

Wyoming Foundational Technology Funding Rationale



Wyoming School Boards Association

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INTRODUCTION

In November of 2007, the WSBA Delegate Assembly adopted the following resolution presented by Johnson County School District #1:

WHEREAS—Schools have an obligation to prepare students for success in the workplace, the global marketplace, and the information society in which the students now live.

WHEREAS—Schools are required by federal mandate to report technology proficiency levels of students in grade 8.

WHEREAS—Our current schools suffer from inadequate funding to support technology infrastructure, hardware, software, support, and professional development to meet the obligations and requirements for which the schools are responsible.

WHEREAS—There is a tremendous opportunity to adequately fund technology initiatives to provide students the learning opportunities to be able to learn effectively and live productively in a rapidly changing digital world. These skills include the National Educational Technology Standards of: 1) creativity and innovation, 2) communication and collaboration, 3) research and information fluency, 4) critical thinking, problem-solving, and decision-making, 5) digital citizenship, 6) and technology operations and concepts.

BE IT RESOLVED that to provide schools adequate technology resources the Wyoming School Boards Association hereby:

Calls on the Wyoming State Legislature and Wyoming Department of Education to provide capital outlay which support:

1. Appropriate teacher numbers to provide year-long technology instruction to students every year Kindergarten through 8th grade.
2. Appropriate teacher numbers to provide career and vocational technology instruction to identified students every year 9th through 12th grade.
3. 1 to 1 computer ratios for all schools, including all staff and students in the ratio.
4. Software to support 1 to 1 computing.
5. Renovation of existing facilities' infrastructure as determined by an appropriate needs assessment which is based on industry standards and supports 1 to 1 computing and future technology growth and initiatives.
6. All new construction will contain infrastructure which is based on industry standards and supports 1 to 1 computing and allows for future technology growth and initiatives.
7. Technology support personnel numbers based on industry standards.
8. Adequate training facilities, support facilities, and funding for professional development to support technology initiatives.

In December of 2008, the Wyoming School Boards Association called a meeting of all school districts to address the issues raised in the resolution. District were asked to send their superintendent and technology director to begin the process of developing comprehensive Technology Guidelines to meet the needs of students in every size school and district that exists in our state.

The meeting was a success and the following people agreed to be the writing group for the new Technology Guidelines. The group was divided into four writing groups, Northwest, Southwest, Northeast and Southeast. These groups chose their own directors for their areas and went to work developing their documents. After several months of working in regional groups, the 8 area directors meet twice to combine the input from the four writing groups.

Participants in the development of this document are as follows:

Mike Mc Manamen, Goshen #1;	Justin Miller, Park #6;
John Hohn, Weston #1;	Randy Tucker, Fremont #14;
Chase Hafner, Sweetwater #1;	Rick Engelbrecht, Hot Springs #1;
Tammy Cox, Fremont #24;	Steve Radaburgh, Hot Springs #1;
Jaraun Dennis, Uinta #1;	Linda Bowe, Campbell #1;
Brad Nimmo, Fremont #24;	Lyla Downey, Campbell #1;
Chuck Mitchell, WDE;	Judy Steingass, Sheridan #1;
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Charlie Clifford, Fremont #1;	Myron Peabody, Fremont #25;
Tina Clifford, Fremont #1;	Nancy Jares, Big Horn #4;
Andrea Schurg, Fremont #1;	Lisa Van Dusen, Big Horn #4;
Stan Hedges, Big Horn #2;	Andrea Gilbert, Johnson #1;
Rich Hardt, WSFC;	Myra Camino, Johnson #1;
Mark Antrim, Natrona #1;	Rod Kessler, Johnson #1;
Drew Walker, Natrona #1;	Scott Cavallier, Laramie #2;
Kevin Paggett, Natrona #1;	Kara Gann, Laramie #1;
Jamie Hamaker, Goshen #1;	Kyle McKinney, Laramie #1;
John Gibson, Converse #1;	Mick Esquivel, Big Horn #1;
Chris Brown, Fremont #1;	Wes Townsend, Big Horn #1;
Dean Skinner, Laramie #2;	Robert Reed, Park #1;
Wik Rooney, Laramie #2;	David Holt, Sweetwater #2;
Gary Hancock, Lincoln #2;	Jerald Thornton, Sublette #1;
Kriti Hibbert, Fremont #2;	Gordon Knopp, Laramie #1;
Jim Heath, Park 6;	Jan Segerstrom, Teton #1.

Area Directors:

Southeast: Jamie Hamaker, Goshen #1 and Gordon Knopp, Laramie #1

Northeast: Andrea Gilbert, Johnson #1 and Lyla Downey, Campbell #1

Southwest: Jaraun Dennis, Uinta #1 and Chase Hafner, Sweetwater #1

Northwest: Chris Brown, Fremont #1 and Stan Hedges, Big Horn #2

The Board of Directors of the Wyoming School Boards Association expresses their appreciation for the contributions of these individual in the development of a comprehensive “ information technology” plan which is critical to prepare Wyoming’s students to be successful in the 21st century workplace.

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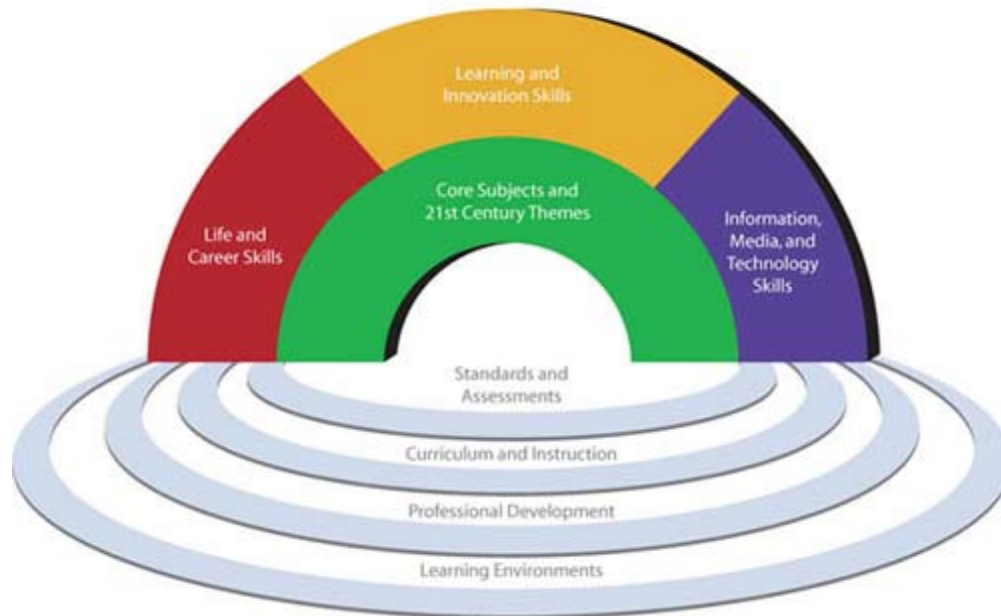
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DATA

How do we prepare Wyoming students to be successful in the 21st century workplace? The Partnership for 21st Century Skills (<http://www.21stcenturyskills.org>) has identified student outcomes (a blending of specific skills, content knowledge, expertise, and literacies) with support systems to help students master the multi-dimensional abilities required of them in the 21st century.¹



Critical to mastering these skills is a comprehensive, sustainable information technology infrastructure. As noted in the CEO Forum Policy paper on Education and Technology²:

Information technology is transforming the global economy and drastically changing the way business and society operates. There must be a corresponding adaption in education to ensure students have the necessary skills to thrive in the digital age. Understanding how to employ technology locate and evaluate information, to learn, reason, make decision, solve problems, and to collaborate and work in teams will be essential abilities in the rapidly changing world. These are the 21st century skills that will be crucial for students to thrive in the digital age. Without serious and significant investment in these skills, curricula and accountability, our schools face the almost impossible challenge of trying to create 21st century learners for a 21st century workforce in the 20th century educational environments.

¹ "Framework for 21st Century Learning." Partnership for 21st Century Skills. 2004. Partnership for 21st Century Skills. 25 Feb 2009
<http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=254&Itemid=120>.

² "A Policy Paper by the CEO Forum on Education and Technology." CEO Forum on Education and Technology. March 2001. CEO Forum on Education and Technology. 24 Feb 2009
<<http://www.ceoforum.org/downloads/forum3.pdf>>.

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These skills will be measured when technology literacy becomes part of the nation's report card. The 2012 edition of the National Assessment of Education Progress will measure whether students understand how to deploy technology for problem solving, whether they know how to select the right tool for the job they are doing, and whether they can differentiate good information from bad³.

Wyoming has a real opportunity to fund educational technology in a way that can help our learners meet the needs of a changing global workplace and gain the science, math, and technology skills necessary to meet the demands of our evolving energy economy. Technology skills are absolutely critical for our students to survive in the current and future job markets.

In order to maximize return on investment for educational technology a comprehensive, research-based approach must be employed. Research indicates one-to-one computing (a computer for every student) increases student achievement and provides anytime, anywhere learning opportunities. This learning structure is absolutely critical for today's digital age and educational demands.

