-1 laptop initiatives in the United States. Currently, of the 49,000 students in Henrico’s schools, 31,000 have their own, district-provided laptops. Teachers and students use their laptops daily to access digital curricula stored on Henrico’s data center, videoconference with experts around the world, collaborate online via the district’s own content management system, and take online courses and conduct online research.

In the spring of 2011, the district upgraded from a 300 Mbps Internet connection to a 500 Mbps connection. The district is currently coordinating plans to establish a 1 Gbps connection in the spring of 2012 to accommodate an increase in demand for broadband access. Each of the district’s 22 secondary schools now has a 100 Mbps connection to Henrico’s cloud, and from the cloud to their data center via a 1 Gbps line.

Bring Your Own

New economic realities are changing policies and attitudes about students bringing their own technology tools to school. The new “Bring Your Own” Device/Technology (BYOD/BYOT) trend is becoming more common in school districts as an increasing number are not only allowing students to bring smart phones and laptops they own to school, but they are encouraging it. These BYOD initiatives permit students to access the school’s wireless network, therefore increasing demand.

Bring Your Own at Forsyth County Schools

Georgia’s Forsyth County Schools are exploring what students and teachers can do when they are allowed to bring their own technology tools—laptops, netbooks, iPads, smartphones—to school through an initiative called Bring Your Own Technology (BYOT). One hundred percent of the schools in this district are currently involved in the program. On average, 35% of classrooms in each school are fully engaged in using BYOT on a regular basis. To support the program, the district upgraded its broadband connection during the summer of 2011 from 550 Mbps to a total of 1.25 Gbps. To provide system redundancy, the district aggregated connections from three different providers, and was able to increase bandwidth for essentially the same cost. Most schools in the district now have dual 1 Gbps connections to the districtwide network. The district maintains two local area networks accessible to staff and students. <http://www.forsyth.k12.ga.us/site/Default.aspx?PageID=1526>

Tablets and Smartphones

Perhaps the most significant change in the device landscape since our 2008 report is the arrival of the tablet computer. Not to be confused with what industry analysts have called “traditional tablets” (laptops with swiveling and/or detachable screens that supported a stylus-

input technology known as digital ink), the new form pioneered by Apple’s iPad created a new device category, the tablet. Multiple vendors now provide tablet devices to schools. By 2011, approximately 600 K-12 districts had begun providing their students with tablets.³⁸

Another trend underscoring the need for broadband in K-12 is the widespread use of handheld and smartphone devices. In the FCC’s 2010 survey of E-Rate funded schools cited earlier, 45% of respondents expected to implement or expand their usage of handheld devices for educational purposes. In the latest Speak Up survey, 55% of high school students and 45% of middle school students report that they access the Internet when at home through a 3 G/4 G or wireless enabled mobile device. As ubiquitous as smartphones may be, however, they’re not yet the platform for everything a student might need to do online (such as access an e-textbook or to take an online test). It’s also worth acknowledging that it can be much more costly to access the Internet with a smart phone over a 3 G/4 G network than via broadband access and therefore most schools and districts are focused on providing broadband access instead of 3 G/4 G access.



Internet-Enabled Communication Services

VoIP

Voice over IP, better known as VoIP, has also found its way into the K-12 tech toolbox.³⁹ School districts are using VoIP solutions to place voice calls and transport voice traffic over the data network, enabling schools to make cloud-based voice services a critical part of their technology infrastructure. School administrators and technology leaders are discovering how hosted VoIP communication lowers total cost of ownership (TCO) while improving productivity and security for schools. In addition to enterprise-wide VoIP solutions, teachers are integrating tools such as Skype and Google Talk for interaction as part of daily classroom instruction.

Although technology for making telephone calls over the Internet and schoolwide area networks is budget friendly, the calls add to network traffic, and thus, the need for greater bandwidth. That demand varies with usage. A standard call over Skype, for example, requires a minimum of 30 Kbps/30 Kbps (download/upload capacity), but the company recommends 100 Kbps/100 Kbps.⁴⁰

Videoconferencing

Videoconferencing is real-time visual and audio communication using a computer, a video camera or webcam, and a network connection, and is becoming increasingly popular in K-12 classrooms. Sometimes called classroom conferencing, this service supports virtual face-to-face collaboration providing access to experts around the world to geographically disparate students and teachers. States and districts also use videoconferencing to provide professional development and peer coaching sessions for teachers.

Popular equipment from Cisco, Polycom, and Lifesize enables a full classroom to experience rich videoconferencing, and newer desktop-based solutions from a variety of competitors allow flexibility for students and teachers to communicate from their desktops or tablets.

Broadband Connects Islands in Maine

In 2009, a group of K-12 educators working in schools located on the five islands that make up the Maine town of Cranberry Isles needed to build a network of support for both their teachers and students. Islesford School, Monhegan School, Matinicus School, Isle Au Haut School, and Cliff School support K-8 students in one-room schoolhouses often with only one student per grade level. Since island hopping is costly, time consuming, and actually dangerous in the winter, collaboration had to be supported by technology. The schools each have at least 50 Mbps access and participate in Maine's 1-to-1 initiative.

Under the auspices of the Outer Island Teaching and Learning Collaboration (TLC), teachers created a virtual classroom community where teachers and students had access to a rich and supportive inter-island peer network in which they videoconference daily. The Outer Islands TLC now serves as the "one-room school of the five islands." The schools team up for a writing lesson and the students use Skype and cloud computing applications on partner assignments. Teachers take turns teaching lessons and preparing assessments. <http://outerislandstlc.org/>

Online Collaboration Tools

Internet connectivity in schools has opened the floodgates of online collaboration. Online collaboration tools have become cornerstone features of K-12-focused learning management systems (LMSs) and Internet-based learning applications. Blackboard, Moodle, cloud computing applications, and others offer everything from “interactive learning experiences” to virtual classrooms as part of their basic feature set. Wikis, both as features of larger systems, and as stand-alone products, provide online environments for collaborative document editing.

In addition, a small but growing number of schools integrate popular social networks, such as Facebook and Twitter, into their classes.

This increasingly essential educational activity can be seriously degraded by a slow Internet connection. Being able to share information in real time, to edit work, and add resources, provides additional opportunities for feedback and collaboration, both during class and outside school. Students don’t have to wait days to meet with a group and/or for the teacher to grade a stack of papers; they receive instant feedback.

Today, social networks are also finding their way into a growing number of classrooms. In a 2010 report from *The Journal of Online Learning and Teaching* researchers referenced

the term “educational networking” to define the use of social networking technologies for educational purposes.⁴¹ In Palo Alto Unified School District in California’s Silicon Valley, for example, teachers and students use Facebook as a primary communications medium. The district has set up a main page for both Palo Alto High School and Gunn High School, as well as pages for the schools’ libraries, choirs, and tutoring services. Teachers also create Facebook pages for individual classes to facilitate collaboration on assignments.

The Pew Internet and American Life Project recently reported that 80% of teenagers who are online now participate in social networking sites. Students turn to social networks to help them evaluate information, to

establish “warning signals” about what’s going on in the world, and to get help with their studies from other students. Students who participate in social networking also appear to be more inclined to collaborate with peers. To these students, decision-making is no longer a solitary event, and learning is a social experience.⁴²

Pennsylvania District Integrates Technology into the Teaching-Learning Process

Starting with the two Upper Darby middle schools, the densely populated and urbanized Pennsylvania district provided a laptop for each of the schools’ 215 teachers, and supported them with a full-time instructional technology coach, which both schools shared. Each school also received two laptop carts earmarked for the eighth grade social studies programs. As part of the program, the district increased their WAN to 1 Gbps.

Because of the high-speed Internet, the eighth grade students have been able to effectively access the online content necessary to research the history of the Alexander Hamilton/Thomas Jefferson debates and develop a position statement via a wiki. Nor would they have been able to participate in a videoconferencing session with a university debate team without the high-speed connection. The students eventually created video podcasts (vodcasts) of their debates modeled on the Hamilton/Jefferson debates. The teacher also posted lessons online and published student projects. <http://www.upperdarbysd.org/>

It's not just the students who use social networking. A 2009 survey of K-12 educators ("A Survey of K-12 Educators on Social Networking and Content-Sharing Tools") co-sponsored by edWeb.net and MMS Education found that 61% of educators had joined a social network.⁴³

Specialized education-focused social networks are also emerging. Edmodo, for example, provides a social platform for students and teachers. Classroom 2.0 is a growing social network of educators and "those interested in Web 2.0, social media, and participative technologies in the classroom." EdWeb.net bills itself as "a professional social network for the education community." Some new tools are also emerging for educators who want to create their own social networks; Ning, for example, was used to create Classroom 2.0. Many schools also leverage social media resources such as those available on YouTube, Flickr, Diigo, and Pinterest.

