

Nevada Schools Educational Technology Needs Assessment

Report to the Nevada Commission on Educational Technology & the Nevada
Department of Education

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Executive Summary

The amount of technology available in Nevada schools and classrooms is significant and growing. Virtually every classroom in the state has at least one computer connected to the Internet. More than half of the teachers who responded to a survey reported that their classroom had some type of computer projection device (e.g., LCD Projector, interactive whiteboard or computer-TV converter). However, only 23% of classrooms have more than three computers for students to use for learning. In other words, while a number of classrooms are well equipped for teacher-led instruction, very few are equipped for student-centered instruction that utilizes computers. Teachers do have additional resources available through the shared use of mobile laptop carts and computer labs that can be used temporarily in the classroom. Thirty one percent of the responding teachers reported that they had access to a mobile laptop cart from their school.

Teachers reported being moderately well prepared to use technology in the classroom and they were generally positive about the technical support systems in place. However, they felt that the professional development opportunities were relatively low in quality and difficult to participate in due to time and budget constraints. Technology coordinators described significant challenges to offering high quality professional development programs that could be widely implemented.

Statewide technology planning is viewed as an important function and in need of increased attention. While the level of technology planning varies by district and school, those who have allocated significant time and resources to planning report that the results have been beneficial. An emphasis on technology planning can a) help make decisions regarding resource allocation, b) increase *buy-in* from district and school leaders, and c) inform other planning documents such as school improvement plans. Technology planning is at times frustrated by inconsistent (sometimes absent) funding mechanisms. In addition, participants in this study reported that guidance from the Nevada

Department of Education and the Commission on Educational Technology would greatly improve their capacity to engage in substantive technology planning.

Overall, the technology needs of Nevada classrooms and schools remain immense and in need of continued and consistent support. The technology penetration has reached the classroom, but not necessarily the students. In other words, classrooms are relatively well equipped to present information but not as well equipped to engage students as active participants. The same can be said for the capacity of teachers. While the initial preparation might be adequate, the professional development opportunities are not sufficient to support the more effective uses of computer technology in the classroom. As one teacher stated in response to a question about the potential for technology use in their classroom: *"I could do so much more."*

Purpose

The purpose of this document is to present the findings of the 2008 Educational Technology Needs Assessment for Nevada schools and districts. The needs assessment was guided by the requirements set forth in SB184 (sections 19.1d, 19.6a-b, and 27.1-27.3). The following research questions were developed to address these requirements.

1. *What is the current status of the state and district educational technology plans?*
2. *In what ways can educational technologies, such as computer-based assessments, laptop computers and web-based tools, improve instructional development, delivery, and assessment in Nevada?*
3. *What is the current capacity of schools in Nevada to positively impact the achievement of students through the use of educational technologies?*
4. *How prepared are Nevada teachers to integrate technology into the classroom?*

Needs Assessment Design

To address these questions a research plan with a focus on Nevada classrooms was developed and implemented. The primary sources of the data reported here are Nevada K-12 classroom teachers and technology coordinators. This data was gathered through the use of a teacher survey, a technology coordinator survey and a limited number of interviews.

Teacher Survey

A Web-based survey for teachers was developed to collect information regarding the current technology capacity of their classrooms, schools and districts. Items in this section included questions such as: *Do you have an LCD projector in your classroom?* and *Do you have computers that students can use?* In addition to the access questions, the survey solicited information regarding

their preparation and professional development opportunities in technology. Items in this section included questions such as: *How would you rate the quality of the professional development opportunities provided by your district?* and *How well prepared are you to integrate technology into the classroom?*

One thousand four hundred and seventy eight Nevada classroom teachers provided information via the Web-based survey. Details on the development, implementation and participant selection can be found in Appendix A. The survey items can be found in Appendix B.

Technology Coordinators Survey

A Web-based survey for district technology coordinators was also developed. This 27-item survey consisted of mostly open-ended questions regarding technology planning, classroom capacity, school resources, teacher preparation and professional development. All of the state technology coordinators were invited to complete the survey. The items presented in this survey can be viewed in Appendix D.

Interviews

A limited number of interviews were also conducted to support the assessment. Eight individual interviews were conducted. Five of these were with district technology coordinators, two with school-based coordinators and one with a technology representative from the Nevada Department of Education. In addition, a focus group session was conducted with four representatives from the Clark County School District. The interview questions are listed in Appendix C.

Other Data Sources

Other significant sources of information included the state technology plan, district technology plans, Nevada public school accountability Web site (Nevada Report Card), and district applications for state technology implementation funds. In addition, numerous research and evaluation studies in the applicable areas were reviewed.

Results

Organization

The results will be organized by the research questions. The first section deals with the state and district technology plans specifically and technology planning in general. The second section will address the findings regarding specific initiatives such as computer-based assessments and laptop initiatives. The third section describes the technology available in Nevada classrooms and schools. The final section addresses questions of teacher preparation and professional development in the area of technology integration.

District Categories

Succinctly describing the technology needs of an entire state is challenging. This is due in part to the great variations that exist in the state districts and schools. Geography, diversity, economics and enrollments all make a critical contribution to the unique needs of each district, school and ultimately the classroom. The data collected to support this assessment can provide the information necessary to tease out how these contributions relate to the technology needs of each district. Much of the findings reported here depend upon the enrollment of the school district. To facilitate a richer description of the findings, this report will refer to large, medium and small school districts using the demarcations described in Table 1.

Table 1. Size definitions

Size	Student Enrollments	Districts
Small	< 2000	Esmerelda Eureka Lander Lincoln Mineral Pershing Storey White Pine
Medium	2000 – 20,000	Carson City Churchill Douglas Elko Humboldt Lyon Nye
Large	> 20,000	Clark Washoe

Technology Plans

The primary sources of information for this section were the interviews with technology coordinators, the survey of technology coordinators and a review of the state and district educational technology plans.