That said, one-to-one computing cannot be successful without appropriate design and implementation. Infrastructure to support today's multi-media applications, security of school buildings, security of networks, appropriate instructional spaces, support services and professional development to ensure teachers have 21st century skills.

*****NOTE: Minimum dollar amounts are rounded to the nearest dollar and are based on smallest Wyoming district of 100 students, 18 certified teachers and 27 staff members (cost increases based on district size).***

³ "NAEP Will Include Technology Literacy in 2012." Electronic Education Report Vol. 15. Number 2020 October 2008 24 Mar 2009

21ST CENTURY TECHNOLOGY

ONE-TO-ONE COMPUTING

One-to-one computing can raise student achievement in core subjects at scale. As part of the Maine Learning Technology Initiative, Maine rolled-out more than 17,000 laptops to seventh graders statewide. In October 2007, the Main Education Policy Research Institute (MEPRI) at the University of Southern Main released the results of a study “Maine’s Middle School Laptop Program: Creating Better Writers.” The study shows that the Maine Learning Technology Initiative has had a clear and significant positive impact on student writing achievement. In fact, twice as many students met “proficiency” standards in writing in the highest-laptop-use group as compared to the lowest-use group.⁴

This same study indicates that laptop enrollment has a significant effect on mathematics and language scores. Specifically, participation in the laptop program is associated with an average per-student gain of 16 points for mathematics scores and 13 points for language scores obtained from the state-mandated standardized NRTs (normed-reference tests).

To successfully implement and maintain a one-to-one computing environment, the following funding must occur:

1. \$1000 per machine per student
2. \$1000 per machine per teacher
3. \$700 per machine for every two staff members
4. \$200 Printing stations
5. 3-year rotation cycle (1/3 of total dollars received annually, allowing for replacement of 1/3 of the machines every 4th year)

TESTING/CURRICULUM AND VOCATIONAL LABS

In addition to one-to-one computing needs, it makes fiscal sense to support testing, instructional and vocational labs and teaching spaces. These labs require high-end specialized equipment and software, making funding prohibitive if attempted for each student laptop. The state-mandated PAWS testing and state-wide MAP testing encompass a least 12 weeks of time, and benchmark testing throughout the year for all subjects is continuous. The federal government mandates technology standards (see Appendix A) proficiency on all 8th grade students, requiring a comprehensive K-12 technology curriculum.

In grades 9-12, the States’ Career Clusters Initiative (SCCI) is an initiative established under the National Career Technical Education Foundation (NCTEF) to provide Career Clusters as a tool for seamless

⁴ "A Complete Guide to One-to-One Computing in the K-12 Environment." *Strategy Papers and Reports*. 25 January 2008. Center for Digital Education. 24 Feb 2009 <<http://www.centerdigitaled.com/story.php?id=106570>>.

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transition from education to career in this era of changing workplace demands.⁵ These career clusters and curriculum to support their implementation is critical to the success of Wyoming students.

Implementation of this infrastructure requires the following equipment which must be maintained on a 3-year replacement cycle:

Testing Labs

Grade Level	Lab	Cost per year
K-12 (or each school building)	One 25 station testing lab for each 25 teachers	\$10,000
K-3 (or each school building)	One 25 station teaching lab for each 25 teachers	\$10,000
4-6 (or each school building)	One 25 station teaching lab for each 25 teachers	\$10,000
7-8 (or each school building)	One 25 station teaching lab for each 25 teachers	\$10,000

Vocational Labs

Career Cluster	Labs Needed	Cost per year
Agriculture, Food & Natural Resources	Software to support curriculum on student laptops	\$1000
Architecture & Construction	One 25 station teaching lab for each 1 full-time teacher	\$15,000
Arts, Audio/Video Technology & Communications	One 25 station teaching lab for each full-time teacher	\$10,000
Business Management & Administration	One 25 station teaching lab for each full-time teacher	\$10,000
Education & Training	Software to support curriculum on student laptops	\$1000
Finance	Software to support curriculum on student laptops	\$1000
Hospitality & Tourism	Software to support curriculum on student laptops	\$1000
Human Services	Software to support curriculum on student laptops	\$1000
Information Technology	One 25 station teaching lab for each full-time teacher	\$10,000
Law, Public Safety, Corrections & Security	Software to support curriculum on student laptops	\$1000
Manufacturing	Software to support curriculum on student laptops	\$1000
Government & Public Administration	Software to support curriculum on student laptops	\$1000
Health Science	Software to support curriculum on student laptops	\$1000
Marketing	Software to support curriculum on student laptops	\$1000
Science, Technology, Engineering & Mathematics	One 25 station teaching lab for each full-time teacher	\$10,000
Transportation, Distribution & Logistics	Software to support curriculum on student laptops	\$1000

MIMIMUM ANNUAL DOLLAR AMOUNT PER DISTRICT (cost increases based on district size): \$155,650

⁵ "States' Career Clusters." About Us. 2009. States' Career Clusters Initiative. 1 Apr 2009 <<http://www.careerclusters.org/aboutus.php>>.

21ST CENTURY CLASSROOMS

21st Century classrooms are absolutely critical to successful delivery of instructional tools and resources in the digital age. As noted in the Year 3 STaR Report:⁶

The creative use of digital content allows teachers and students to transform the learning environment into a more dynamic, demanding, vibrant and interactive exchange. These environments combine the best of traditional learning with the unprecedented opportunities created by technology. Once digital content is integrated into curriculum, the learning process becomes:

- Problem and Project Centered. Less concerned with one right answer, problem and project centered digital learning prepares students to answer questions and support arguments. When connected to real world information, students and teachers become more active in local and global community efforts.
- Student-centered. Students actively participate in defining their individual learning objectives and the plan to achieve them. Teachers take on the more sophisticated role of facilitators, while remaining the cornerstone of a student's learning team that also includes the student, parent, peers and outside experts. By providing the framework, goals, guidance and advice teachers help manage and encourage students as they pursue their own learning.
- Collaborative. Students engage in multi-age, interdisciplinary projects in teams within the school or at a distance. Learning becomes an interactive experience as teachers and students access content, exchange ideas and consult with experts at anytime from anywhere. As students pursue self-directed projects, teachers and students often exchange roles so that students teach their teacher.
- Communicative. Students, teachers and community members communicate and give feedback through e-mail, videoconferences, threaded discussions, bulletin boards, chat rooms, file transfer and even traditional and Internet-enabled voice telephony. Peer review exercises and local and global community efforts provide guidance, interaction and an increased sense of relevance and accountability. In addition, this interaction fosters a greater appreciation of various cultural perspectives.
- Customized. Digital learning conveys a new capacity for tailoring information to meet individual student needs, learning styles, and abilities. Tools such as student information systems and class management software can facilitate data-driven decision-making that supports individual student needs. A greater range of content allows teachers to capture target information through random access video⁷ and meld modules from various courses, so that learning becomes more dynamic and responsive.

⁶ "The Power of Digital Learning: Integrating Digital Content." The CEO Forum on School and Technology Readiness Report. June 2000. The CEO Forum on Education and Technology. 25 Feb 2009 <<http://www.ceoforum.org/downloads/report3.pdf>>.

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- Productive. Innovative projects and digital tools encourage students and teachers to become content producers. Consequently, the quality of projects is elevated as students and teachers connect and receive feedback from the wider local and global community. Teachers and students also face an increased responsibility to be aware of and respect copyright and trademark laws in a digital environment.
- Lifelong at anytime, from anywhere. With wireless connections and distance learning, the artificial boundaries that often confine education fade in a digital environment. Students of every age and ability leverage communication technology, information resources, and people, close-by or at a distance.

Minimally, classrooms need the following equipment, which must be maintained on a 5-year replacement cycle.

Technology	Install Cost	Annual Cost
Ceiling mounted or close range wall mounted LCD projection with at least 2500 lumens	\$1400	\$280
2 replacement bulbs for life of projector	\$500	\$100
Interactive whiteboard	\$1000	\$200
Document camera	\$700	\$140
Audio enhancement	\$400	\$80
Integrated systems (CATV, video, audio)	\$400	\$400
Adequate electrical and/or extended life batteries for one-to-one laptop use	\$4000	\$800
Scanner	\$100	\$20

MINIMUM ANNUAL DOLLAR AMOUNT PER CLASSROOM: \$2020

TOTAL COST OF OWNERSHIP (TCO)

Integral to the successful implementation of one-to-one computing is planning for TCO. TCO can be defined generally as all of the costs involved in implementing and maintaining computers and related networks. Total Cost includes all costs within the CoSN-Gartner TCO model.⁷ It is a balanced look at what it truly takes to support a computer for the district.

PROFESSIONAL DEVELOPMENT

The budget item most critical to a school district's ability to achieve its technology goals is professional development. If teachers and other staff members do not understand how to use new technologies and

⁷ "K-12 Total Cost of Ownership Tool." Gartner K12-TCO. Gartner K12-TCO. 24 Feb 2009 <<https://k12tco.gartner.com/home/default.aspx>>.