Cloud Computing

Underlying virtually all of these trends is "the cloud," an umbrella term for a group of technologies that provide and manage data storage, application deployment, even computing from remote servers. This computing-as-a-service model, which moves data and applications to offsite servers and delivers them on demand to end-user devices (PCs, smartphones, etc.) via the Internet, is taking the business community



Lawrence Township Expands Its Learning Spaces

In 2010, Lawrence Township Public Schools (LTPS), a suburban district in Mercer County, New Jersey, received grant funds from the state's TALENT21 (Teaching and Learning with Essential New Technologies in the 21st Century) program to establish a "reliable and robust wireless network" and a 1-to-1 wireless mobile computing environment. LTPS focused to give teachers and administrators the skills they needed to prepare the students for life after high school in a technology-driven world.

Teachers were instructed on how to integrate multiple online tools, such as Diigo, Google Earth, Jing, and wikis into the curriculum. Administrators were trained to communicate with parents, community members, and students through social networks, such as Twitter, Facebook, and blogs.

Students in the district's intermediate and middle school were provided with netbooks they could use at school and at home. In the two schools, access points were upgraded from "G" to "N," increasing the accessible wireless bandwidth to the classrooms from 54 Mbps to 144 Mbps. The switches that provide the bandwidth to the access points as well as between buildings were upgraded, enabling them to provide 1 GB connections to the access points and 10 GB connections between schools. This provided significant improvement from the original 1 GB switch. While the current provider at the intermediate school does not have adequate bandwidth, the district is currently running their own fiber that will enable Lawrence Township to provide a 10 GB connection. This will decrease the carrier costs while allowing the technology to meet the current demands of the growing 1-to-1 initiative. <http://ltps.org/>

by storm. Districts are turning to the cloud to save money, increase accessibility, and enhance security. Cloud-based services, such as GoogleApps, are becoming essential tools in many K-12 districts. Making the most of remotely hosted services and storage requires a high-speed Internet connection.

Illinois’s IlliniCloud, for example, is a district-owned, vendor-neutral, standards-based community cloud that provides state-of-the-art computing resources to K-12 schools throughout the state. The IlliniCloud supplies participating

school districts with a secure and reliable means of hosting a variety of Illinois K-12 applications in an infrastructure as a service (IaaS) environment. Participating school districts are given access to managed applications within that infrastructure, including student information systems, and curriculum and instructional applications offered in a software-as-a-service (SaaS) model. In addition, the IlliniCloud hosts disaster recovery options for local software applications of the participating school districts, as well as applications hosted within the IlliniCloud.

<http://illinicloud.org/>

Sample Broadband Requirements (Download Only) for Various Activities

The chart below identifies the typical broadband speeds required for the seamless integration of activities that support student learning experiences. In this chart the speeds are indicated per-user based on the trends indicated in the above section.

Activity	Recommended Download speeds
Email and Web Browsing	500 Kbps ⁴⁴
Download a 1 MB digital book in 5.3 seconds	1.5 Mbps ⁴⁵
Online Learning	250 Kbps ⁴⁶
HD-quality Video Streaming	4 Mbps ⁴⁷
Skype Group-Video Session, 7+ people	8 Mbps ⁴⁸
Download a 6144 MB Movie in 8 minutes	100 Mbps ⁴⁹
Current Generation Multiple Choice Assessments	64 Kbps/student ⁵⁰

* Averages are indicated for single users

A FRAMEWORK FOR ASSESSING SCHOOL BANDWIDTH REQUIREMENTS

Just as there is no one-size-fits-all model for digital learning in schools, actual bandwidth needs will vary. Actual throughput depends on such variables as the number of concurrent network users, usage patterns, types of content, and traffic on the backbone. In addition to student use, schools must consider bandwidth for data systems operations, administration and reporting, other back-office school operations needs, and teacher professional development opportunities. Most importantly, schools must plan for meaningful learning experiences rooted in technologies to best prepare students for college and to compete in a global economy. Broadband access should never be a factor when teachers or students are planning for educational activities.

One useful metric is *bandwidth-per-student/teacher*, which directly correlates with the quality of a student's online experience. It defines a framework for assessing bandwidth requirements based on what the users, both students and teachers, truly need to engage in the range of activities that necessitate an Internet connection. Leaders must consider the number of concurrent and peak connection times in schools when evaluating their school's broadband needs.

“It’s challenging to predict needs,” says Henrico County, Virginia’s Director of Technology, Lloyd Brown. “But it’s critical for schools to continually review and monitor network usage to best meet the needs of the teachers and students.”

Broadband needs vary from school to school, of course, but a common evolutionary path has emerged since our 2008 report toward what we term “technology-rich learning environments.”^{51 52}

A technology-rich learning environment is an aligned and synergistic education system that:

- Provides equitable access to quality learning tools, technologies, and resources such as: laptops, tablets, projectors, video cameras, interactive whiteboards, interactive response systems, education portals, learning management systems, digital content, online assessments, and/or collaborative tools
- Enables students to learn in relevant, real-world contexts through project-based or other applied work
- Provides avenues for group, and individual learning
- Personalizes and blends the educational experience through face-to-face and online opportunities, and frequent feedback on performance
- Supports online professional learning communities that enable educators to collaborate, share best practices, integrate new skills into classroom practice, and assess their effectiveness.

While many schools are still on the path toward building technology-rich learning environments for their students and faculty, policymakers and school leaders need to understand the likely trajectory of K-12 education and plan for adequate access.

The example below illustrates how the broadband needs of schools are fluid and may develop over time—from basic connectivity for supplemental enrichment, to emerging reliance on online educational tools and resources, to a technology-rich learning environment.

Basic Connectivity for Supplemental Enrichment

A high school might start integrating technology into its curriculum by connecting a group of desktop machines in a standard computer lab to the Internet. In this setting, the students are scheduled to visit a central lab to access locally-run software applications, go online to conduct research for term papers, and compose occasional papers and presentations. Faculty and staff might use the network primarily for email and to post newsletter updates and announcements to the school's website and to track attendance records. A **10 Kbps per student/staff broadband connection** provides these students and teachers with enough capacity to avoid slow downloads and frustrating delays while engaging in these low-bandwidth activities.

Emerging Reliance on Online Educational Tools and Resources

Over time, the school expands its use of Internet-based educational tools and technologies in numerous ways. It implements a partial 1-to-1 laptop program (9th and 10th grades only) and encourages its students to use their devices to access the web for more dynamic content, collaborate with other students, download videos, and receive and post assignments on the school's learning management system. Teachers begin adding some online assessment activities to their lessons, and administrators start to use web-enhanced office management software. To support the increased network traffic generated by these activities, the school upgrades its network to a **50 Kbps per student/staff broadband connection** to best meet the needs of teachers and students.

Transformation to a Technology-Rich Learning Environment

Once Internet-based educational technologies and practices have been integrated into the curriculum, teachers and students naturally begin exploiting the full potential of their connectedness. Students actively use their laptops in class to access rich, multimedia-enhanced educational content from the Internet. They post their content (including audio and video podcasts) to school learning management systems, access their e-textbooks and get their assignments online, and collaborate daily across the network with other students via wikis and other Internet-based applications. Teachers regularly download streaming media to the classroom and take their students on virtual field trips to interact with subject area experts. Classes use videoconferencing systems to interact with other classes on campus, as well as students and content experts around the world. Formative and summative assessments are conducted online for all students. The school expands its curriculum to include online courses, which students access at school, from home, and through various WiFi hotspots in the community. Teachers actively participate in online professional learning communities to share lessons and to participate in professional development. To support these contemporary classroom activities, the school upgrades its network to provide a **minimum of 100 Kbps per student/staff broadband connection**. The reliance on dozens of bandwidth intensive activities, coupled with large numbers of concurrent users, requires this jump in bandwidth.



Moving Forward

As federal, state, district, and school leaders plan for the modern learning environment, they should make certain that those plans provide enough bandwidth so that availability never becomes a concern of the educator. In other words, if the question, “Do we have enough bandwidth for that?” never comes up, then teachers and students can simply focus on their schoolwork. Perhaps even more importantly, a seamless relationship between educational tools and Internet resources provides opportunities for innovation.

Leaders should expect the next generation of educational tools and technologies to create even greater demands on the network in the future. If recent trends are any indication, bandwidth requirements are all but destined to increase. “The cloud” wasn’t even part of the conversation a few short years ago. Also, consider how quickly—and for the most part, unexpectedly—video streaming became an essential means of delivering educational content to the classroom, and how educators are beginning to incorporate online collaboration into their lessons.