The reported use of the state and district educational technology plans varies seemingly with the size of the school district. Large districts have made significant commitments to administrative positions directing technology initiatives. These districts tend to use their own plans regularly in the planning of technology initiatives. While most noted that the state plan is dated, they do utilize it to guide some of the decision making related to technology. Medium districts use of the plans varied. Many would utilize the state plan when required and used it to support the development of their district plan. The small districts utilized the state plan to guide requests for

funding and the development of their own plans. All of the districts felt that a new state plan was needed.

District Technology Plans

District plans are used extensively for technology planning in most districts. The plans are regularly reviewed and updated in part due to requirements from the state and federal governments. For most districts these plans impact district-level decisions, but few seem to have a consistent impact on what happens with school technology purchases.

The involvement of district leaders in the development, approval, and implementation of the technology plans was often noted in interviews as a critical feature of an effective plan. Some districts did this through the sharing of the technology plan with the school board on an annual basis. Others accomplished this through the inclusion of district administrators on the district technology committee. Another critical feature of effective plans was the regular review and updating of plans. These reviews would include assessing progress towards goals, updates in the language and technologies. Reviews would also include updates that reflected changes to district improvement plans and academic standards. Districts have attempted to have these reviews coincide with updates to the state plan. However, the lack of predictable revisions to the state plan has made this difficult.

State Technology Plan

The overall alignment of the state and district plans was strong. This indicates there is significant value in having a thoughtful and useful state plan in place. Districts will look to the state plan for guidance, which can in turn impact school plans. However, the connection between the school plans and district plans seems limited in most of the small and medium districts where there is not an onsite technology representative. Virtually every district plan referred to the goals laid out in the state plan. While this may have been due in large part to requirements established by the state technology office, it is clear that the use of a common set of goals can help to guide planning at multiple levels.

Technology Plan Impact

The systematic development and review of technology plans has the potential for broad positive impact on student outcome measures such as achievement and motivation. This can be accomplished through the use of a shared vision that is presented in a common language. Once this vision and language is established, more progress can be made in these areas.

At present, the impact of the state and district plans on technology integration and student achievement is difficult to ascertain. While the goals of the state plan are frequently referenced in grant applications, there does not appear to be a strong consensus around what these goals mean. For example, the state plan goal number 2 states:

High-quality content materials are available and accessible to both students and teachers to support a standards-based curriculum.

This goal is frequently referenced in applications for state grants for requests as varied as iPods, interactive whiteboards and supporting distance-learning programs. If the goals articulated in the state plans were clear to all the districts, one would expect more consistency in the types of activities that are conducted under the premise that they help meet a particular goal. As it stands now, districts are more likely to reference a goal simply because it is required rather than as a mechanism to help focus resources in critical areas.

One district emphasized the need for the state plan to include measurable targets and timelines. This can better support the evaluation of the progress towards educational goals. One of the areas where the current state plan did include specifics was the description of the Levels of Technology Integration. Several coordinators would describe their schools in terms of these levels. It was also clear that the need to achieve level one integration in terms of hardware (1 computer in every classroom) had driven some of the early allocations of resources. The evidence suggests that virtually every classroom has at least one Internet connected computer. Unfortunately, few classrooms go beyond meeting the requirements for level one integration. Classroom technology capacity will be described in more detail later in the report. The

important point here is that the technology plan can provide a common language and set of goals that can be used to discuss and plan for technology needs.

Funding & Guidance

In interviews and surveys, technology coordinators repeatedly indicated that inconsistent funding and guidance made it extremely difficult to plan. Some districts reported they had a small amount of dependable funding from operational funds. State, federal and other grants provide the bulk of the funds for technology. This dependence upon irregular funds results in a number of one-year (or less) programs that are difficult to evaluate.

Restrictions on how funds can be used were noted as significant challenges. In some instances, these restrictions have resulted in schools becoming rich in hardware but so poor in other areas such as bandwidth and/or professional development that the hardware could not be effectively utilized. The teacher survey results presented below describe a state where district needs vary greatly depending upon how they have allocated prior resources.

Guidance from the state was also noted as a challenge for many in terms of planning for technology integration. Over the past several years, there has been a limited amount of support from the state. The Technology and Innovative Programs office is not equipped to adequately and consistently support the necessary granting, documentation, planning and communication functions that are now required of state departments of education. A cursory look at comparable states reveals that other offices are staffed at a much higher level. Reviews of the staff listings from the web sites of surrounding states indicated that the comparable state offices had significantly more resources committed to technology. The web site of the State Educational Technology Directors Association (SETDA) also lists the *EdTech Team* members for each state and appears to support the assertion that when compared to western states with similar populations, Nevada is on the low end of allocating personnel resources to educational technology. This preliminary look should not be construed as a thorough comparison of resource allocations

at the state level. However, it does indicate that a more in depth review is warranted.

Other States

Like Nevada, surrounding states have developed educational technology plans to support an efficient use of resources and meaningful planning. There is a wealth of resources available on the Internet to support these activities. Identifying a few of the most valuable sites will help guide future revisions of the state technology plan.

Several states explicitly refer to the International Society for Technology in Education (ISTE) standards in their technology plans. The plans include general mission statements and attempt to specify the purpose of the document. The plans include general goals but often expand on the goals to include specific indicators that would imply progress towards the goals.

General Observations

The state technology plan is in many ways the starting point of educational technology for district technology coordinators. Districts are looking for the state to provide guidance in this area. An up-to-date and well articulated state plan can guide plan development in each district and provide a common document upon which substantive collaborations can be built.