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incorporate them into the classroom, a district's technological investment will not achieve its desired results.⁸

The need for the ongoing, sustained professional development regarding the implementation of technology into teaching and learning is a critical and often overlooked component of successfully using technology within the classroom. In 2008, the International Society for Technology in Education (ISTE) created a Policy Brief titled, Technology and Student Achievement-The Indelible Link⁹ focusing on the role of technology and learning. Within this policy document seven factors for successfully implementing technology for learning are discussed along with recommendations that policy makers must consider based on research studies that positively affect student achievement and enhance 21st century skills. These seven conditions are:

1. Effective professional development for teachers in the integration of technology into instruction is necessary to support student learning.
2. Teacher's direct application of technology must be aligned to local and/or state curriculum standards.
3. Technology must be incorporated into the daily learning schedule (i.e., not as a supplement or after-school tutorial).
4. Programs and applications must provide individualized feedback to students and teachers and must have the ability to tailor lessons to individual student needs.
5. Technology use must be incorporated in a collaborative environment to be most effective.
6. Project-based learning and real-world simulations must be the main focus of instructional technology.
7. Effective technology integration requires leadership, support, and modeling from teachers, administrators, and the community/parents.

The integration of education technology provides students with 21st century skills that allow students not only knowledge in Reading, Writing, and Math, but also the skills necessary to be productive and competitive in the workplace, in higher education, the military and in community service positions. Research has been conducted and the findings are that technology effectively integrated into teaching and learning has a positive impact on student achievement. It is important to realize that professional development for our Wyoming school district employees is a critical component of impacting teacher pedagogy and the integration of effective technology into 21st century instructional practices.

Wyoming has an excellent start to professional development funding through the School-Based Instructional Facilitators grant (HB0139, Section 4, Enrolled Act No. 23). This grant states that the

⁸ TCO Checklist: Professional Development. "Taking TCO to the Classroom. COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <http://www.classroomtco.org/checklist/prof_dev.html>

⁹ ISTE Policy Brief. Technology and Student Achievement-The Indelible Link. ISTE. Feb 20 2009 <<http://www.iste.org/Content/NavigationMenu/Advocacy/Policy/59.08-PolicyBrief-F-web.pdf>>

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facilitator's role is to work with teachers to improve their teaching skills and/or technology facilitators with a focus on assisting teachers in the effective use of technology in the classroom.¹⁰

As we move forward with the goal to improve learning within our Wyoming schools, we must continue support of technology professional development along with support for the Instructional Facilitators. Professional development for school district staff is imperative as we prepare our students for their future in a world that is constantly changing. We must provide a funding stream for educational technology that is tied to sustained, high-quality professional development throughout the state of Wyoming.

Due to rapidly changing technologies, professional development will be ongoing. Therefore, one Instructional Technology Facilitator per 30 teachers is needed, with a minimum of one per district.

MINIMUM ANNUAL DOLLAR AMOUNT PER DISTRICT (cost increases based on district size): \$50,000.00

SUPPORT

Regardless of the number of computers in the district, it is absolutely critical that a school district has highly-qualified technical personnel to maintain systems such as accounting packages and security systems, network and other hardware, and to help users solve the problems they encounter with their computers and software packages. In addition, new audit and state/federal reporting requirements require Data Management Specialists to ensure data quality and accurate reporting. Finally, leadership in the form of a full-time District Technology Director is absolutely critical to ensure all systems, funding and resources are planned and implemented effectively.

When an educational PC fails, International Data Corporation (IDC) said, it can get taken out of service for several days, while a business computer is usually repaired or replaced within an hour or two. When the Milken Exchange asked district technology directors how long it takes to fix a problem when something breaks, and gave them the option of responding in hours or days, the average number of hours reported was 5.6 and the average number of days, 3.6¹¹. This down-time is unacceptable in today's digital environment. From a Total Cost of Ownership perspective, if a school district does not provide adequate technical support, the district will pay the price somewhere: in a reduction of teacher productivity when teachers have to solve their own computer problems, in the need for additional staff training when teachers decide they can't rely on the network to be up, in the cost of wasted time and

¹⁰ School-Based Instructional Facilitators/ Instructional Coaches Grant Report to the Wyoming Joint Education Interim Committee 29 March 2009 <<http://legisweb.state.wy.us/2009/interim/schoolfinance/WDE05.pdf>>

¹¹ "TCO Checklist: Support." Taking TCO to the Classroom. COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <http://www.classroomtco.org/checklist/prof_dev.html>.

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labor when administrative functions can't be managed reliably on the district's network.¹² To put this in perspective consider this¹³:

Fairfax County is a large district in the suburbs of Washington, DC, with 155,000 students and 26,000 employees. It calculated that if every teacher spends at least one hour a week trying to fix their own computer problems, that equals 307 Full Time Equivalent positions, at a cost to the district of \$15.3 million in lost teaching time. In addition, if 5 percent of teachers are regarded as "technical wizards" by their peers, and are asked to provide 1.5 hours a week of informal support, that equals 23 Full Time Equivalent positions, at a cost of \$1.2 million.

Thus, the district concluded that its "hidden" costs for technical support could amount to an estimated \$16.5 million.

Even in smaller school districts, the negative impact on budget and instructional time is proportionately the same. For example, in a school district of only 35 teachers in which each teacher spends one hour a week solving their own tech support problems, the total number of hours lost annually is 1,365—almost a single full teacher position (calculated as 1,447.5 hours per school year). Furthermore, if the equivalent of 5 percent of the teaching staff helps out their peers for 1.5 hours a week, that translates into another 102.38 hours. Together they total the equivalent of one teaching position a year worth of "hidden" tech support.

It is important to understand that technical support requires a highly-specialized work force with a specific skill set. Districts must compete for this work force with other businesses in Wyoming. An appropriate wage scale is necessary to successfully hire qualified personnel. In addition, appropriate support systems such as hardware and software are needed to manage technical trouble-shooting and repair.

Appropriate Technical Support for districts has been identified as follows (see Appendix B for job descriptions):

1. District Technology Director: Educational leadership background to oversee systems, finances, and planning
 - a. 1 full-time for each district
2. Technical Personnel:
 - a. Level 1 Technicians (troubleshooters): Capable of basic troubleshooting
 - i. 1 full-time technician for every 100 staff members and students, with a minimum of one per district.

¹² "How Much Tech Support Does a School District Need?." Taking TCO to the Classroom. COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <http://www.classroomtco.org/checklist/prof_dev.html>.

¹³ "TCO Checklist: Support." Taking TCO to the Classroom. COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <http://www.classroomtco.org/checklist/prof_dev.html>.

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- b. Level 2 Technicians (network technician): Certified hardware repair technicians and basic system support
 - i. 1 full-time for every 1000 staff members and students
- c. Level 3 Technicians (network manager): Certified network and system administrators
 - i. 1 full-time for every district
- 3. Data Management Specialists:
 - a. Level 1 (Data processing specialists): data quality assurance and student information system support
 - i. full-time 1 for each district
 - b. Level 2 (Data administrator): data query and analysis, reporting, system integration
 - i. 1 full-time for every 1000 staff members and students

Personnel	State Average Annual Salary
District Technology Director	\$73,393
Level 1 Technician	\$18.33 per hour - \$38,273
Level 2 Technician	\$23.50 per hour - \$49,068
Level 3 Technician	\$23.65 per hour - \$49,192
Level 1 Data Management	\$19.28 per hour - \$40,102
Level 2 Data Management	\$15.00 per hour - \$31,200

Additional software and dollars critical for adequate support structure:

Software/Dollars	Identified Need	Cost per Student
Help desk software	Manage help requests, track training needs, track repair costs	\$10
Inventory tracking software	Ensure accuracy and management of resources	\$2
Repair dollars	Repair and maintenance of technologies	\$5

TOTAL ANNUAL PER STUDENT COSTS: \$17

MINIMUM ANNUAL DOLLAR AMOUNT PER DISTRICT (cost increases based on district size): \$208,967

CONNECTIVITY

Providing students with access to networked computers helps prepare them for the economy and society they will face in the 21st century. Basic competence in the use of computers and electronic networks is becoming a fundamental requirement for employment in the better jobs in the U.S. economy. According to research conducted by the Children's Partnership, 47% of jobs in 1993 required computer and/or networking capability-up from 25% in 1984. (1) By the year 2000, this study forecasts, 60% of jobs will require these skills and will reward them with a 10-15% pay premium over jobs that do not require such capabilities. In addition, the growing availability of on-line information and research

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resources gives a competitive advantage to students and workers who can effectively use these tools in their studies or jobs¹⁴.

Connectivity is not limited to Internet access. Consideration must also be given to the following areas:

1. Bandwidth
 - a. Connection to school
 - b. Connection within school
2. Network
 - a. Management
 - b. Wired
 - c. Wireless
 - d. Hardware
 - e. Software
3. Electrical Needs

Bandwidth/Internet Connectivity Scale

The Wyoming Equality Network (WEN) is providing basic connectivity to all school buildings within Wyoming. However, the current connectivity to schools is not adequate to support current instructional needs. Data indicates 100 megs of connectivity is needed for every elementary school and 200 megs of connectivity is needed for every secondary or K-12 school using Multiple Protocol Label Switching (MPLS) from the school connection back to the Cheyenne central point. A minimum of 10GB connection is needed within schools. Packet shaping ability is needed to maximize bandwidth.