CONCLUSION & RECOMMENDATIONS

The increasing demands of preparing all students for college and careers will require additional bandwidth in many, if not most, K-12 districts in this country over the next few years. A school's bandwidth increasingly determines which online content, applications, and functionality students and educators will be able to use effectively in the classroom, and without an upgrade many will be left behind. Moreover, out-of-school access to digital learning resources via broadband must be addressed if 24/7 learning environments are to become a reality for students.

Given current trends and the real-world experiences of states and leading districts, SETDA offers four recommendations for K-12 policymakers and school leaders committed to charting a course for the future of K-12 education enabled by broadband:

Recommendation 1: Move to Address K-12 Broadband Infrastructure Needs

Broadband is *the* enabling technology of modern learning environments, and broadband concerns should never be a factor when teachers or students are planning for educational activities. Unless we swiftly and systematically move to address the impending bandwidth dearth facing schools nationwide we will find it to be the limiting factor in school reform and improvement.

To reach the goal of sufficient broadband access for enhanced K-12 teaching and learning and improved school operations as outlined in this report, SETDA recommends that schools and districts meet the following *minimum* bandwidth targets between now and the 2017-18 school year:

Broadband Access for Teaching, Learning and School Operations	2014-15 School Year Target	2017-18 School Year Target
An external Internet connection to the Internet Service Provider (ISP)	At least 100 Mbps per 1,000 students/staff	At least 1 Gbps per 1,000 students/staff
Internal wide area network (WAN) connections from the district to each school and among schools within the district	At least 1 Gbps per 1,000 students/staff	At least 10 Gbps per 1,000 students/staff

Recommendation 2: Ensure Universal Broadband Access

Home access to broadband is arguably as important to the overall quality of the learning experience as access at school and is key to extending learning time. Thanks to the proliferation of low-cost laptops, tablets, and smartphones—and the rise of state and district high-access and 1-to-1 programs—teaching and learning is no longer limited to the confines of a school building or a school day.

To reach the goal of universal broadband access by students and educators, as outlined in this report, SETDA recommends the federal government, states, and districts take responsibility for ensuring easy access to robust broadband connectivity outside of schools including, but not limited to, the home and such publicly accessible institutions as libraries and community centers. Existing inequities in out-of-

school access to broadband within and across school districts, if left unaddressed, will only serve to limit student-learning opportunities and widen existing gaps in student achievement and attainment.

Recommendation 3: Build State Leadership

State leadership is essential to the process of providing adequate and equitable bandwidth. SETDA recommends all states provide direct leadership in the development and implementation of programs to provide adequate and equitable bandwidth to K-12 schools, homes, and publicly accessible institutions, such as libraries and community centers. State leadership could entail expanding broadband coverage via the implementation of cost-effective state broadband networks and working in partnership with school districts to leverage federal and public-private partnership programs in support of a state's broadband needs.

Recommendation 4: Advocate for Federal Funding

The U.S. ranks 15th among industrialized nations in the availability of high-speed Internet access.⁵³ Bandwidth to homes and schools in Taiwan, France, South Korea, Sweden, and Japan is generally greater and more widely available than it is in the U.S., because the governments of those countries support national efforts to increase broadband access at affordable prices, including public WiFi.⁵⁴ For example, some areas of Seoul provide commercial Internet speeds of more than 100 Mbps for merely \$30 per month. With this type of speed, a consumer can download an entire HD movie in five minutes—a process that can take two hours or more in the U.S., even in densely populated cities. Yet the South Koreans pay less than U.S. citizens do for Internet service.

To reach the goals outlined in this report, additional resources will be required, and the federal government is uniquely positioned to build upon the success of the E-Rate program to help address these needs for education. SETDA recommends the federal government increase funding options to support a) states in implementing and maintaining high-speed broadband, statewide networks, b) districts and schools in increasing bandwidth capacity, c) communities in providing access points at anchor institutions, including but not limited to, libraries and community centers, and d) low-income families access to broadband at home.

Further resources should be considered for the currently under-funded E-Rate program, in addition to further resources for related programs that can serve to support universal broadband access at school and in homes. To maximize the cost-effectiveness of the E-Rate program, the FCC should work with applicants to make E-Rate more efficient by developing a more streamlined application process for applicants to apply without the need to hire consultants.

The Challenge

While broadband access is currently proliferating in K-12 environments, evolving educational needs are, or soon will be, straining existing bandwidth capacities. The need for increasing bandwidth over the next few years is clear, not only as a means of accommodating those coming changes, but as core infrastructure for future innovations.

The recommendations in this paper focus on supporting an educational ecosystem that sparks innovation, prepares students for college and careers, and allows our teachers and students to exploit the full spectrum of online educational content and evolving best practices available today to every nation via the Internet.

Other challenges remain to be addressed and questions answered. How do we reach persistently underserved and unserved communities with broadband services? How can we best leverage private broadband to help the public good? How can we exploit the potential of 3 G/4 G wireless networks to provide more affordable connections? How do we make the most of the Internet2 for K-12?

To compete globally and develop the innovators our country needs to lead the world, *all* of our students must have access to adequate bandwidth in the classroom, in the home, and wherever learning takes place, regardless of their economic status or geography.

APPENDIX A: TERMS AND DEFINITIONS

Bits and Bytes

Bits and bytes are both units of digital information. A bit is the basic element; a byte is equal to eight bits. The terms kilobyte (KB), megabyte (MB), and gigabyte (GB) are used to indicate the size of a file or a program. The terms kilobit (Kb), megabit (Mb), and gigabit (Gb) are used to convey the rate at which data are transferred over a network, i.e., megabits per second, or Mbps.

Kilobit per second (Kbps) = 1,000 bits per second

Megabit per second (Mbps) = 1,000 Kbps

Gigabit per second (Gbps) = 1,000 Mbps

Speed vs. Capacity

A 1 Mbps broadband connection is “faster” than a 1 Kbps connection which means that it has a greater capacity to carry data. The 1 Kbps connection can deliver a maximum of 1,000 bits of information to your computer from the Internet in a second; a 1 Mbps connection can deliver 1,000 KB in a second. Although the bits are moving at the same speed (more or less), one connection delivers more in the same amount of time, so it feels faster to the end user. This capacity is referred to as *bandwidth*.

Throughput

The actual amount of data that gets transmitted from a PC, through the collection of networks known as the Internet, to the web server—per second—is what is known as *throughput*. Throughput rates vary, depending on traffic and other factors, but it will always be lower than the speed quoted by the ISP providing the connection. Think of that number as the fastest possible speed under ideal circumstances.

Cloud Computing

The term “cloud computing” refers to a computing model in which data, applications, and other computing resources are available on the Internet from just about any connected device. Another way to think of it: It’s computing delivered as a service.

APPENDIX B: SELECT FEDERAL FUNDING SOURCES

Funding strategies for the implementation and upgrade of broadband systems should include consideration of partnerships with others in the state and community to aggregate demand and create economies of scale.

E-Rate

The primary source of federal funding for bandwidth upgrades in K-12 continues to be the Schools and Libraries program, better known as E-Rate. The FCC is mandated by Congress to use a set-aside portion of revenues from phone companies, paging service companies, and some VoIP service companies to provide eligible K-12 public schools and libraries with discounts of between 20 and 90% on approved telecommunications, Internet access, and internal connections costs. According to the Software & Information Industry Association (SIIA),⁵⁵ the principal trade association for the software and digital content industries, more than \$59 billion in E-Rate funding was requested between 1998 and 2010. E-Rate provides critical subsidies to support broadband in K-12.

E-Rate discounts are based on the number of students eligible for the National School Lunch Program. Schools and libraries in low-income urban communities and rural areas qualify for higher discounts.

In 2010, the FCC extended the E-Rate program to allow states and local governments to use these federal funds to provide the general public with access to the Internet facilities of schools and public libraries by permitting them to remain open after hours. The revisions also allowed the annual cap on E-rate spending to grow by the rate of inflation, and it allowed non-telecommunications providers (such as the state networks mentioned above) to use E-rate for fiber-based services for schools and libraries.

Connect America Fund

In November 2011, the FCC approved the creation of the new Connect America Fund (CAF),⁵⁶ which effectively transformed the commission's outdated universal service and inter-carrier compensations systems into a new service aimed at rural broadband users. At the time the FCC called it "the most significant policy step ever taken to connect all Americans to broadband." The goal of the fund is to help seven million rural Americans connect to high-speed Internet and voice by 2016.