Coordination with national standards can support the planning process in a number of ways. ISTE is a non-profit organization that has committed significant resources to supporting technology planning and the development of academic and professional standards. *Using ISTE's planning resources and standards as a basis for the development of a new state technology plan is recommended.*

Educational Technologies Improving Instructional Development, Delivery, and Assessment in Nevada

The integration of technology in teaching and learning has widespread support from educators, policy makers, parents, and industry. The premise for this support often includes considerations of efficiency, improvements in achievement, and the need for technology skills amongst graduates. Rather than looking at technology integration in general terms, this section of the report will focus on some specific activities that many believe can support these larger goals. In particular, this section will address the potential for expanding the use of computer-based assessments, laptop computers, and web-based collaborative technologies.

Computer-based Assessments

The educational reform movements of the past twenty years have placed a strong emphasis upon accountability and data-driven decision-making. Assessment development and implementation are resource intensive activities. The need to utilize technology to increase efficiency in the process is important for a number of reasons. One of the most widely cited reasons is the need to provide timely feedback for students and teachers. In addition, the costs of printing and distributing paper tests can be eliminated.

When asked about the possibility of expanding the use of computer-based assessments most technology coordinators in the state expressed optimism and support. However, they quickly acknowledged the tremendous challenges that this would present with the current infrastructure. The discussion of computer-based assessments was telling in that it provided an excellent example of the potential for technology to greatly improve a major task of schools but how the poor infrastructure renders it virtually impossible to realize the potential.

Discussions with assessment experts in the state and elsewhere reflected a similar level of optimism. Their reactions were also quickly tempered with the realization that the infrastructure to support wide-scale implementation is not in place. They noted that when every student in a school takes a paper and

pencil test, the physical resources necessary are easily accessible. Once the same exam is moved to a computer, *every* student needs a dependable computer and Internet connection. When asked to consider rotating students through computer labs or the use of portable laptop carts most felt that for the majority of schools, this would not be practical. In addition, to deal with technical issues there would need to be someone on site—something that is not common in Nevada schools.

There are limited instances of computer-based assessments being utilized on a broad scale in Nevada and elsewhere in the United States. Several medium sized Nevada school districts are using MAP testing for literacy and mathematics. Those districts reported that this approach has been positive overall but they rely on wide testing windows to facilitate rotation cycles and dependable Internet connectivity. The districts involved are also on the higher end in terms of numbers of computers per-student. In other states where computers are being used on a wide scale to support assessments, the infrastructure commitments are extensive. Maine, for example, has committed to providing every middle school student with a laptop computer.

In addition to infrastructure, many raised concerns around test integrity and quality. For example, if students rotated through computer labs over several weeks to take the test, will those taking the exams later be advantaged? In addition, each student will need unique logins and methods for insuring identity to avoid cheating. While these challenges are not unique to online testing, it is important that concerns are adequately addressed before any broad changes are initiated.

Expanded Use of Laptop Computers

Many have argued that to truly take advantage of the educational power of computers, students and teachers should have their own computer. This was one premise of the Apple Classrooms of Tomorrow (ACOT) study initiated over 20 years ago. The ACOT study evaluated classrooms that had been immersed in technology to such a degree that the computers became an integral part of the educational setting (Dwyer, 1994). This included giving each student and

teacher a computer for his or her home. This was done with an eye toward the future when computers would be more mobile and less expensive. The outcomes of this study have engendered optimism towards the use of computers as a catalyst for critical educational reforms. Most notably is the need to shift classrooms to more student-centered environments. This shift was frequently observed in the ACOT classrooms (Dwyer, 1994).

Educational pricing for well-equipped laptop computers is currently under \$1000. In addition, a new category of laptops has emerged that utilize innovative designs, more efficient software and emphasize connectivity (Trotter, 2008). Laptops in this emerging category are being sold at less than \$500. It is clear that there will be a time when every student will have some type of computer to use in school. A near one-one computer to student ratio currently exists when one considers that today's cell phones are more powerful than computers that were introduced in the ACOT program 20 years ago. A recent survey of Washoe County School District high school students revealed that 78% of students had their own cell phone (Anstee & Christiansen, 2007).

Currently the use of laptops in Nevada schools generally involves the use of a cart containing a classroom set of computers. Teachers check these out and have them wheeled into their classroom for use (see the Classroom Capacity section for more details on availability). The technology coordinators report that teachers find these carts very useful for short lessons. Unfortunately, the check out system can frustrate teachers who would prefer to use the technology for more in-depth activities that might run for a few days.

A number of large-scale laptop computing initiatives have been undertaken in the United States. Each of these have been studied extensively and the results are positive (Muir et al., 2006). For example, the Maine Learning Technology Initiative (MLTI) involved giving every middle school student in the state a laptop for use at home and school. The evaluation studies of these schools find that students are more engaged and are less likely to be referred for disciplinary reasons (Muir et al., 2006). MLTI evaluations have also focused on more specific initiatives to ascertain impacts on achievement. One such study investigated the use of online virtual manipulatives in mathematics courses.

The students' use of these environments had a positive impact on student achievement. Other large scale laptop initiatives in Irving, Texas and Fullerton, California have reported similar outcomes.

One potential outcome of expanded access to laptops for students is a reduced dependence upon traditional textbooks. For some schools, such as the Clark County Virtual High School and Washoe County's vision of a redesigned Regional Technical Institute, textbooks are already being replaced by electronic content. These are unique instances in that the technology is pervasive for these schools but it is indicative of what can happen if sufficient resources are present.

Some districts currently negotiate access to electronic versions (in addition to print) of content when they negotiate textbook contracts. There are also limited initiatives where school districts are getting teachers contributing activities to shared spaces. Wiki-Teacher.com is one such initiative in Clark County where teachers can contribute activities that are based on state standards. The system includes a process of reviewing and rating contributions.