Each student in a school district will consume approximately 400K of bandwidth per second when you factor in Web 2.0, Video & Audio Streaming, Online Assessments, Online delivery of Enrichments & Interventions and 1-to-1 Programs.

Examples

- 1000 Students @ 400K per second = 400MB Connection to the Internet
- 2000 Students @ 400K per second = 800MB Connection to the Internet
- 3000 Students @ 400K per second = 1.2GB Connection to the Internet
- 4000 Students @ 400K per second = 1.6GB Connection to the Internet
- 5000 Students @ 400K per second = 2.0GB Connection to the Internet

¹⁴ McKinsey & Company, Inc.. "Connecting K-12 Schools to the Information Superhighway." [University of Arkansas](http://www.uark.edu/mckinsey/). National Information Advisory Council. 24 Feb 2009 <<http://www.uark.edu/mckinsey/>>.

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Network

Networks need to be constructed and managed for maximum efficiency and to ensure compliance with Federal law. The infrastructure needs to be maintained on a minimum 5-year replacement cycle.

Components for infrastructure and management include:

District

Component	Defined Need	Annual Cost
Distribution Facilities (MDF/IDF rooms) with: <ol style="list-style-type: none"> 1. Power failure generators for critical systems 2. UPS backup systems 3. Adequate heating/cooling (environment controls) 4. Security (limited access and alarmed) 5. Equipment racking and cable management 	Critical component for data delivery and connectivity	\$4000
District level storage	Needed for disaster recovery, delivery of services, and safety of data	\$5000
Computer imaging capabilities/licensing	minimize technical issues and downtime	\$2000

Building

Component	Defined Need	Annual Cost
Layer 1 separation between data, phone, and security systems	maximize efficiency	\$10,000
Adequate file server storage and licensing	Needed for disaster recovery, delivery of services, and safety of data	\$2000
Switching equipment with adequate port density on 5-year replacement cycle with maintenance contracts	Critical component for data delivery and connectivity	\$6000
Wireless networking infrastructure that includes: <ol style="list-style-type: none"> 1. High-density capabilities with controllers 2. Access point in every classroom 3. Ability to support IP phones (needed for emergency situations) 	Critical component for data delivery and connectivity	per 400 students - \$25,000
Video distribution infrastructure: <ol style="list-style-type: none"> 1. Cabling 2. Amplification (as needed) 	Critical component for data delivery and connectivity	\$2000
Network Access Control	Ensures that every machine connected to the network has appropriate anti-virus, current windows patches.	\$15,000
Connectivity with Multiple Protocol Label	Bandwidth to deliver services	\$1500

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Switching (MPLS) for secondary school or K-12 building		
Connectivity with Multiple Protocol Label Switching (MPLS) for elementary school	Bandwidth to deliver services	\$1200

Classroom

Component	Defined Need	Annual Cost
Adequate electrical meeting state standards	Required by law	\$500

MIMIMUM ANNUAL DOLLAR AMOUNT PER DISTRICT (cost increases based on district size): \$11,000

MIMIMUM ANNUAL DOLLAR AMOUNT PER BUILDING: \$42,750

MIMIMUM ANNUAL DOLLAR AMOUNT PER CLASSROOM: \$500

SOFTWARE

Funding to deliver the necessary digital content and tools in the form of software is critical. In addition, software such as network management software, computer-based curriculum materials, application and productivity software, accounting software, student information system software, data-reporting software and the software needed to adapt technology to the special needs of users is non-negotiable. These software packages are necessary for the district to do business and meet state and federal reporting requirements. Many businesses also find that the Total Cost of Ownership can be controlled if software packages are upgraded at the same time across the company, and if employees are encouraged to use the same version of the software if they work at home. Money can be saved, too, when the installation and upgrading of software can be controlled centrally over the network.¹⁵ Software packages typically have a purchase price and annual maintenance dollars associated with the cost.

Software Needed	Annual Cost per Student
Student Information System	\$4
Network management	\$22
Curriculum materials <ul style="list-style-type: none"> • Reading instructional tools • Writing instructional tools • Math instructional tools • Social studies instructional tools 	\$18

¹⁵ "TCO Checklist: Software Costs and How to Control Them." Taking TCO to the Classroom. COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <<http://www.classroomtco.org/checklist/software.html>>.

Wyoming Foundational Technology Funding Rationale

<ul style="list-style-type: none"> • Science instructional tools • Professional development instructional tools 	
Data reporting	\$2
Accounting/Fiscal management	\$3
Software Needed	Annual Cost per Student
Transportation management/reporting	\$9
Email system	\$2
Web Management	\$10
Application and productivity software <ul style="list-style-type: none"> • Microsoft Office Suite or similar • PDF/web creation software • Basic video creation software • Basic photo editing software 	\$36
Course delivery (such as Blackboard)	\$15
Emergency Alert system	\$3
Assessment tools <ul style="list-style-type: none"> • Reading benchmark • Writing benchmark • Math benchmark • Science benchmark • Social Studies benchmark 	\$15

TOTAL ANNUAL PER STUDENT COSTS: \$139

REPLACEMENT COSTS

Industry standard replacement cycles and costs have been calculated into all scenarios in this document.

RETROFITTING¹⁶

One cost that will vary widely from school district to school district is the amount that must be spent to wire an existing physical plant. Retrofitting is not traditionally part of Total Cost of Ownership analyses, but it is a cost that school districts frequently face-and sometimes fail to anticipate.

The best time to wire a school is when it is under construction, or in the case of an existing building, when it is being renovated or expanded. Wiring existing schools will involve additional costs, including, in some cases, the cost of asbestos and/or lead removal, new lighting and modifications to meet the requirements of the Americans with Disabilities Act.

¹⁶ "TCO Checklist: Retrofitting." [Taking TCO to the Classroom](http://www.classroomtco.org/checklist/retrofitting.html). COSN Advancing K-12 Technology Leadership. 24 Feb 2009 <<http://www.classroomtco.org/checklist/retrofitting.html>>.

Wyoming Foundational Technology Funding Rationale

For the purpose of producing a nationwide figure, a study by McKinsey & Company Inc. estimated that 65 percent of American schools were more than 35 years old and had not undergone a major renovation to support technology. The study projected that some of these schools would use wireless technology, but that would not be practical in every case. To wire older schools, the consultants projected it would cost an average of \$65,000 per school for asbestos removal and other infrastructure improvements. New schools were assumed to have adequate wiring; schools that were between 5 and 35 years old were assumed to require wiring, but not asbestos removal.

McKinsey also projected that 23 percent of the nation's schools would require an upgrade of their electrical system and another 4 percent, improvements to their heating, ventilation and air conditioning (HVAC) systems. It estimated that the average school would spend \$240,000 on electrical upgrades and \$31,800 on HVAC. It also projected that the average school district would spend \$355 per computer on new furniture and \$350 per room on security improvements.

A study for the Council of Educational Facility Planners International and based on 30 construction projects in the Midwest found it cost \$1,500 per "classroom equivalent" for infrastructure in new construction and \$3,000 per "classroom equivalent" in renovation-modernization projects. That cost included one additional 20-amp 100VAC circuit, six empty data box drops and six duplex outlets. Additional electrical service, it said, would cost a minimum of \$50,000.

It has been projected that up to 10 percent of the total cost of technology systems and related building modifications could be saved if both initiatives are planned and implemented at the same time.

ANY SCHOOL NOT MEETING MINIMUM REQUIREMENTS OUTLINED IN THIS DOCUMENT
WILL NEED MAJOR MAINTENANCE DOLLARS FOR RETROFITTING

SAFETY AND SECURITY

Network security is absolutely critical in today's sophisticated, technical environment. Network security functions in two arenas. First, protecting school district data systems from unauthorized viewing and; second, protecting children and staff from inappropriate and dangerous internet practices. Every school district employs a student management system which includes not only confidential student information but is required by the state of Wyoming in order to receive state and federal funding. Additionally, districts deploy distributed accounting systems across their wide area network. These systems as well as email, special education and data warehouses are often the target of inside and outside hacking.

The Children's Internet Protection Act of 2004 requires school districts who receive federal funding to block certain Web sites. Additionally, due to the volume as well as the explicit and embarrassing nature of spam sent to district staff and students, spam management appliances are becoming necessary management tools for district email systems.

School districts are thus charged with the responsibility to purchase and maintain security systems including filters, firewalls, proxies and security management appliances.

Wyoming Foundational Technology Funding Rationale

Component	Cost Per User (based on the estimated cost of the unit, 3 years of maintenance and support)
Email SPAM Firewalls	\$3
External threat firewall	\$2
Web content filter	\$10

TOTAL ANNUAL PER STUDENT COSTS: \$15



ACCOUNTABILITY

It is important to note that in the technology field, all of the resources defined in this document are dependent on each other. For example, a laptop in every student’s hand is inconsequential without adequate training for teachers and staff. Adequate training is of little value if there is not adequate technical support, which allows teachers to focus on teaching and learning. Technologies will have little value if there is not sufficient bandwidth to deliver resources. Resources will lose their impact if there is not adequate network and security infrastructures.