ARRA EETT

In 2009, U.S. Congress passed the American Recovery and Reinvestment Act (ARRA), appropriating more than \$90 billion to education, with \$650 million allocated specifically for technology. SETDA has published 28 case studies highlighting state and district use of ARRA funds to support technology programs, many of which include high-access programs that increased bandwidth to support the new hardware.

Broadband Technology Opportunity Program (BTOP)

Administered by the Department of Commerce's National Telecommunications and Information Administration (NTIA), the Broadband Technology Opportunities Program (BTOP) was a game-changing program for many states that had been lacking broadband connectivity. It provided \$4.7 billion in grant funds to support the deployment of broadband infrastructure in unserved and underserved areas, to enhance broadband capacity at public computer centers, and to encourage "sustainable adoption of broadband service."

The program, launched in 2009, provided funding for projects deploying new or improved broadband Internet facilities, such as laying new fiber-optic cables or upgrading wireless towers, and connecting such community anchor institutions as schools, libraries, hospitals, and public safety facilities. “These networks help ensure sustainable community growth,” the NTIA states on its website, “and provide the foundation for enhanced household and business broadband Internet services.”

The program also provided funds “to establish new public computer facilities or upgrade existing ones that provide broadband access to the general public or to specific vulnerable populations, such as low-income individuals, the unemployed, seniors, children, minorities, and people with disabilities.”

The focus of the program was increased broadband Internet usage and adoption among “vulnerable populations where broadband technology traditionally has been underutilized.” Many projects include digital literacy training and outreach campaigns to increase the relevance of broadband in people’s everyday lives.⁵⁷

For example, thanks to the “Sparking Broadband Use in the Eastern Upper Peninsula of Michigan” project (supported by both ARRA EETT and BTOP funding), broadband was extended into the district’s rural communities. The program is bridging what had been an expanding digital divide between rural and urban residents by providing opportunities to students and their parents to access educational resources, both in school and at home or in community centers.

These investments must also be fully leveraged to help increase and maintain broadband access. The initial program helped to lay the fiber and provide access but leaders must work to support the use of this broadband now available.

APPENDIX C: REFERENCES

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* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11635		5143 3 RIVERS TELEPHONE COOPERATIVE	1,262.08					
		Camrose 0210						
		used up credit amounts of \$1676.12-ERate discounts						
9		07/01/13 fiber lease/dsl	304.86		101	100-1000	531	
10		07/01/13 fiber lease/dsl	304.86*		201	100-1000	531	
11		07/01/13 fiber lease/dsl	304.86		101	100-2300	531	
12		07/01/13 fiber lease/dsl	304.86*		201	100-2300	531	
13		07/01/13 admin phone bill	10.56		101	100-2300	531	
14		07/01/13 el phone bill	14.23		101	100-2400	531	
15		07/01/13 hs phone bill	15.21		201	100-2400	531	
16		07/01/13 GTCC phone bill	2.64		182	107-2212	531	570
11620		6375 ACADIA HEALTHCARE	7,442.23					
1		015465 05/30/13 reimb medicaid payments	178.75*		115	999-6200	920	313
2		2010109 05/30/13 reimb medicaid payments	2,616.13*		115	999-6200	920	313
3		2016753 06/06/13 reimb medicaid payments	48.75*		115	999-6200	920	313
4		2016754 06/06/13 reimb medicaid payments	991.24*		115	999-6200	920	313
5		2018112 06/13/13 reimb medicaid payments	3,249.86*		115	999-6200	920	313
6		2018113 06/13/13 reimb medicaid payments	357.50*		115	999-6200	920	313
11673		5966 ALBERTSON'S-PURCHASE ADVANTAGE	40.89					
1		06/07/13 cooking class for RECCS	40.89*		115	434-1000	610	183
11680		5729 AMSAN	1,329.96					
1		06/25/13 additional amount	8.20	9177	101	100-2600	610	
2		06/25/13 additional amount	9.26*	9110	201	100-2600	610	
3		290671049 06/25/13 staff only parking sign	97.00*	9299	201	100-2600	610	
4		291279511 06/25/13 2lin dust filter-band	20.25*	9299	201	100-2600	610	
5		291279537 07/05/13 extraction cleaner	47.80*	9298	201	100-2600	610	
6		2907456128 06/21/13 uhs floor cleaner	120.60*	9298	201	100-2600	610	
7		2907456128 06/21/13 signature floor finish	1,020.25*	9298	201	100-2600	610	
8		2907456128 06/21/13 shipping&handling	6.60*	9298	201	100-2600	610	
11655		6515 API SYSTEMS INTEGRATORS	730.01					
1		515169 06/26/13 Administration Phone for	730.01*	9283	201	100-1000	670	
11647		59 BEN TAYLOR INC	2,357.29					
		High School, Camrose, Uplander, and Taurus are district car						
		cf						
1		90937 06/25/13 route fuel 60% EL	821.00		110	100-2700	624	
2		90937 06/25/13 route fuel 40% HS	547.33		210	100-2700	624	
3		90937 06/25/13 district car fuel 50% EL	268.68		101	100-2650	624	
4		90937 06/25/13 district car fuel 50% HS	268.68*		201	100-2650	624	
5		534169 06/18/13 paint and supplies high school	451.60*		201	100-2600	610	

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Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11675		6799 BRENNA SMEDSRUD	31.36					
1		06/26/13 reimb RECCS cooking supplies	31.36*		115	434-1000	610	183
G416		4996 BRIANNA WHITE	97.18					
1		07/01/13 mileage to Great Falls	97.18		182	107-2212	582	570
11645		6803 BRYNN MOLL	1,049.56					
1		06/27/13 lodging/gas/meals-new teacher	1,049.56*		201	150-2210	582	
11670		6748 BRYSON SALES AND SERVICE OF	248.73					
1		223430 06/04/13 bus parts	124.37		110	100-2700	610	
2		223776 06/21/13 bus parts	124.36		210	100-2700	610	
G403		6735 C.M. RUSSELL MUSEUM	84.00					
1		2600-0621 06/25/13 museum entrance fee	84.00		182	107-2212	610	570
11658		5023 CAMROSE COLONY	2,721.94					
		lunch=3.22						
		breakfast=1.83						
1		06/30/13 June 2013 Summer Food Program	2,721.94*		212	910-3100	631	
11664		5965 CARMELITA FLYNN	48.00					
1		06/25/13 MASBO/meals	24.00*		101	100-2500	610	
2		06/25/13 MASBO/meals	24.00		201	100-2500	610	
11668		68 CARQUEST AUTO PARTS	104.56					
1		203891 05/01/13 batteries/alarm system-Camrose	104.56		101	71 100-1000	610	
11641		4585 CDW GOVERNMENT, INC.	879.00					
1		DC81676 06/25/13 Belkin OmniView PRO3 16-p	195.00	9305	101	100-1000	670	
2		DC81676 06/25/13 Belkin OmniView PRO3 16-p	195.00*	9305	201	100-1000	670	
3		DC81676 06/25/13 Belkin Dual-Port Micro-Ca	120.00	9305	101	100-1000	670	
4		DC81676 06/25/13 Belkin Dual-Port Micro-Ca	120.00*	9305	201	100-1000	670	
5		DD14674 06/25/13 Samsung Chromebook	109.50	9301	101	100-1000	660	
6		DD14674 06/25/13 Samsung Chromebook	109.50*	9301	201	100-1000	660	
7		DD14674 06/25/13 ACAD Google Chromeos mgt	15.00	9301	101	100-1000	660	
8		DD14674 06/25/13 ACAD Google Chromeos mgt	15.00*	9301	201	100-1000	660	
11666		1833 CHEMSEARCH	449.80					
1		1128689 06/06/13 x-large gloves	152.00*	9273	201	100-2600	610	
2		1129804 06/06/13 flash	297.80*	9273	201	100-2600	610	