For most districts, the consideration of replacing of textbooks with electronic materials largely assumed the continued use of traditional publishing houses. There was little recognition of opportunities available to utilize the Internet as either a primary source of content or a medium through which quality content could be collaboratively developed and distributed. When prompted to consider alternative models for distributing content, technology coordinators expressed skepticism based upon a lack of infrastructure. They were also concerned about the lack of time needed to investigate and ultimately implement alternative models of curriculum distribution.

General Observations

The potential for technologies such as computer-based assessments, electronic textbooks, and laptops to enhance the educational environment in the state are tremendous. However, the infrastructure necessary to support and implement these technologies is dependent upon a consistent and strong commitment to funding that has not yet materialized.

Current Capacity of Nevada Schools

This section describes the capacity of Nevada classrooms and schools largely from a teacher's perspective. Much of the information provided here comes from the results of a survey of 1,478 Nevada classroom teachers. These results are supplemented with data provided by district technology coordinators. A complete description of the survey methodology can be viewed in Appendix A.

Nevada Classrooms

The intent of this section is to provide a view of what the typical Nevada classroom looks like. Teachers were asked to describe the technology they have in their classroom at all times. A subsequent section solicited information regarding technologies available from the school for defined periods of time (i.e., check out).

Virtually every classroom in the state (99%) has at least one computer that the teacher can use for administrative tasks. The computer is generally 2-3 years old (see Figure 1).

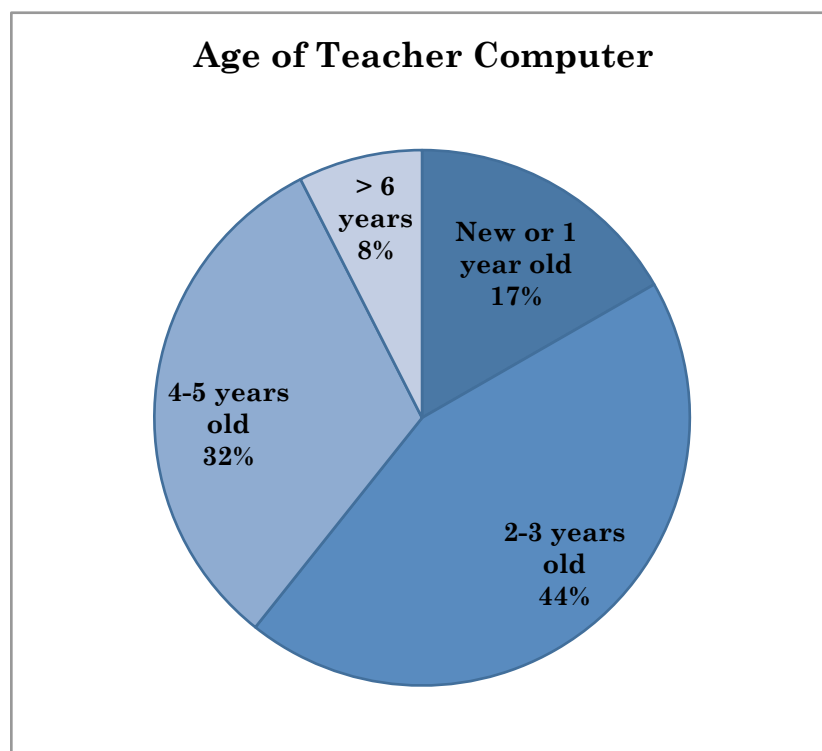


Figure 1.

Sixty percent of the teachers responding to the survey reported having some type of classroom display (e.g., LCD Projector, Interactive Whiteboard or VGA to TV converter) in their own classroom (see Figure 2). This was consistent across small, medium and large districts.

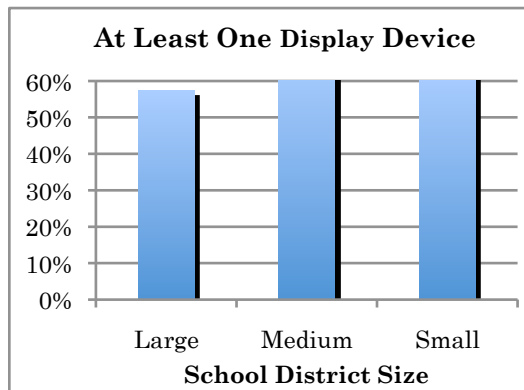


Figure 2

While the percentage of classrooms that had some way to display the computer screen to the class was consistent, *how* this is done varies by the size of the school district (see Figure 3). For example, interactive whiteboards appear in a much higher percentage of small district classrooms.