If all resources are funded appropriately, the following benchmarks can be expected following the 5-year implementation period:

MEASURE 1

From Teaching, Learning, and One-to-One Computing, Talbot Bielefeldt, International Society for Technology in Education National Educational Computing Conference, San Diego, July 6, 2006:

Finding	Reported in*	Example
Attendance and discipline rates improve.	Knezek & Christensen, (2005); Light et al. (2002); Zucker & McGhee, (2005)	Discipline referrals in Texas schools participating in a laptop initiative dropped, while referral rates in comparison schools increased. (Knezek & Christensen, 2005)
Students access a broader array of learning resources and experiences (including increased collaboration with others and increased use of technology for learning).	Lane (2003); Light, et al. (2002); Vahey & Crawford (2002); Walker et al. (2000); Zucker & McGhee, (2005)	Increased use of technology for educational use in school and at home; improved scores on writing assessment in the Microsoft/Toshiba Learning Anytime Anywhere Pilot (Walker et al., 2000).
Relationship between teacher and student changes	Bobkoff & Kratcoski, (2004-2005); Honey (2001); Sargent (2003); Light et al. (2002). Owen et al. (2005-2006); Zucker & McGhee, (2005)	Students and teachers report increased frequency and quality of supportive individual and group interactions (Light et al., 2000).
Student attitudes toward school improve.	Lane 2003; Vahey & Crawford, (2002); Swan et al. (2005); Zucker & McGhee, (2005)	Students and teacher survey responses show increased enthusiasm for school work in classes among participants in Palm’s Education Pioneers program (Vahey & Crawford, 2002).
Parent attitudes toward school improve.	Rockman (2003); Zucker & McGhee, (2005).	In schools participating in laptop programs, parent involvement and communication increases (Rockman, 2003).
Student achievement increases.	Gulek & Demirtas, (2005); Light et al. (2002); Muir et al. (2004); Swan et al. (2005); Walker et al. (2000).	Schools implementing Maine’s laptop initiative for three years had significantly higher test scores than comparison schools in Science, Math, and Visual/Performing arts. (Muir et al., 2004).

*See the reference list for complete citations.

MEASURE 2

From Learning With Technology: The Impact of Laptop Use on Student Achievement, James Cengiz Gulek & Hakan Demirtas, 2005 [E]ighth grade students in the 2003-04 school year... went through the program for three consecutive years... Their baseline data was gathered in 2000-01 when they were fifth graders...

2003-04 Cumulative Grade Point Average		
Grade	Program Enrollment	
	Laptop	Non-laptop
Eighth	3.23	3.07
2003-2004 End of Course Grades — Eighth Grade		
Letter Grade	Program Enrollment	
	Laptop	Non-laptop
	English Language Arts	
A	36%	39%
B	54%	40%
C	10%	17%
D	0%	3%
F	0%	1%
	Mathematics	
A	24%	23%
B	36%	29%
C	20%	28%
D	20%	11%
F	0%	9%

MEASURE 3

From Maine’s Middle School Laptop Program: Creating Better Writers, David L. Silvernail and Aaron K. Gritter, Maine Education Policy Research Institute, University of Southern Maine, October 2007:

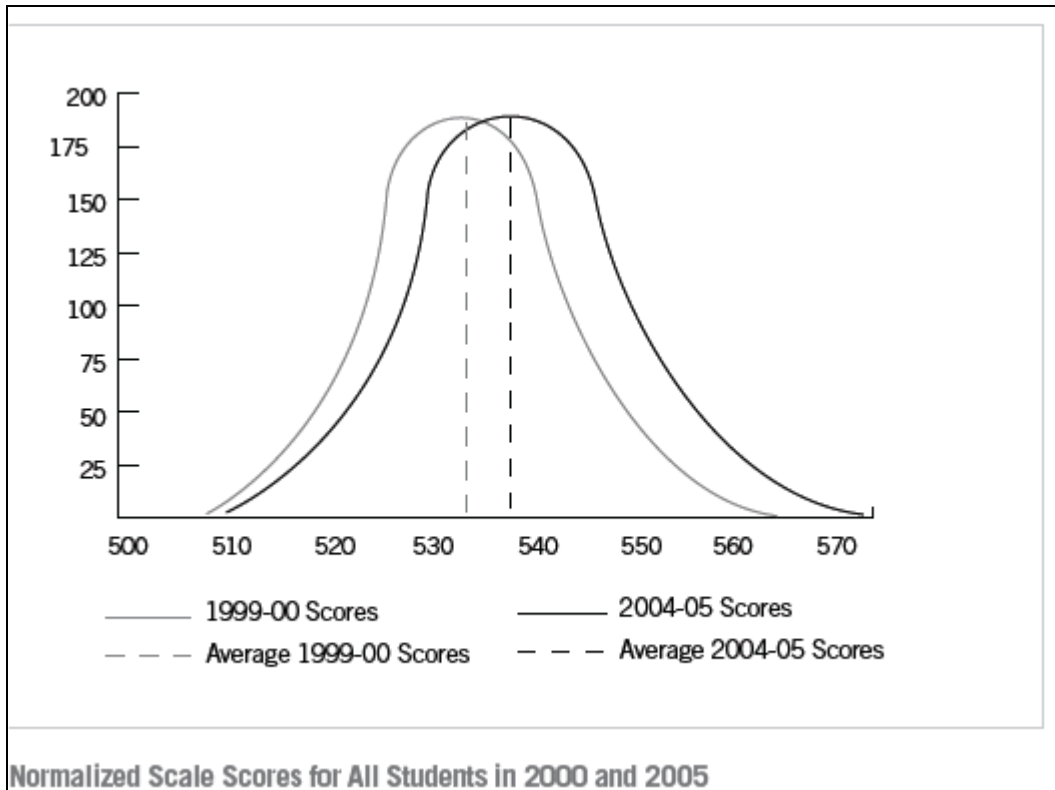
[Eighth] grade MEA (Maine Educational Achievement) writing scores were examined for two time periods; for 2000, a year prior to implementation of the statewide program, and for 2005, five years after the initial implementation of the program. The writing portion of the MEA consists of a writing prompt that is double scored. Scale scores may range from 500 to 580, and a scale score of 540 or above indicates a student has met or surpassed the state established proficiency level in writing. The following graph depicts the... information... as normalized scale scores for the two years.

An average student in 2005 scored better than approximately two-thirds of all students in 2000. Further analysis revealed there was a concomitant improvement in the number of students actually meeting the

Wyoming Foundational Technology Funding Rationale

state writing proficiency standard. In 2000, 29.1 percent of the eighth graders met the writing proficiency standard on the MEA, and in 2005, this had increased to 41.4 percent. Thus, the results indicated writing performance has improved.

[O]ther factors, beyond implementation of the laptop program, may have contributed to improved writing performance over the course of five years (implementing new writing programs in schools, more teacher professional development, etc.), but since these did not occur in all Maine middle schools, and the results are based on the total population of all eighth graders and all Maine middle schools, the results may be attributed, at least in part, to the laptop program.



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FINAL FISCAL RECOMMENDATION

Each school district in Wyoming is at a different level of implementation. To address district needs, it is recommended that this money be funded in a Technology Block Grant, allowing districts to address needs to meet the minimum infrastructure outlined in this document.

*****NOTE: Minimum dollar amounts are rounded to the nearest dollar and are based on smallest Wyoming district of 100 students, 18 certified teachers and 27 staff members (cost increases based on district size).***

District Expenses <ul style="list-style-type: none"> • One-to-One Computing • Testing/Curriculum and Vocational Labs • Professional Development • Support • Connectivity 	\$425,617
Building Expenses <ul style="list-style-type: none"> • Connectivity 	\$42,750
Classroom Expenses <ul style="list-style-type: none"> • 21st Century Classrooms • Connectivity 	\$45,360
Per Student Expenses <ul style="list-style-type: none"> • Support • Software • Safety & Security 	\$17,100
TOTAL MINIMUM DOLLAR AMOUNT	\$530,827

APPENDIX A (NATIONAL EDUCATIONAL TECHNOLOGY STANDARDS)

1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

- a. apply existing knowledge to generate new ideas, products, or processes.
- b. create original works as a means of personal or group expression.
- c. use models and simulations to explore complex systems and issues.
- d. identify trends and forecast possibilities.

2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

- a. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
- b. communicate information and ideas effectively to multiple audiences using a variety of media and formats.
- c. develop cultural understanding and global awareness by engaging with learners of other cultures.
- d. contribute to project teams to produce original works or solve problems.

3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

- a. plan strategies to guide inquiry.
- b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
- d. process data and report results.

4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students:

- a. identify and define authentic problems and significant questions for investigation.
- b. plan and manage activities to develop a solution or complete a project.
- c. collect and analyze data to identify solutions and/or make informed decisions.
- d. use multiple processes and diverse perspectives to explore alternative solutions.

5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students:

- a. advocate and practice safe, legal, and responsible use of information and technology.
- b. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
- c. demonstrate personal responsibility for lifelong learning.

- d. exhibit leadership for digital citizenship.