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11618		3 CITY OF SHELBY WATER DEPT	2,507.93					
5		06/22/13 bus barn/water/garbage BUS BARN WATER BILL	101.74		110	100-2700	421	
6		06/22/13 bus barn/water/garbage BUS BARN WATER BILL	101.73*		210	100-2700	421	
7		06/22/13 hs&el/water/garbage/sewer/land WATER, GARBAGE & LANDFILL BILL	1,382.68		101	100-2600	421	
8		06/22/13 hs&el/water/garbage/sewer/land WATER, GARBAGE & LANDFILL BILL	921.78		201	100-2600	421	
11627		6793 COURTNEY HARPER	19.00					
1		07/09/13 reimb lunches paid not used	19.00*		212	910-3100	630	
11660		2900 CRISTINE STEINBACHER	427.23					
		Bozeman miles-542 roundtrip						
1		06/25/13 mileage & meals/MBI conference	427.23		115	420-1000	582	323
11628		6795 CRYSTAL ENNEBERG	24.50					
1		07/09/13 reimb lunches paid not used	24.50*		212	910-3100	630	
11634		220 DAVIS BUSINESS MACHINES	1,215.76					
1		135520 07/02/13 COPIER MAINT/TONER	303.94		101	100-1000	440	
2		135520 07/02/13 COPIER MAINT/TONER	303.94*		201	100-1000	440	
3		135554 07/02/13 COPIER MAINT/TONER	303.94*		201	100-2300	440	
4		135554 07/02/13 COPIER MAINT/TONER	303.94		101	100-2300	440	
11640		159 DEMCO INC	48.79					
1		5007734 06/25/13 Kick it up posters	17.85	9304	101	100-1000	610	
2		5007734 06/25/13 Bookmarks	17.00	9304	101	100-1000	610	
3		5007734 06/25/13 shipping	3.50	9304	101	100-1000	610	
4		5007734 06/25/13 additional shipping	10.44		101	100-1000	610	
11663		4100 DENISE FLESCH	354.23					
1		06/25/13 MASBO/meals-mileage	177.12*		101	100-2500	610	
2		06/25/13 MASBO/mels-mileage	177.11		201	100-2500	610	
G409		2851 DIANA KNUDSON	471.25					
1		07/01/13 mileage out of district	288.05		182	107-2212	582	570
2		07/01/13 mileage in district	133.20		182	108-2212	596	580
3		07/01/13 phone allowance	50.00		182	107-2212	531	570
G421		4724 DOROTHEA M. SUSAG	1,586.85					
1		07/01/13 workshop presenter	1,500.00		182	108-2212	320	580
2		07/01/13 mileage	50.85		182	108-2212	596	580
3		07/01/13 meals	36.00		182	108-2212	592	580

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Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
G410		199 FIELDSTONE OFFICE SUPPLY	17.50					
1		06/27/13 folders	17.50		182	107-2212	610	570
11672		199 FIELDSTONE OFFICE SUPPLY	335.38					
1		06/20/13 frame for painting	335.38*		101	100-2500	610	
11682		74 FOOD SERVICES OF AMERICA	479.01					
1		4468163 06/18/13 summer food program/June	286.76*		212	910-3100	631	
2		4473112 06/25/13 summer food program/June	192.25*		212	910-3100	631	
11626		22 GENERAL DISTRIBUTING CO	164.24					
1		139997 06/11/13 CYLINDER RENTAL	26.44		201	310-1000	450	
2		144957 06/30/13 CYLINDER RENTAL	137.80		201	310-1000	450	
G415		6802 GREENFIELD SCHOOL	60.00					
1		06/20/13 WORKSHP REFUND	60.00		182	108-2212	330	580
G405		5633 HAMPTON INN	426.91					
1		07/01/13 conf. rooms and catering/IEFA	426.91		182	108-2212	592	580
G406		5633 HAMPTON INN	507.13					
1		06/27/13 conf. rooms and catering/Art	507.13		182	108-2212	592	580
11653		19 HEMMER PLUMBING & HEATING	60.00					
1		8303 06/05/13 service call	60.00		101	100-2600	440	
11649		2514 HIGHLINE COMMUNICATIONS	36.00					
1		72357 06/14/13 dual band antenna	36.00		110	100-2700	610	
G417		6529 HILTON GARDEN INN-GT FALLS	1,415.75					
1		06/20/13 banquet rooms/meals	1,415.75		182	108-2212	592	580
11654		5560 JACK A. STERLING	475.00					
1		10.0 hours x \$47.50=\$475.00 06/30/13 e-rate 7-1-13 thru 6-30-2014	475.00*		101	100-2300	330	
G413		6801 JACKIE KANNBERG	60.00					
1		06/13/13 WORKSHOP OVERPAYMENT	60.00		182	108-2212	330	580
11652		6251 JANET FLESCH	37.84					
1		06/03/13 reimb snacks/club success	37.84		101	100-1000	610	

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Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
G412		6800 JEAN MURPHY	60.00					
1		06/13/13 WORKSHOP OVERPAYMENT	60.00		182	108-2212	330	580
11632		6291 JEANNE M WIGEN	86.00					
1		05/25/13 reimb meals/HS State track	69.00*		201	720-3500	582	
5		05/30/13 6th and 5th grades trips	17.00		101	710-3400	582	
11661		3974 KATHY JOHNSON	121.00					
		Bozeman miles-542 roundtrip						
1		06/25/13 meals/MBI conference	121.00		115	420-1000	582	323
11631		6798 KEISHA HOYE	10.70					
1		07/09/13 reimb lunches paid not used	10.70*		212	910-3100	630	
11623		3436 KENCO SECURITY & TECHNOLOGY	106.00					
2		1044938 07/01/13 Labor & Monitoring-06-13	53.00		101	100-2600	340	
4		1044938 07/01/13 Labor & Monitoring-06-13	53.00*		201	100-2600	340	
G420		5286 LEE SILLIMAN	1,836.97					
1		07/01/13 materials for workshop	110.00*		182	108-2212	600	580
2		07/01/13 workshop presenter	1,500.00		182	108-2212	320	580
3		07/01/13 mileage/Missoula-Great Falls	190.97		182	108-2212	596	580
4		07/01/13 meal allowance	36.00		182	108-2212	592	580
11656		1541 LIBERTY ELECTRIC INC	70.24					
1		43014 06/25/13 labor and material	70.24		101	100-1000	340	
G418		6682 LORI BROWN-CHAUVET	1,492.32					
1		06/10/13 door prizes/materials	30.37*		182	108-2212	600	580
2		06/10/13 stipend/presenter	1,392.75		182	108-2212	320	580
3		06/10/13 mileage/GFalls-FBenton	45.20		182	108-2212	596	580
4		06/10/13 MEALS	24.00		182	108-2212	592	580
11662		1856 LYLE KIMMET	12.82					
1		06/24/13 reimb meals/driver workshop	12.82*		110	100-2700	582	
11648		644 LYN'S BODY SHOP	2,579.40					
1		06/12/13 repair equinox/insurance paid	2,579.40		110	100-2700	440	
11636		6405 MACKIN EDUCATIONAL RESOURCES	201.57					
1		358269 06/07/13 Early NF, Upper FIC	201.57*	9258	101	100-2225	640	

* ... Over spent expenditure

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Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Acct/Source/ Prog-Func	Obj	Proj	
G414		4766 MALTANA	139.10						
1		06/20/13 LODGING/TECH TOYS	139.10		182	108-2212	592	580	
11621		2 MARIAS RIVER ELECTRIC COOP	4,843.08						
		el 60%							
		hs 40%							
		switch between 110 & 210 every month							
Cf									
1		06/21/13 electric	2,728.15		101	100-2600	412		
2		06/21/13 electric	1,818.77		201	100-2600	412		
3		06/21/13 bus barn electric	296.16		110	100-2700	412		
11650		390 MARK'S TIRE	137.89						
1		32434 06/03/13 repairs/materials	137.89		110	100-2700	610		
11619		228 MASBO	650.00						
1		664 06/28/13 Flesch conference/membership	162.50*		101	100-2500	810		
2		664 06/28/13 Flesch conference/membership	162.50*		201	100-2500	810		
3		664 06/28/13 Flynn conference/membership	162.50*		101	100-2500	810		
4		664 06/28/13 Flynn conference/membership	162.50*		201	100-2500	810		
11683		5930 MEADOW GOLD GREAT FALLS	150.61						
3		11000150 06/17/13 dairy products/summer food p	33.37*		212	910-3100	631		
		HOT LUNCH FOOD BILLS							
4		11000180 06/20/13 dairy products/summer food p	55.50*		212	910-3100	631		
5		11000217 06/24/13 dairy products/summer food p	61.74*		212	910-3100	631		
11665		5833 MONTANA COOPERATIVE SERVICES	488.00						
1		1257 04/30/13 MCS Dues for 13-14	244.00*		101	100-2300	810		
2		1257 04/30/13 MCS Dues for 13-14	244.00		201	100-2300	810		
G422		6742 MONTANA TEACHERS RETIREMENT	438.60						
1		07/01/13 employee/employer contribution	438.60*		182	108-2212	220	580	
11643		3439 MSU-Northern Business Office	2,031.76						
1		06/28/13 S Clark driver's ed tuition	2,031.76		218	100-1590	320		
11676		6342 MSU/TOOLE COUNTY EXTENSION	25.80						
1		2013-0628 06/28/13 RECCS/supplies	25.80*		115	434-3300	610	183	
11642		5961 NAEIR	1,050.00						
1		H516411 06/21/13 supplies/Matt Genger	525.00		101	100-1000	610		
2		H516539 06/24/13 supplies/Matt Genger	525.00		201	100-1000	610		