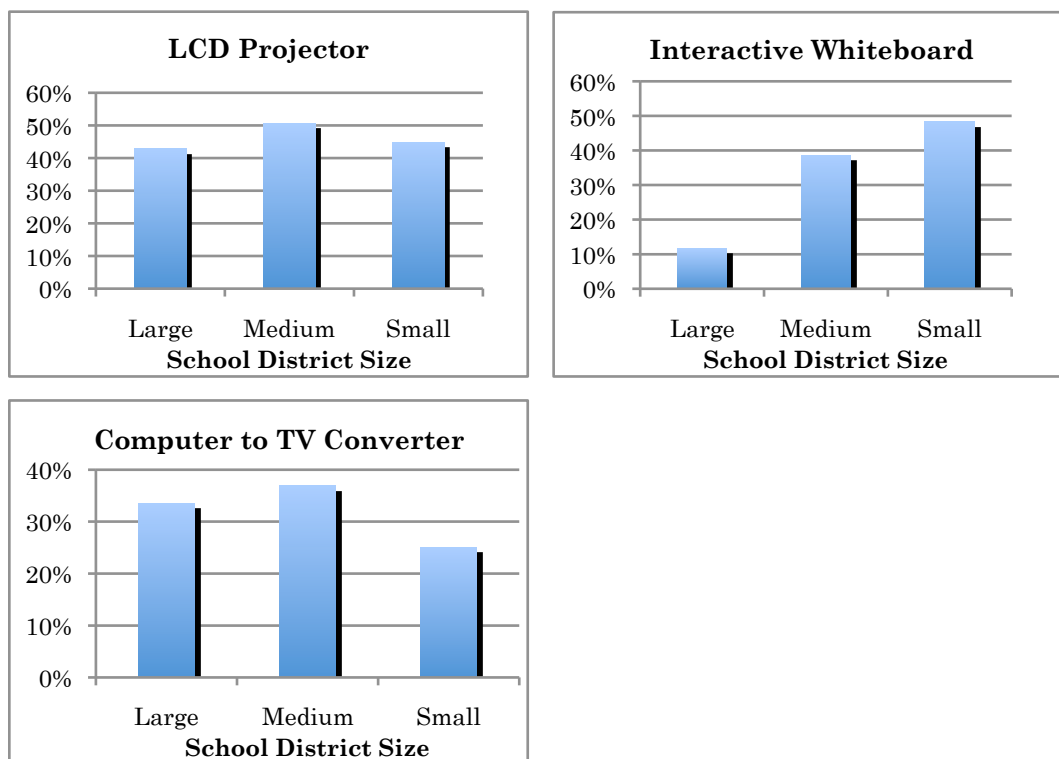


Figure 3

In addition, 15% of all classrooms have a digital camera and five percent have a digital video camera.

Sixty percent of the teachers reported having computers in their classroom that students can use for instructional purposes. Teachers having enough computers in their classroom for individuals or pairs of students to have their own computer is rare (see Figure 4).

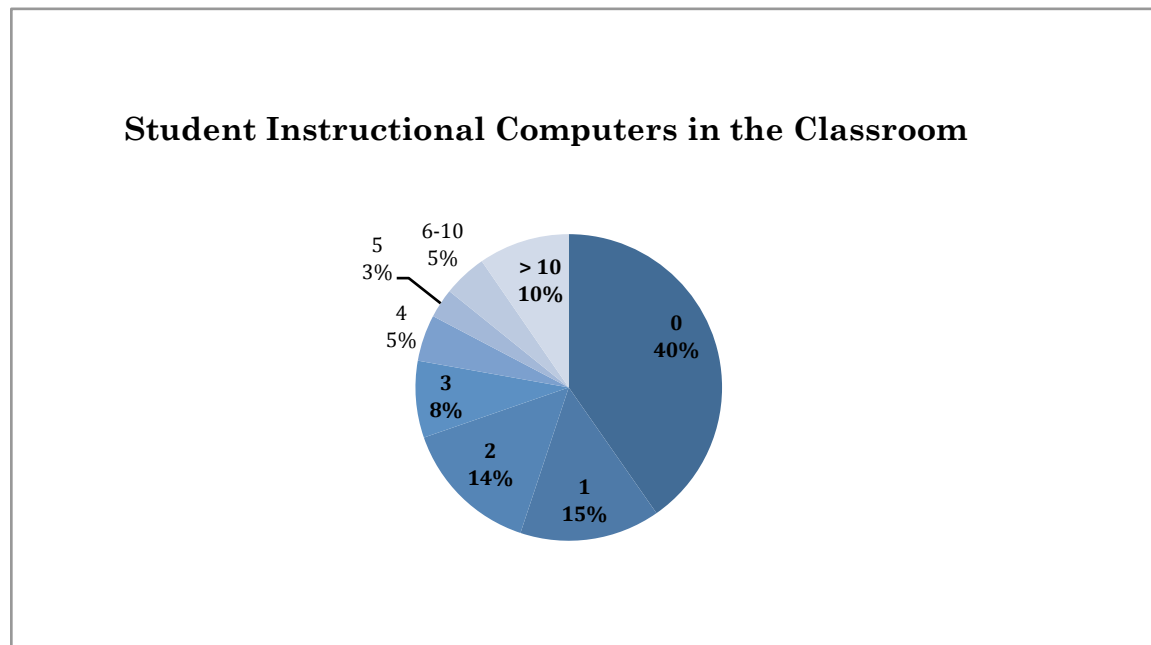


Figure 4

Ninety-two percent of the responding teachers reported that their classroom has Internet access. Of those having access, many reported the speed to be good. Teachers were asked how quickly a typical internet video would load on their classroom computer, very quickly (less than 5 seconds) to very slowly (more than three minutes). Across the state, 54% selected either *very quickly* or *quickly*.