6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Students:

- a. understand and use technology systems.
- b. select and use applications effectively and productively.
- c. troubleshoot systems and applications.
- d. transfer current knowledge to learning of new technologies.

APPENDIX B (TECHNICAL JOB DESCRIPTIONS)

Job Title: Technology Director

Reports To: Superintendent

FLSA Status: Exempt

Date: 3-4-2008

Job Purpose: Under broad supervision, this position is responsible for coordinating the use of technology to support the K-12 curriculum in the district.

Under broad supervision, this position supervises Technology Integration Specialists, District Technicians, Network Administrator, and Data Processing Specialist.

Characteristic Duties and Responsibilities

Essential Functions:

1. Writes the district's technology plan.
 2. Plans and leads district technology committees.
 3. Interprets and communicates the initiatives in the district technology plan to various groups in and out of the district.
 4. Plans and implements training programs for effective use of technology in administrative offices and the classroom.
 5. Oversees management of student and administrative data.
 6. Demonstrates and models instructional strategies that integrate technology into the classroom.
 7. Plans and coordinates procedures for the maintenance and repair and technical support of computer and computer-related equipment for administrative offices and the classroom.
 8. Develops and communicates technology policies, including acceptable use of technology.
 9. Establishes an effective communication system that allows easy inquiry by users.
 10. Informs users and potential users of services available, new software, and state of the art information.
 11. Oversees computer development and technology; evaluates hardware and software in order to recommend and coordinate the most economical and effective acquisition and use of computer technology by administration, teaching and support staff.
 12. Prepares recommendations and specifications for acquisition of hardware and software. Coordinates the installation of new equipment.
 13. Coordinates and manages financial resources.
 14. Gathers additional funding sources for technology.
 15. Controls and manages technology-related grants at the district level.
 16. Serves as a liaison with other community agencies and businesses.
 17. Meets and communicates regularly with representatives groups of administrators, teachers, and the community.
 18. Coordinates district expectations and planning for new construction.
 19. Screens candidates and makes recommendations to the Superintendent.
 20. Evaluates personnel under direct supervision.
 21. Completes all reports and special duties as assigned by the Superintendent.
-

Wyoming Foundational Technology Funding Rationale

Job Specifications and Qualifications

Education:

- Masters Degree and five years of direct experience in technology and education; Required

Experience:

- Demonstrated proficiency in leadership and technology; Required

Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting
- Non-Smoking environment
- Ability to lift 25 lbs. from desk to floor and floor to desk

Wyoming Foundational Technology Funding Rationale

Job Title: Instructional Technology Facilitator

Reports To: Technology Director

FLSA Status: Non-Exempt

Contract Days: 185

Date: 2-25-2008

Job Purpose: Create learning environments conducive to powerful uses of technology. These learning environments will meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs.

Characteristic Duties and Responsibilities

Essential Functions:

Facilitate the use of technology to support student learning.

Technology Facilitation Standard I. (TF-I)

Technology Operations and Concepts.

Educational technology facilitators demonstrate an in-depth understanding of technology operations and concepts. Educational technology facilitators:

TF-I.A. Demonstrate knowledge, skills, and understanding of concepts related to technology (as described in the ISTE National Educational Technology Standards for Teachers). Facilitators:

1. Assist teachers in the ongoing development of knowledge, skills, and understanding of technology systems, resources, and services that are aligned with district and state technology plans.
2. Provide assistance to teachers in identifying technology systems, resources, and services to meet specific learning needs.

TF-I.B. Demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies. Facilitators:

1. Model appropriate strategies essential to continued growth and development of the understanding of technology operations and concepts.

Technology Facilitation Standard II. (TF-II)

Planning and Designing Learning Environments and Experiences.

Educational technology facilitators plan, design, and model effective learning environments and multiple experiences supported by technology. Educational technology facilitators:

TF-II.A. Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners. Facilitators:

1. Provide resources and feedback to teachers as they create developmentally appropriate curriculum units that use technology.
2. Consult with teachers as they design methods and strategies for teaching computer/technology concepts and skills within the context of classroom learning.

Wyoming Foundational Technology Funding Rationale

3. Assist teachers as they use technology resources and strategies to support the diverse needs of learners including adaptive and assistive technologies.

TF-II.B. Apply current research on teaching and learning with technology when planning learning environments and experiences. Facilitators:

1. Assist teachers as they apply current research on teaching and learning with technology when planning learning environments and experiences.

TF-II.C. Identify and locate technology resources and evaluate them for accuracy and suitability. Facilitators:

1. Assist teachers as they identify and locate technology resources and evaluate them for accuracy and suitability based on district and state standards.
2. Model technology integration using resources that reflect content standards.

TF-II.D. Plan for the management of technology resources within the context of learning activities. Facilitators:

1. Provide teachers with options for the management of technology resources within the context of learning activities.

TF-II.E. Plan strategies to manage student learning in a technology-enhanced environment. Facilitators:

1. Provide teachers with a variety of strategies to use to manage student learning in a technology-enhanced environment and support them as they implement the strategies.

TF-II.F. Identify and apply instructional design principles associated with the development of technology resources. Facilitators:

1. Assist teachers as they identify and apply instructional design principles associated with the development of technology resources.

Technology Facilitation Standard III. (TF-III)

Teaching, Learning, and the Curriculum.

Educational technology facilitators apply and implement curriculum plans that include methods and strategies for utilizing technology to maximize student learning. Educational technology facilitators:

TF-III.A. Facilitate technology-enhanced experiences that address content standards and student technology standards. Facilitators:

1. Use methods and strategies for teaching concepts and skills that support integration of technology productivity tools (refer to NETS for Students).
2. Use and apply major research findings and trends related to the use of technology in education to support integration throughout the curriculum.
3. Use methods and strategies for teaching concepts and skills that support integration of research tools (refer to NETS for Students).
4. Use methods and strategies for teaching concepts and skills that support integration of problem solving/decision-making tools (refer to NETS for Students).
5. Use methods and strategies for teaching concepts and skills that support use of media-based tools such as television, audio, print media, and graphics.

Wyoming Foundational Technology Funding Rationale

6. Use and describe methods and strategies for teaching concepts and skills that support use of distance learning systems appropriate in a school environment.

7. Use methods for teaching concepts and skills that support use of web-based and non web-based authoring tools in a school environment.

TF-III.B. Use technology to support learner-centered strategies that address the diverse needs of students. Facilitators:

1. Use methods and strategies for integrating technology resources that support the needs of diverse learners including adaptive and assistive technology.

TF-III.C. Apply technology to demonstrate students' higher order skills and creativity.

Facilitators:

1. Use methods and facilitate strategies for teaching problem solving principles and skills using technology resources.

TF-III.D. Manage student learning activities in a technology-enhanced environment. Facilitators:

1. Use methods and classroom management strategies for teaching technology concepts and skills in individual, small group, classroom, and/or lab settings.

TF-III.E. Use current research and district/region/state/national content and technology standards to build lessons and units of instruction. Facilitators:

1. Describe and identify curricular methods and strategies that are aligned with district/region/state/national content and technology standards.

2. Use major research findings and trends related to the use of technology in education to support integration throughout the curriculum.

Technology Facilitation Standard IV. (TF-IV)

Assessment and Evaluation.

Educational technology facilitators apply technology to facilitate a variety of effective assessment and evaluation strategies. Educational technology facilitators:

TF-IV.A. Apply technology in assessing student learning of subject matter using a variety of assessment techniques. Facilitators:

1. Model the use of technology tools to assess student learning of subject matter using a variety of assessment techniques.

2. Assist teachers in using technology to improve learning and instruction through the evaluation and assessment of artifacts and data.

TF-IV.B. Use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

Facilitators:

1. Guide teachers as they use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

TF-IV.C. Apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity. Facilitators:

Wyoming Foundational Technology Funding Rationale

1. Assist teachers in using recommended evaluation strategies for improving students' use of technology resources for learning, communication, and productivity.
2. Examine and apply the results of a research project that includes evaluating the use of a specific technology in a P-12 environment.

Technology Facilitation Standard V. (TF-V)

Productivity and Professional Practice.

Educational technology facilitators apply technology to enhance and improve personal productivity and professional practice. Educational technology facilitators:

TF-V.A. Use technology resources to engage in ongoing professional development and lifelong learning. Facilitators:

1. Identify resources and participate in professional development activities and professional technology organizations to support ongoing professional growth related to technology.
2. Disseminate information on district-wide policies for the professional growth opportunities for staff, faculty, and administrators.

TF-V.B. Continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning. Facilitators:

1. Continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.

TF-V.C. Apply technology to increase productivity. Facilitators:

1. Model advanced features of word processing, desktop publishing, graphics programs, and utilities to develop professional products.
2. Assist others in locating, selecting, capturing, and integrating video and digital images in varying formats for use in presentations, publications and/or other products.
3. Demonstrate the use of specific-purpose electronic devices (such as graphing calculators, languages translators, scientific probeware, or electronic thesaurus) in content areas.
4. Use a variety of distance learning systems and use at least one to support personal/professional development.
5. Use instructional design principles to develop hypermedia and multimedia products to support personal and professional development.
6. Select appropriate tools for communicating concepts, conducting research, and solving problems for an intended audience and purpose.
7. Use examples of emerging programming, authoring or problem solving environments that support personal/professional development.
8. Set and manipulate preferences, defaults, and other selectable features of operating systems and productivity tool programs commonly found in P-12 schools.