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount				Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj	
11667		6808 NAPA Auto Parts of Great Falls	6.08						
1		06/29/13 can of grease	6.08		101	100-2600	610		
11678		6645 NCS PEARSON INC	4,987.50						
1		07/09/13 Write to Learn subscription	4,987.50		201	100-1000	810		
G411		5361 NORTHERN ROCKIES EDUCATIONAL	3,487.50						
1		06/27/13 Tech Toys presenter	3,000.00		182	108-2212	320	580	
2		06/27/13 meals	92.00		182	108-2212	592	580	
3		06/27/13 mileage	395.50		182	108-2212	596	580	
11679		4583 NORTHWESTERN SCHOLASTIC INSURERS	4,617.60						
431X 1.60=689.60									
1		06/30/13 accident coverage 2013-2014	3,928.00		201	720-3500	520		
2		06/30/13 catastrophic insurance	689.60		101	100-3500	520		
11657		6114 OFFICE CENTER (THE)	194.72						
2		011746 06/19/13 billing-05/15/13-06/14/13	194.72		182	108-2212	550	580	
G404		6737 PARIS GIBSON SQUARE MUSEUM	40.00						
1		07/01/13 donation/wshop participation	40.00*		182	108-2212	600	580	
11637		39 PITNEY BOWES INC	449.34						
1		9256-JN13 06/13/13 postage machine rental	224.67		101	100-5200	840		
2		9256-JN13 06/13/13 postage machine rental	224.67*		201	100-5200	840		
11625		758 QUILL CORPORATION	812.90						
1		3440687 06/17/13 shredder	134.39	9300	201	100-2400	610		
2		3440687 06/17/13 office supplies	78.59	9300	201	100-1000	610		
3		3440696 06/17/13 8 chairs/board room	599.92*	9300	101	100-2400	610		
11651		6806 RICHARD JORATA	313.06						
2		06/08/13 lodging/mileage-Helena conf	313.06*		201	100-2311	582		
11639		3055 RIDDELL/ALL AMERICAN	9,940.06						
1		60215730 06/26/13 Shipping	336.00*	9286	201	720-3500	610		
2		95725277 06/22/13 HP jerseys	6,400.00*	9286	201	720-3500	610		
3		95725277 06/22/13 HP pants	3,200.00*	9286	201	720-3500	610		
4		95725277 06/22/13 additional amount	4.06*		201	720-3500	610		
11659		5135 SHAWN CLARK	762.41						
5		07/02/13 meals/mileage-Class B Admin	492.85*		201	720-3500	582		
6		07/02/13 meals/mileage-driver's ed Havr	269.56*		218	100-1590	582		

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11622		1 SHELBY GAS ASSOCIATION	1,937.69					
	el							
	hs							
		switch between 110 & 210 every month						
	cf							
1		06/21/13 bus barn gas	75.02		210	100-2700	411	
2		05/24/13 gas	1,117.60*		101	100-2600	411	
3		05/24/13 gas	745.07*		201	100-2600	411	
11671		61 SHELBY PAINT AND HARDWARE	293.03					
1		006332 05/31/13 sump pump	159.99*		201	100-2600	610	
2		006605 05/31/13 coupler/clamps	17.44		101	100-2600	610	
3		006344 06/10/13 keys for admin	10.00*		101	100-2300	610	
4		006618 06/18/13 paint supplies/high school	105.60*		201	100-2600	610	
11674		8 SHELBY PROMOTER	106.25					
1		1322012 05/29/13 RECCS plant sale & exchange	56.25*		115	434-2000	530	183
2		1325015 06/19/13 advertise-bus driver	50.00*		110	100-2700	540	
11646		6805 SPOKANE PUBLIC SCHOOLS	745.00					
1		AR118041 06/21/13 Brynn Moll AP Eng/fees	745.00*		201	150-2210	582	
11681		75 SYSCO FOOD SERVICES OF MONTANA	611.15					
4		06/28/13 summer food program/June	611.15*		212	910-3100	631	
11630		6797 TAWNEE HARTWELL	10.55					
1		07/09/13 reimb lunches paid not used	10.55*		212	910-3100	630	
11677		6809 The Learning Workshop Inc	716.00					
1		3712 05/13/13 Title 1 workshop	716.00		115	420-1000	582	323
G419		5528 THOMAS MARINKOVICH	1,392.75					
1		07/01/13 PRESENTER STIPEND	1,392.75		182	108-2212	320	580
11669		3128 TLC CATERING PLUS	256.75					
1		555604 06/05/13 PIR days	256.75					
					101	100-1000	610	
11629		6796 TRISHA FERRY	10.75					
1		07/09/13 reimb lunches paid not used	10.75*		212	910-3100	630	

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11624		6644 US BANCORP Equipment Finance Inc.	2,206.70					
mf								
1		231142787 06/21/13 copier lease/davis business	1,103.35		101	100-1000	452	
2		231142787 06/21/13 copier lease/davis business	1,103.35*		201	100-1000	452	
11633		2753 VICKY WARILA	5,375.00					
3rd of five payments								
1		07/03/13 3rd year/negotiated buyout	5,375.00		101	100-1000	266	
G407		3484 VISA (for GTCC) 3278	712.67					
1		07/01/13 conference registration	250.00		182	107-2212	810	570
2		07/01/13 3 rivers phone & internet	101.86		182	107-2212	531	570
3		07/01/13 office materials	360.81		182	107-2212	610	570
G408		3484 VISA (for GTCC) 3278	652.90					
1		07/01/13 books/office materials	406.94*		182	108-2212	600	580
2		07/01/13 lodging	245.96		182	108-2212	592	580
11684	E	6023 WELLS FARGO BANK P CARD SYSTEM	64.53					
1		06/27/13 RECCS supplies	64.53*		115	434-1000	610	183
11685	E	6023 WELLS FARGO BANK P CARD SYSTEM	1,398.80					
1		06/10/13 dirver's ed supplies	13.30*		218	100-1000	610	
2		06/11/13 S Clark lodging/Red Lodge	410.88*		201	720-3500	582	
3		06/13/13 S Clark lodging/Helena	179.62*		201	720-3500	582	
4		06/17/13 AP English-new teacher	795.00*		201	150-2210	582	
11686	E	6023 WELLS FARGO BANK P CARD SYSTEM	76.50					
1		05/31/13 pizza/alternative school kids	76.50*		217	100-1000	610	
11687	E	6023 WELLS FARGO BANK P CARD SYSTEM	237.29					
1		06/30/13 L Davis purchases/June	237.29	9293	101	100-2600	610	
11688	E	6023 WELLS FARGO BANK P CARD SYSTEM	684.34					
1		06/30/13 bus parts and supplies	342.17		110	100-2700	610	
2		06/30/13 bus parts and supplies	342.17		210	100-2700	610	
11689	E	6023 WELLS FARGO BANK P CARD SYSTEM	148.98					
1		06/21/13 bus driver training lodging	74.49*		110	100-2700	582	
2		06/20/13 bus driver training-gas	74.49*		210	100-2700	582	
11690	E	6023 WELLS FARGO BANK P CARD SYSTEM	204.26					
1		06/10/13 R James/lodging in Helena	177.55*		101	100-2500	582	
2		06/10/13 thank you cards	26.71*		101	100-2500	610	