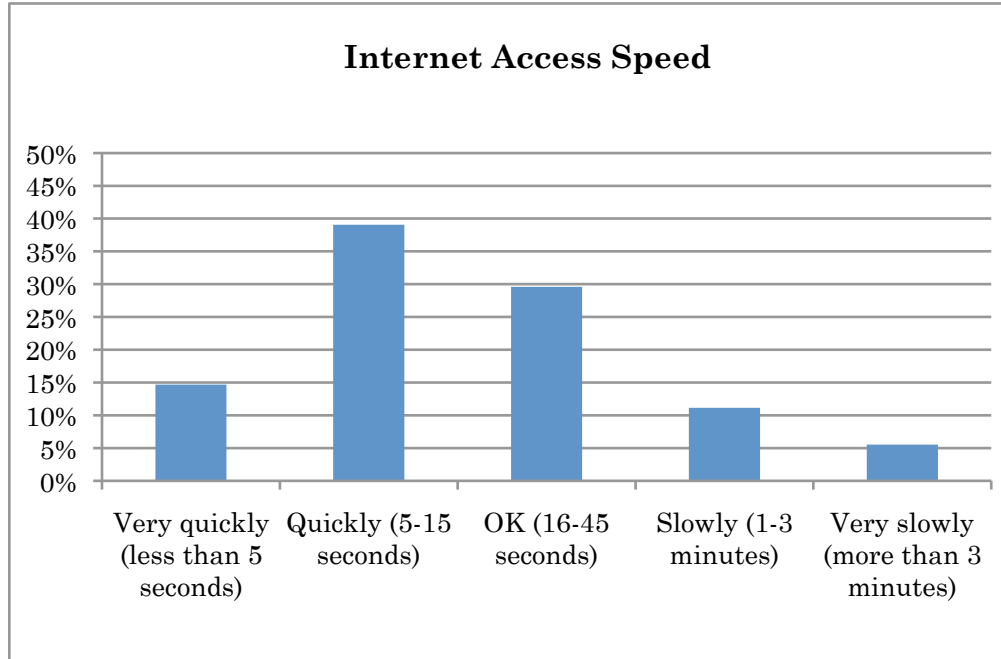


Figure 5

While the responses did not indicate any trends from small to large districts, they did vary significantly within groups. For example, while 59% of Clark teachers report that Internet access is very quick or quick, Washoe teachers selected these options 38% of the time (see Figure 6).

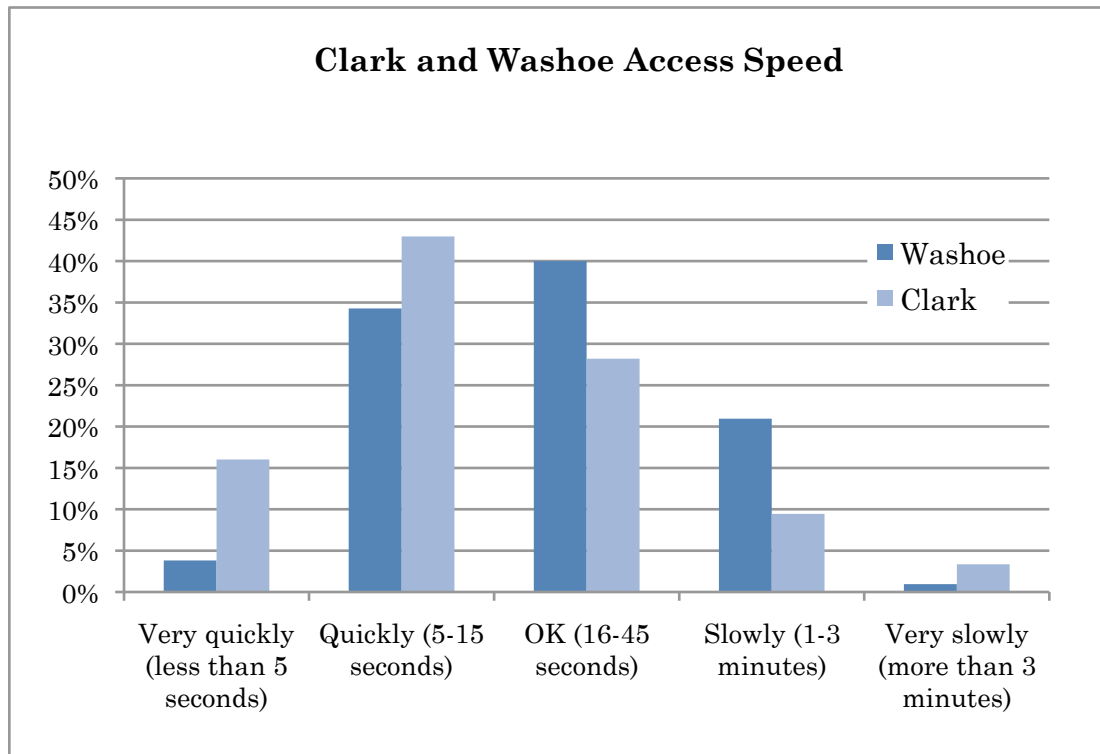


Figure 6

Schools

This section will describe the technology capacity of Nevada schools. Most schools will utilize a reservation policy to stretch limited resources across an entire school.

An increasingly popular way for schools to get more computers into classrooms is to use a laptop cart. These carts can easily be rolled from classroom to classroom. The power of these carts is magnified when the school has wireless network access. Thirty-one percent of the respondents reported that they have access to a laptop cart at school.

Display devices are also common items available for check out in schools. Fifty nine percent of respondents reported having access to an LCD projector in their school. Twenty three percent have access to an interactive whiteboard. These percentages vary slightly by district size with larger districts more likely to have LCD projectors and the smaller districts having proportionally more

interactive whiteboards. Interestingly, 15% of respondents were unsure about the availability of these technologies in their own school.

Technical support is another important consideration as teachers try to integrate technology into the classroom. Overall, teachers tend to agree with statements such as *The system in place for technical support is adequate* (Figure 7) and *The computers in my classroom are in good working condition* (Figure 8).