TF-V.D. Use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning. Facilitators:

1. Model the use of telecommunications tools and resources for information sharing, remote information access, and multimedia/hypermedia publishing in order to nurture student learning.
2. Communicate with colleagues and discuss current research to support instruction, using applications including electronic mail, online conferencing, and web browsers.
3. Participate in online collaborative curricular projects and team activities to build bodies of knowledge around specific topics.
4. Design, develop, and maintain Web pages and sites that support communication between the school and community.

Technology Facilitation Standard VI. (TF-VI)

Social, Ethical, Legal, and Human Issues.

Educational technology facilitators understand the social, ethical, legal, and human issues surrounding the use of technology in P-12 schools and assist teachers in applying that understanding in their practice. Educational technology facilitators:

TF-VI.A. Model and teach legal and ethical practice related to technology use. Facilitators:

1. Develop strategies and provide professional development at the school/classroom level for teaching social, ethical, and legal issues and responsible use of technology.
2. Assist others in summarizing copyright laws related to use of images, music, video, and other digital resources in varying formats.

TF-VI.B. Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities. Facilitators:

1. Assist teachers in selecting and applying appropriate technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.
2. Identify, classify, and recommend adaptive /assistive hardware and software for students and teachers with special needs and assist in procurement and implementation.

TF-VI.C. Identify and use technology resources that affirm diversity. Facilitators:

1. Assist teachers in selecting and applying appropriate technology resources to affirm diversity and address cultural and language differences.

TF-VI.D. Promote safe and healthy use of technology resources. Facilitators:

1. Assist teachers in selecting and applying appropriate technology resources to promote safe and healthy use of technology.

TF-VI.E. Facilitate equitable access to technology resources for all students. Facilitators:

1. Recommend policies and implement school/classroom strategies for achieving equitable access to technology resources for all students and teachers.

Job Specifications and Qualifications

Education:

- Master's Degree in Education AND Wyoming Teaching Certificate; Required

Wyoming Foundational Technology Funding Rationale

Experience:

- Five years of continuous work experience in the education field; Required
- Experience with adult learning; Required
- Five years of continuous work experience using educational technologies, including email, online learning software, Microsoft Office, multimedia equipment, and electronic tools; Required

Knowledge, Skills, Abilities:

- Advanced knowledge of technology systems, resources and services aligned with the National Technology Standards.
 - Advanced knowledge of effective adult learning environments and multiple learning styles.
 - Outstanding interpersonal and electronic communication skills (communication, problem solving, and conflict management, collaboration) to share research based instructional approaches with teachers and administrators and provide advice, mentoring and coaching.
 - Outstanding presentation and facilitation skills.
 - Strong organizational skills.
-

Working Conditions / Physical Requirements:

- Office setting
 - Forced air heat and air conditioned environment
 - Extensive use of computers, copiers, printers, telephones, fax machines
 - Long periods of sitting
 - Non-Smoking environment
-

Wyoming Foundational Technology Funding Rationale

Job Title: Technical Personnel – Level I Technician

Reports To: Technology Director

FLSA Status: Non-Exempt

Date: 3-4-2008

Job Purpose: To insure timely support and efficient customer service to district staff and students who request repair or assistance with district technological and related electronic systems.

Characteristic Duties and Responsibilities

Essential Functions:

1. Provide help desk support in operation role.
2. Assists with installations, configuration, and ongoing usability of desktop & laptop computers, peripheral equipment and software with established standards and guidelines.
3. Work with vendors to resolve technical problems with equipment and software.
4. Interact with computer platforms in a multi-layered client server environment.
5. Ensure desktops interconnect seamlessly with diverse systems including file servers, email servers, application servers and administrative systems .
6. Train staff on basic use of hardware, software and remote access.
7. Recommends and / or performs upgrades on systems.
8. Works with Procurement staff to purchase hardware and software.
9. The ability to learn new software titles quickly and efficiently and train others on its use.

Supplemental Functions:

1. Ability to interact professionally with all levels of employees
2. Demonstrated effective customer service skills
3. Strong Time Management skills; ability to prioritize and manage multiple tasks; and ability to work under pressure and under time constraints
4. Ability to plan, organize, prioritize and follow-up on tasks to complete work as scheduled and to meet deadlines
5. Ability to apply an analytical approach and develop alternatives and recommendations
6. Attitude of teamwork, professionalism and a can – do spirit
7. Ability to train and coach others
8. Ability to follow documented operational procedures and independently organize, coordinate, and complete work requests

Job Specifications and Qualifications

Education:

- Associates Degree in Information Technology or closely related area OR two years of direct experience; Required

Licensure:

- None Specified

Wyoming Foundational Technology Funding Rationale

Experience:

1. Demonstrated proficiency in trouble shooting and resolving hardware problems on PC platforms as well as operating and maintaining PC clients; Required
2. Demonstrated proficiency in networking and software applications; Required

Knowledge, Skills, Abilities:

- Basic knowledge of Windows operating system and Microsoft Office, including operation and troubleshooting
- Knowledge of personal computers and networking components
- Ability to install and configure personal computer components, including hard drives, CD ROMs, scanners, video cards, and memory is beneficial
- Ability to install software applications
- Proven ability to troubleshoot computer and peripheral issues
- Intimate knowledge of Windows Professional platforms, Microsoft Office, and Adobe Products.
- Hand-on desktop experience with Intel architecture PC's and Dell laptops.
- Excellent technical knowledge of PC internal components such as video cards, motherboards, etc.
- Experience supporting peripheral devices such as printers, pda's, scanners, etc.
- Analytical and problem-solving abilities, with keen attention to detail.
- Knowledge of industry best practices and procedures.
- Good knowledge of networking protocols and components within a corporate WAN.
- Proven written oral and interpersonal communications skills to effectively communicate with peers and management.
- Excellent customer service skills required to provide a high level of customer service by answering questions, providing accurate information, and responding to requests in a timely manner.

Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting
- Non-Smoking environment
- Ability to lift 75 lbs. from desk to floor and floor to desk
- Ability to climb ladders 6-8 feet in height
- Work safely with high and low-voltage wiring and equipment

Wyoming Foundational Technology Funding Rationale

Job Title: Technical Personnel – Level II Technician

Reports To: Technology Director

FLSA Status: Non-Exempt

Date: 3-4-2008

Job Purpose: To insure timely support and efficient customer service to district staff and students who request repair or assistance with district technological and related electronic systems.

Characteristic Duties and Responsibilities

Essential Functions:

1. Responds to trouble tickets assigned through the request management system.
2. Provides accurate, timely, and creative solutions to users' technology problems of moderate to complex nature that require detailed business, systems and applications knowledge.
3. Responds to situations where standard procedures have failed in isolating or fixing problem equipment or software.
4. Performs restorative and maintenance actions either remotely or at the end user's location to resolve problems, using advanced troubleshooting and technical skills.
5. Maintains accurate information and data regarding user issues within the tracking system and according to policies and standards.
6. Performs desktop software and hardware deployment as required to support IT project initiatives and site openings and/or relocations.
7. Installs client desktop systems and laptops, coordinates hardware maintenance and repairs, tracks and maintains inventory.
8. Provides proactive customer support.
9. Provide communication between the operation and planning sides of the district technology programs.
10. Performs any other duties as assigned by his/her supervisor.

Supplemental Functions:

1. Ability to interact professionally with all levels of employees
2. Demonstrated effective customer service skills
3. Strong Time Management skills; ability to prioritize and manage multiple tasks; and ability to work under pressure and under time constraints
4. Ability to plan, organize, prioritize and follow-up on tasks to complete work as scheduled and to meet deadlines
5. Ability to apply an analytical approach and develop alternatives and recommendations
6. Attitude of teamwork, professionalism and a can – do spirit
7. Ability to train and coach others
8. Ability to follow documented operational procedures and independently organize, coordinate, and complete work requests

Job Specifications and Qualifications

Education:

- Associates Degree in Information Technology or closely related area OR two years of direct experience; Required

Wyoming Foundational Technology Funding Rationale

Licensure:

- Ability to obtain Wyoming Low Voltage General License within three months of hire: Required

Wyoming Foundational Technology Funding Rationale

Experience:

1. Demonstrated proficiency in trouble shooting and resolving hardware problems on PC platforms as well as operating and maintaining PC clients; Required
2. Demonstrated proficiency in networking and software applications; Required

Knowledge, Skills, Abilities:

- Basic knowledge of Windows operating system and Microsoft Office, including operation and troubleshooting
- Knowledge of personal computers and networking components
- Ability to install and configure personal computer components, including hard drives, CD ROMs, scanners, video cards, and memory is beneficial
- Ability to install software applications
- Proven ability to troubleshoot computer and peripheral issues
- Intimate knowledge of Windows Professional platforms, Microsoft Office, and Adobe Products.
- Hand-on desktop experience with Intel architecture PC's and Dell laptops.
- Excellent technical knowledge of PC internal components such as video cards, motherboards, etc.
- Experience supporting peripheral devices such as printers, pda's, scanners, etc.
- Analytical and problem-solving abilities, with keen attention to detail.
- Knowledge of industry best practices and procedures.
- Good knowledge of networking protocols and components within a corporate WAN.
- Proven written oral and interpersonal communications skills to effectively communicate with peers and management.
- Excellent customer service skills required to provide a high level of customer service by answering questions, providing accurate information, and responding to requests in a timely manner.

Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting
- Non-Smoking environment
- Ability to lift 75 lbs. from desk to floor and floor to desk
- Ability to climb ladders 6-8 feet in height
- Work safely with high and low-voltage wiring and equipment

Wyoming Foundational Technology Funding Rationale

Job Title: Technical Personnel – Level III Technician

Reports To: Technology Director

FLSA Status: Exempt

Date: 2-17-2008

Job Purpose: Act as advanced technical resource for the District's technology support team; perform advanced analysis, development, implementation and monitoring of network operations, communication systems, video and server domains at the enterprise level; provides scripting for a variety of network and computer systems; researches and evaluates software, hardware and peripheral purchase options; ensure minimal network downtime through best practice analysis and optimal designs and configurations; monitor and update network security for District computer systems; analyze network for security weaknesses; design, implement, and administer security solutions for District information systems including global firewall; maintain security across multiple systems, platforms and network(s); investigate security violations and fraudulent activity; act as advanced expert functional specialist; acts as liaison between the Technology Team and the District by providing advanced level technical expertise while working under minimal supervision.

Characteristic Duties and Responsibilities

Essential Functions:

1. Install, configure, maintain, troubleshoot, and analyze district networks, computer systems, telecommunication systems, and software applications, providing advanced technical expertise in all matters;
2. Install, configure, test, and analyze software and hardware to insure operational status of network systems;
3. Coordinate maintenance of software, systems and network;
4. Design, analyze, configure, and maintain networks and systems, ensuring compatibility with district standards;
5. Design, analyze, configure, and maintain network security best practices, ensuring information, file and data integrity throughout all district systems;
6. Provide district Administration with sufficient information and data in order for technological and management decisions to be made based upon factual and appropriate data through the proactive analysis and monitoring of district network and computer domains/systems;
7. Assist technology team in troubleshooting problems and project implementation based upon district level analysis and monitoring. Respond to system failures in order to bring them back to functioning levels of operation;
8. Confer with teachers, staff and administration concerning information, support and needs requests; maintain production support for systems by working with stakeholders on upgrades, enhancements or new product installs;
9. Assist with development and revision of procedures, documentation, disaster recovery plans, and specifications;
10. Develop procedures to maintain integrity, access, and protection of networks, data, systems hardware and associated software including backups and updates; oversee and update procedure manuals/documents.

Wyoming Foundational Technology Funding Rationale

Supplemental Functions:

1. Confer with and provide training and support to help desk staff on network and systems issues;
2. Practice network asset management, including maintenance of network component inventory;
3. Aid in the specification and purchase of new equipment, systems and software;
4. Provide advanced support, installation and configuration of document management stations;
5. Perform other duties and participate in special projects as assigned by administration.

Job Specifications and Qualifications

Education:

- Associates Degree in Information Technology or closely related area OR five years of direct experience; Required

Licensure:

- Ability to obtain Wyoming Low Voltage General License within three months of hire: Required

Experience:

- Three years of continuous work experience performing the installation, configuration and analysis of enterprise level networking equipment, including advanced routing, switching and security techniques; Required
- Three years of continuous work experience performing multi-server domain security, installation, configuration and analysis; Required
- Two years experience using various scripting languages and techniques; Required
- Two years experience installing, configuring and maintaining distributed database systems; Required

Knowledge, Skills, Abilities:

- Working knowledge of various operating systems such as FreeBSD, Linux, UNIX, and Windows based platforms;
- Advanced knowledge of personal computers, software and peripheral devices;
- Advanced knowledge of telecommunication systems;
- Working knowledge of advanced methods and techniques of network analysis, design, computer operations, and systems monitoring;
- Working knowledge of analysis, design, installation, compatibility, connectivity, and operating systems principles;
- Working knowledge of computer, video, and communications technologies;
- Working knowledge of advanced network protocols, topologies, routing and switching methodologies.
- Working knowledge of analysis and design of computer, network and security systems, network data control, password, and file protection protocols;
- Information Technology project planning, research, cost estimation, and task support;
- Information Technology strategic planning;
- Software and hardware troubleshooting methods and techniques;
- Ability to work under pressure of deadlines and varying work schedules;
- Ability to act as lead worker;
- Demonstrated ability to establish effective working relationships with team members, vendors, and administration;

Wyoming Foundational Technology Funding Rationale

- Demonstrated customer service skills;
- Advanced troubleshooting and research skills;
- Demonstrated ability to act as an effective team member, can train, coach and learn from others;
- Demonstrated flexibility in the work environment, ability to adapt to changing priorities, requests and requirements.

Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting
- Non-Smoking environment
- Ability to lift 75 lbs. from desk to floor and floor to desk
- Ability to climb ladders 6-8 feet in height
- Work safely with high and low-voltage wiring and equipment

Wyoming Foundational Technology Funding Rationale

Job Title: Data Management Specialist – Level I Specialist

Reports To: Technology Director

FLSA Status: Non-Exempt

Date: 3-4-2008

Job Purpose: To ensure timely and efficient data entry and reporting.

Characteristic Duties and Responsibilities

Essential Functions:

1. Provides proactive customer support.
 2. Provide communication between the operation and planning sides of the district technology programs.
 3. Data entry into the student management and other systems.
 4. Confirm accuracy of data in district systems.
 5. Export appropriate data for state reporting.
 6. Create and/or export data for data analysis tasks for district and/or schools.
 7. Create appropriate Excel charts and spreadsheets for data analysis.
 8. Create online forms for data input.
 9. Access state systems to collect data for district and/or schools.
 10. Responds to trouble tickets assigned through the request management system.
 11. Provide end user support.
 12. Create and/or post updates to student management and other systems.
 13. Ensure collection and storage of assigned system backups.
 14. Generate appropriate data state reports.
 15. File state reports in accordance with deadlines.
 16. Upload data from district servers to state servers.
 17. Coordinate and/or collect information in data gathering activities as defined by the District Technology Director.
 18. General document creation (i.e. letters, newsletter, brochures) as assigned by the District Technology Director.
 19. Other duties as assigned by the District Technology Director.
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Job Specifications and Qualifications

Education:

- Associates Degree or closely related area OR two years of direct experience; Required

Experience:

- Demonstrated proficiency in data input, analyzing data, and data accuracy; Required
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Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting

Wyoming Foundational Technology Funding Rationale

- Non-Smoking environment
- Ability to lift 25 lbs. from desk to floor and floor to desk

Job Title: Data Management Specialist – Level II Specialist

Reports To: Technology Director

FLSA Status: Non-Exempt

Date: 3-4-2008

Job Purpose: To ensure timely and efficient data reporting, analysis and system integration.

Characteristic Duties and Responsibilities

Essential Functions:

1. Compiles a variety of reports (e.g. status/activity reports, logs, grades, financial status, etc.) for the purpose of providing information and/or complying with legal mandates.
2. Coordinates installation and maintenance of computer hardware, software and peripherals, including communication hardware and software as they relate to student and business management programs (e.g. upgrades, drivers, etc.) for the purpose of providing access to local applications by site and district users.
3. Designs and creates reports options and/or database applications for the purpose of providing personnel with information customized to their specific needs.
4. Designs reports options and/or database applications for the purpose of providing personnel with information customized to their specific needs.
5. Develops and prepares user materials for the purpose of providing instruction and reference.
6. Instructs district and site staff on the use of districtwide information systems (e.g. new applications, upgrades, updates, etc.) for the purpose of ensuring proper and efficient use of system.
7. Oversees assigned projects or program components (e.g. updating bell schedules, student systems, upgrades generating calendars, etc.) for the purpose of ensuring accurate and timely completion of related tasks.
8. Prepare written materials (e.g. reports, memos, instructions, etc.) for the purpose of documenting activities, providing written reference and/or conveying information.
9. Responds to inquiries relating to computer hardware and/or software applications (primarily student information and business management software) for the purpose of resolving problems and supporting site and district users.
10. Responds to user requests for a variety of report options (e.g. attendance, enrollment, test scores, timelines, etc.) for the purpose of disseminating information to appropriate parties.
11. Troubleshoots issues related to the districtwide information systems and software applications for the purpose of resolving user problems.
12. Other duties as assigned by the District Technology Director.

Job Specifications and Qualifications

Wyoming Foundational Technology Funding Rationale

Education:

- Associates Degree or closely related area OR two years of direct experience; Required

Experience:

- Demonstrated proficiency in data input, analyzing data, and data accuracy; Required
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Working Conditions / Physical Requirements:

- Office setting
- Forced air heat and air conditioned environment
- Extensive use of computers, copiers, printers, telephones, fax machines
- Long periods of sitting
- Non-Smoking environment
- Ability to lift 25 lbs. from desk to floor and floor to desk



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