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11691	E	6023 WELLS FARGO BANK P CARD SYSTEM	145.66					
1		06/24/13 admin supplies	145.66*		101	100-2400	610	
11692	E	6023 WELLS FARGO BANK P CARD SYSTEM	756.10					
1		06/24/13 MASBO lodging/meals	756.10*		101	100-2400	610	
11693	E	6023 WELLS FARGO BANK P CARD SYSTEM	163.07					
1		06/20/13 M Genger/supplies/gasoline	163.07*		101	100-2300	610	
11694	E	6023 WELLS FARGO BANK P CARD SYSTEM	200.04					
1		06/20/13 Shooting Chrony Fl Chrono	99.29	9197	201	100-1000	610	
2		06/20/13 Presenter	35.75	9207	215	360-1000	610	392
3		06/20/13 Montana Mag. of Western	65.00*	9234	201	100-2225	650	
11695	E	6023 WELLS FARGO BANK P CARD SYSTEM	499.00					
1		10550532 05/29/13 Shure PGXD14/85	499.00	9287	201	100-1000	610	
11696	E	6023 WELLS FARGO BANK P CARD SYSTEM	529.85					
1		06/21/13 MBI conference/lodging	529.85	9290	115	420-1000	582	323
11697	E	6023 WELLS FARGO BANK P CARD SYSTEM	607.94					
1		06/30/13 L Kimmert supplies for june	225.55	9297	101	100-2600	610	
2		06/17/13 driver's training fees/lodging	191.20*		110	100-2700	582	
3		06/17/13 driver's training fees/lodging	191.19*		210	100-2700	582	
11698	E	6023 WELLS FARGO BANK P CARD SYSTEM	508.00					
1		06/12/13 counselor materials/next year	508.00*		201	100-2122	610	
11699	E	6023 WELLS FARGO BANK P CARD SYSTEM	118.42					
1		06/09/13 RECCS food for summer class	118.42*		115	434-1000	610	183
11700	E	6023 WELLS FARGO BANK P CARD SYSTEM	529.85					
1		06/21/13 MBI conference/lodging	529.85	9280	115	420-1000	582	323
11701	E	6023 WELLS FARGO BANK P CARD SYSTEM	179.62					
1		06/21/13 driver's training/lodging	89.81*		110	100-2700	582	
2		06/21/13 driver's training/lodging	89.81*		210	100-2700	582	
11702	E	6023 WELLS FARGO BANK P CARD SYSTEM	81.74					
1		06/30/13 summer food program groceries	81.74*		212	910-3100	631	
11703	E	6023 WELLS FARGO BANK P CARD SYSTEM	238.44					
1		06/28/13 P Taylor office supplies	238.44	9303	101	100-1000	610	

07/07/13
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SHELBY SCHOOL DISTRICT
Claim Approval List
For the Accounting Period: 6/13

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Report ID: AP100

* ... Over spent expenditure

Claim	Warrant	Vendor #/Name	Amount			Acct/Source/		
Line #		Invoice #/Inv Date/Description	Line Amount	PO #	Fund Org	Prog-Func	Obj	Proj
11704	E	6023 WELLS FARGO BANK P CARD SYSTEM	551.87					
1		06/30/13 M White/AD mtng/lodging-gas	551.87*		201	720-3500	582	
11705	E	6023 WELLS FARGO BANK P CARD SYSTEM	179.62					
1		06/24/13 driver's training/J Wigen/lodg	179.62*		110	100-2700	582	
11706	E	6023 WELLS FARGO BANK P CARD SYSTEM	188.64					
1		06/30/13 M Schwenke June supplies	188.64*	9296	201	100-2600	610	
11638		6523 WELLS FARGO FINANCIAL LEASING	485.08					
1		5000223534 06/14/13 GTCC copier 07/29/13-08/28	485.08		182	108-2212	550	580
Total:			95,554.75					
Total Electronic Claims			8,292.56					
Total Non-Electronic Claims			87,262.19					

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SHELBY SCHOOL DISTRICT
Fund Summary for Claims
For the Accounting Period: 6/13

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Report ID: AP110

Fund/Account	Amount
101 General Fund	
101	\$20,138.88
110 Transportation Fund	
101	\$5,036.67
115 Miscellaneous Federal Funds	
101	\$10,103.41
182 Interlocal Agreement	
101	\$15,661.82
201 General Fund	
101	\$36,521.05
210 Transportation Fund	
101	\$1,546.10
212 Food Services	
101	\$4,119.95
215 Miscellaneous Federal Funds	
101	\$35.75
217 ADULT EDUCATION FUND	
101	\$76.50
218 Traffic Education or Driver's Ed.	
101	\$2,314.62
Total:	\$95,554.75

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SHELBY SCHOOL DISTRICT
Claim Approval Signature Page
For the Accounting Period: 6/13

Page: 13 of 13
Report ID: AP100A

I have carefully examined the above Register and refer the same to the
Board of Trustees.

Filed: _____

Allowed Amount \$ _____

Disallowed Amount \$ _____

Approved by the Board of Trustees

Chairman

Attest: _____
Clerk

Account	Opening Balance	Receipts				Invest (+)	Misc.	Misc.	Closing Balance
		Disbursed (-)	in Transit (+)	Deposits (+)	Transfers (+)		Earnings (+)	Charges (-)	
407 ART CLUB	1432.61	0.00	0.00	0.00	0.00		0.00	0.00	1432.61
101 ATHLETICS	-5281.35	0.00	0.00	0.00	0.00		0.00	0.00	-5281.35
405 AUTO/WOOD SHOP/VICA	614.79	0.00	0.00	0.00	0.00		0.00	0.00	614.79
402 BAND	2528.66	0.00	0.00	0.00	0.00		0.00	0.00	2528.66
408 BAND & CHOIR UNIFORMS/TRAVEL	1031.64	0.00	0.00	0.00	0.00		0.00	0.00	1031.64
213 BPA	1228.58	0.00	0.00	0.00	0.00		0.00	0.00	1228.58
203 CHEERLEADERS	579.93	0.00	0.00	0.00	0.00		0.00	0.00	579.93
403 CHOIR	2001.53	0.00	0.00	0.00	0.00		0.00	0.00	2001.53
313 CLASS OF 2013 (SR)	1981.90	0.00	0.00	0.00	0.00		0.00	0.00	1981.90
314 CLASS OF 2014 (JR)	2380.18	0.00	0.00	0.00	0.00		0.00	0.00	2380.18
315 CLASS OF 2015 (SO)	3537.62	0.00	0.00	0.00	0.00		0.00	0.00	3537.62
316 CLASS OF 2016 (FR)	780.05	0.00	0.00	0.00	0.00		0.00	0.00	780.05
202 CONCESSIONS	10599.20	0.00	0.00	0.00	0.00		0.00	0.00	10599.20
503 DISTRICT 7 MUSIC FESTIVAL	4905.82	0.00	0.00	0.00	0.00		0.00	0.00	4905.82
217 EF TOURS	1392.39	0.00	0.00	0.00	0.00		0.00	0.00	1392.39
206 EXPLORE AMERICA	842.02	0.00	0.00	0.00	0.00		0.00	0.00	842.02
212 FCCLA	1029.67	0.00	0.00	0.00	0.00		0.00	0.00	1029.67
211 FFA	2756.84	0.00	0.00	0.00	0.00		0.00	0.00	2756.84
209 FINE ARTS	196.84	0.00	0.00	0.00	0.00		0.00	0.00	196.84
406 FRENCH CLUB	2518.04	0.00	0.00	0.00	0.00		0.00	0.00	2518.04
208 HOWL	97.77	0.00	0.00	0.00	0.00		0.00	0.00	97.77
640 MIDDLE SCHOOL BAND	1736.21	0.00	0.00	0.00	0.00		0.00	0.00	1736.21
610 MIDDLE SCHOOL BOYS ATHLETICS	4634.26	0.00	0.00	0.00	0.00		0.00	0.00	4634.26
624 MIDDLE SCHOOL BUILDERS CLUB	1121.17	0.00	0.00	0.00	0.00		0.00	0.00	1121.17
622 MIDDLE SCHOOL CHEERLEADERS	1541.10	0.00	0.00	0.00	0.00		0.00	0.00	1541.10
641 MIDDLE SCHOOL CHOIR	128.74	0.00	0.00	0.00	0.00		0.00	0.00	128.74
623 MIDDLE SCHOOL DRILL TEAM	415.63	0.00	0.00	0.00	0.00		0.00	0.00	415.63
611 MIDDLE SCHOOL GIRLS ATHLETICS	2875.16	0.00	0.00	0.00	0.00		0.00	0.00	2875.16
643 MIDDLE SCHOOL HOME EC	686.68	0.00	0.00	0.00	0.00		0.00	0.00	686.68
642 MIDDLE SCHOOL INDUSTRIAL ARTS	412.39	0.00	0.00	0.00	0.00		0.00	0.00	412.39
621 MIDDLE SCHOOL STUDENT COUNCIL	870.98	75.00	0.00	0.00	0.00		0.00	0.00	795.98
612 MIDDLE SCHOOL UNIFORM MAINTENANCE	3623.78	0.00	0.00	0.00	0.00		0.00	0.00	3623.78
401 NHS	536.49	0.00	0.00	0.00	0.00		0.00	0.00	536.49
219 REACT	22.20	0.00	0.00	0.00	0.00		0.00	0.00	22.20
501 RECOGNITION	3757.81	0.00	0.00	0.00	0.00		0.00	0.00	3757.81
214 SCHOOL PLAY	406.79	0.00	0.00	0.00	0.00		0.00	0.00	406.79
216 SCIENCE CLUB	1228.02	0.00	0.00	0.00	0.00		0.00	0.00	1228.02
700 SHELBY ELEMENTARY	4592.26	0.00	0.00	0.00	0.00		0.00	0.00	4592.26
205 SPEECH & DRAMA	3121.50	0.00	0.00	0.00	0.00		0.00	0.00	3121.50
201 STUDENT COUNCIL	3592.41	0.00	0.00	0.00	0.00		0.00	0.00	3592.41
102 TOURNAMENT FUNDS	771.44	0.00	0.00	0.00	0.00		0.00	0.00	771.44
104 UNIFORM MAINTENANCE	11174.51	0.00	0.00	0.00	0.00		0.00	0.00	11174.51
404 VO-AG	3303.93	0.00	0.00	0.00	0.00		0.00	0.00	3303.93
207 YEARBOOK	4365.04	0.00	0.00	0.00	0.00		0.00	0.00	4365.04
Total for Student Accounts	92073.23	75.00							91998.23
Bank Account Totals	92073.23	75.00	0.00	0.00	0.00		0.00	0.00	91998.23
							Bank Balance		91998.23
							Plus Outstanding Checks		5742.26
							Minus Outstanding Deposits		0.00