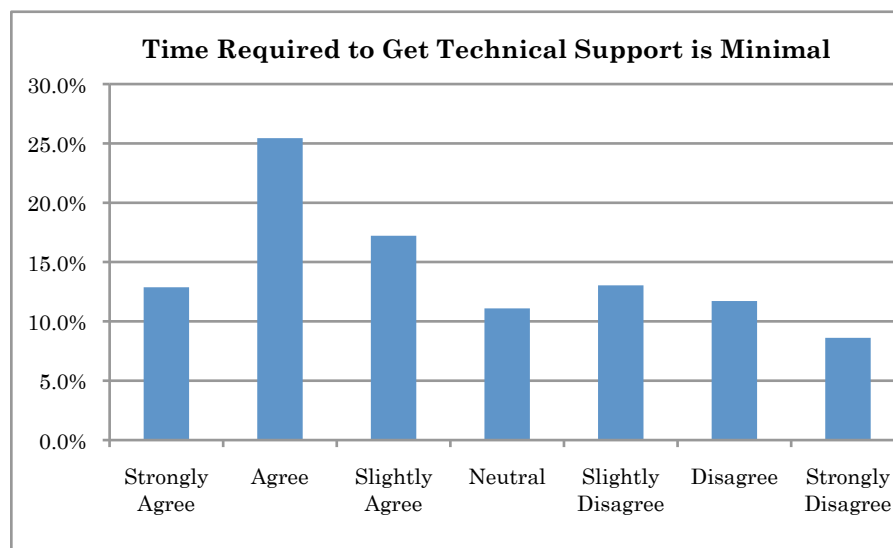


Figure 7

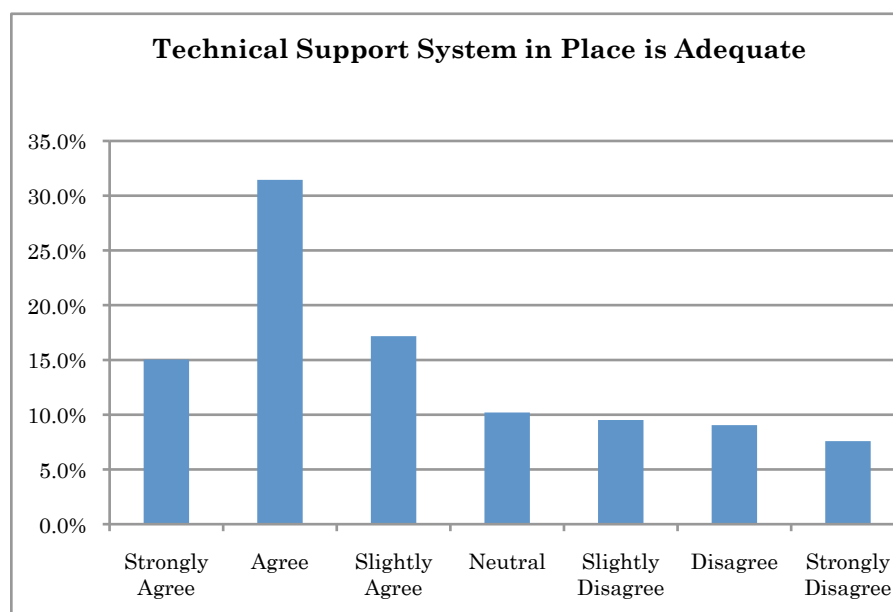


Figure 8

Since Clark has a unique approach, site-based support through the Educational Computing Strategist, it is informative to evaluate how their results differ in some of these categories. For example, the Clark teachers are more likely to agree with statements regarding the adequacy of technical support in their school (see Figure 9). Teachers also have more positive views of the time required to get assistance (see Figure 10).

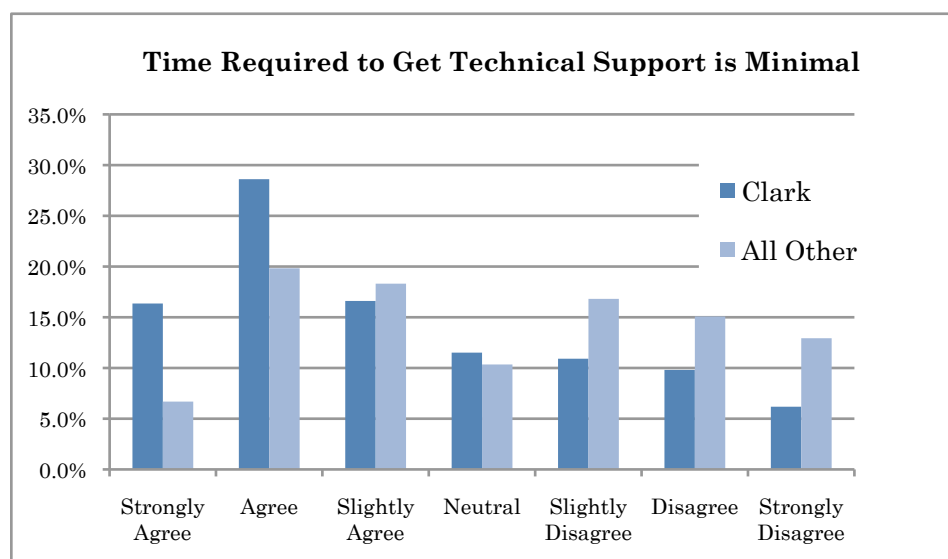


Figure 9

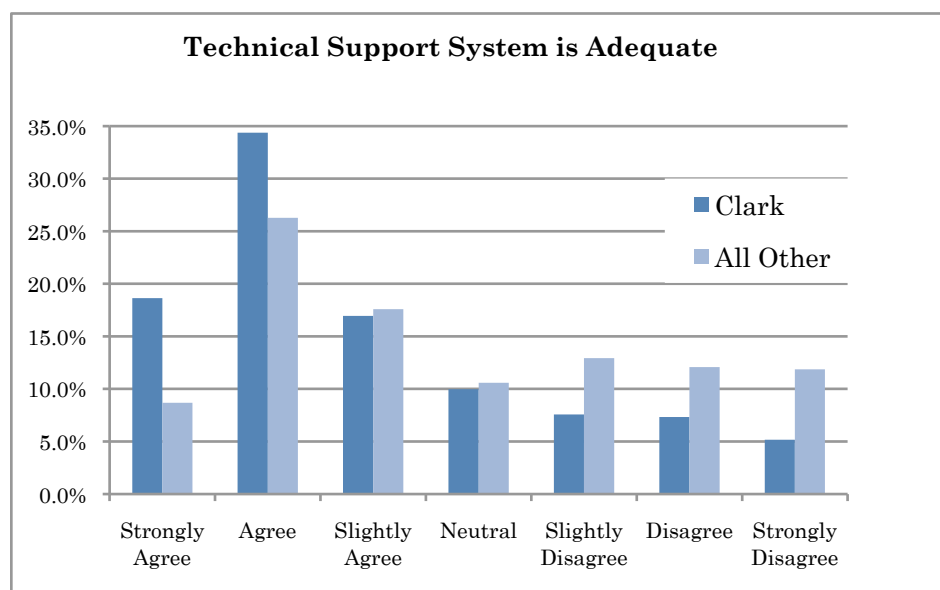


Figure 10

Frequency of Technology Use

Given this access to technology and technical support, what is the probability that a visitor will find teachers using the technology in their teaching? What is the probability that a visitor would find the students using technology? To address this question, teachers were asked to consider their most recent 60 minutes of instructional time. First, they were asked if during that time they had used a computer or the Internet for instructional purposes. Across the state, 56% of the respondents reported using the computer for instructional purposes and 48% reported using the Internet.