Balance	97740.49
Minus Receipts in Transit	0.00

Statement Balance	97740.49

Fund	Expended Current Month	Expended YTD	Encumbered YTD	Committed YTD	Current Appropriation	Available Appropriation
101 General Fund	106,581.58	2,340,560.86	5,058.93	2,345,619.79	2,510,674.00	165,054.21
110 Transportation Fund	14,384.97	142,984.22	0.00	142,984.22	198,900.00	55,915.78
111 Bus Depreciation Fund	0.00	0.00	0.00	0.00	155,746.30	155,746.30
113 Tuition	0.00	380.00	0.00	380.00	18,825.32	18,445.32
114 Retirement	13,140.44	287,074.60	0.00	287,074.60	364,020.00	76,945.40
128 Technology Fund	0.00	52,285.36	0.00	52,285.36	52,285.36	0.00
129 Flexibility Fund	0.00	11,992.50	300.00	12,292.50	18,014.29	5,721.79
150 Debt Service	0.00	59,396.25	0.00	59,396.25	319,292.50	259,896.25
201 General Fund	89,402.37	1,535,905.18	457.77	1,536,362.95	1,580,715.55	44,352.60
210 Transportation Fund	8,365.37	108,711.16	0.00	108,711.16	126,480.00	17,768.84
211 Bus Depreciation Fund	0.00	0.00	0.00	0.00	194,923.08	194,923.08
214 Retirement	13,344.01	181,888.48	0.00	181,888.48	225,996.00	44,107.52
217 ADULT EDUCATION FUND	76.49	34,126.85	0.00	34,126.85	67,000.00	32,873.15
228 Technology Fund	0.00	49,453.04	0.00	49,453.04	49,453.04	0.00
229 Flexibility Fund	0.00	12,192.50	0.00	12,192.50	25,662.04	13,469.54
250 Debt Service	0.00	29,698.75	0.00	29,698.75	159,897.50	130,198.75
261 Building Reserve	0.00	48,104.92	0.00	48,104.92	98,179.78	50,074.86
Grand Total:	245,295.23	4,894,754.67	5,816.70	4,900,571.37	6,166,064.76	1,265,493.39

182 Interlocal Agreement

Account	Object	Expended Current Month	Expended YTD	Encumbered YTD	Committed YTD	Current Appropriation	Available Appropriation
100	Regular Education Programs -						
107	GTCC Interlocal Funds						
2212	Instruction of Curriculum Development Services						
112-570	Professional-Education GTCC Interlocal Dues	5,410.67	64,927.88	0.00	64,927.88	63,654.00	-1,273.88
115-570	Office/Clerical/Technology GTCC Interlocal Dues	2,759.10	35,154.80	0.00	35,154.80	33,100.00	-2,054.80
160-570	Sick Leave GTCC Interlocal Dues	0.00	0.00	0.00	0.00	3,000.00	3,000.00
170-570	Vacation Leave GTCC Interlocal Dues	0.00	0.00	0.00	0.00	4,000.00	4,000.00
210-570	Social Security/Medicare GTCC Interlocal Dues	609.68	7,503.25	0.00	7,503.25	7,600.00	96.75
220-570	Teachers' Retirement GTCC Interlocal Dues	404.18	4,850.14	0.00	4,850.14	4,856.00	5.86
230-570	PERS GTCC Interlocal Dues	187.62	2,390.53	0.00	2,390.53	2,258.00	-132.53
240-570	Unemployment Compensation GTCC Interlocal Dues	26.14	320.22	0.00	320.22	219.00	-101.22
250-570	Workers' Compensation GTCC Interlocal Dues	44.37	447.32	0.00	447.32	809.00	361.68
260-570	Health Insurance GTCC Interlocal Dues	0.00	12,239.40	0.00	12,239.40	12,291.00	51.60
320-570	Professional-Educational Services GTCC Interlocal Dues	0.00	0.00	0.00	0.00	2,500.00	2,500.00
340-570	Technical Services GTCC Interlocal Dues	0.00	325.00	0.00	325.00	2,000.00	1,675.00
440-570	Repair and Maintenance Services GTCC Interlocal Dues	0.00	0.00	0.00	0.00	3,500.00	3,500.00
531-570	Telephone GTCC Interlocal Dues	154.50	1,856.90	0.00	1,856.90	2,500.00	643.10
532-570	Postage GTCC Interlocal Dues	0.00	448.26	0.00	448.26	1,000.00	551.74
582-570	Travel Out-of-District GTCC Interlocal Dues	385.23	4,566.76	0.00	4,566.76	5,000.00	433.24
610-570	Supplies GTCC Interlocal Dues	462.31	2,498.34	0.00	2,498.34	3,800.00	1,301.66
650-570	Periodicals GTCC Interlocal Dues	0.00	99.00	0.00	99.00	400.00	301.00
660-570	Minor Equipment-New GTCC Interlocal Dues	0.00	198.00	0.00	198.00	500.00	302.00
681-570	Software GTCC Interlocal Dues	0.00	0.00	0.00	0.00	2,000.00	2,000.00
810-570	Dues & Fees GTCC Interlocal Dues	250.00	293.45	0.00	293.45	350.00	56.55
	Function Total:	10,693.80	138,119.25	0.00	138,119.25	155,337.00	17,217.75
	Program Total:	10,693.80	138,119.25	0.00	138,119.25	155,337.00	17,217.75

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Account	Object	Expended Current Month	Expended YTD	Encumbered YTD	Committed YTD	Current Appropriation	Available Appropriation
108	GTCC Professional Development - Dues						
2212	Instruction of Curriculum Development Services						
150-580	Stipends	0.00	3,864.24	0.00	3,864.24	4,500.00	635.76
	GTCC Professional Development Dues						
210-580	Social Security/Medicare	0.00	241.00	0.00	241.00	430.00	189.00
	GTCC Professional Development Dues						
220-580	Teachers' Retirement	438.60	2,852.33	0.00	2,852.33	1,015.00	-1,837.33
	GTCC Professional Development Dues						
240-580	Unemployment Compensation	0.00	10.08	0.00	10.08	20.00	9.92
	GTCC Professional Development Dues						
250-580	Workers' Compensation	0.00	17.10	0.00	17.10	35.00	17.90
	GTCC Professional Development Dues						
320-580	Professional-Educational Services	8,785.50	27,071.27	0.00	27,071.27	33,100.00	6,028.73
	GTCC Professional Development Dues						
330-580	Other Professional Services	180.00	859.00	0.00	859.00	1,000.00	141.00
	GTCC Professional Development Dues						
340-580	Technical Services	0.00	3,340.24	0.00	3,340.24	6,000.00	2,659.76
	GTCC Professional Development Dues						
550-580	Printing, Binding and Duplication	679.80	10,109.39	0.00	10,109.39	12,200.00	2,090.61
	GTCC Professional Development Dues						
592-580	Meals & Lodging	2,922.85	29,998.96	0.00	29,998.96	30,125.33	126.37
	GTCC Professional Development Dues						
596-580	Mileage	815.72	8,479.30	0.00	8,479.30	12,000.00	3,520.70
	GTCC Professional Development Dues						
600-580	Supplies and Materials	587.31	9,648.27	0.00	9,648.27	6,000.00	-3,648.27
	GTCC Professional Development Dues						
	Function Total:	14,409.78	96,491.18	0.00	96,491.18	106,425.33	9,934.15
	Program Total:	14,409.78	96,491.18	0.00	96,491.18	106,425.33	9,934.15
	Program Group Total:	25,103.58	234,610.43	0.00	234,610.43	261,762.33	27,151.90
	Fund Total:	25,103.58	234,610.43	0.00	234,610.43	261,762.33	27,151.90
	Grand Total:	25,103.58	234,610.43	0.00	234,610.43	261,762.33	27,151.90