Thirty-five percent of the teachers reported having students use computers during the most recent 60 minutes of instructional time. Of those classrooms where students were using computers, the most typical arrangement was one where every student had a computer (see Figure 11).

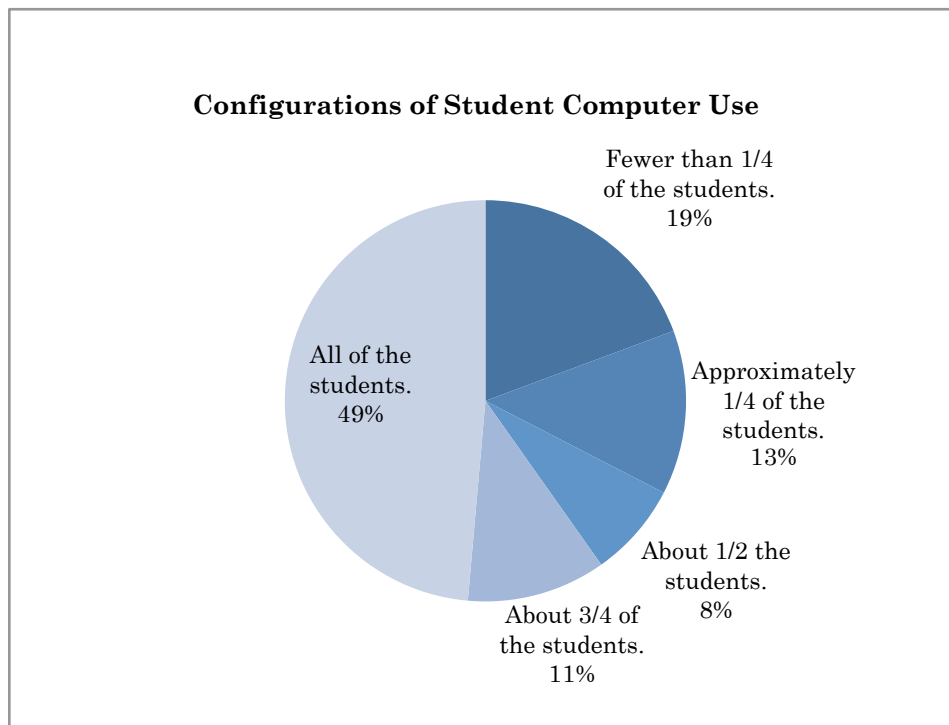


Figure 11

Teachers were also asked to describe the number of times that same class (the most recent one) had used technology during the past academic year (see Figure 12).

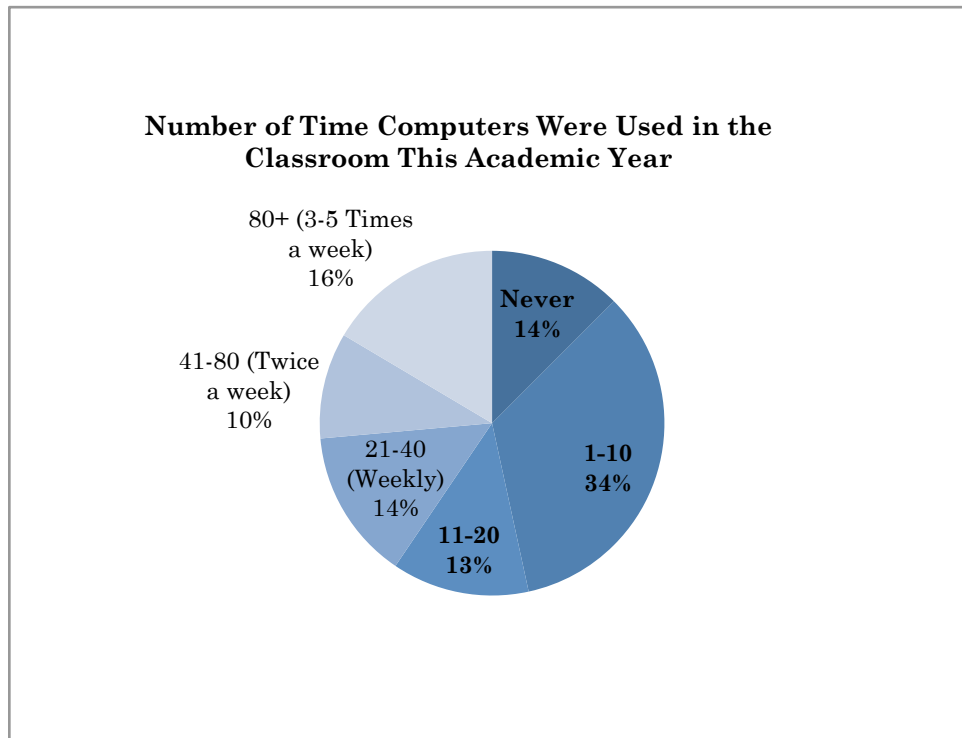


Figure 12

As one might expect, teachers with better access to technology are more likely to integrate technology in the classroom. Access to computers in the classroom and technical support were all related to the frequency with which teachers would engage students in computer-based activities.

Preparation & Professional Development

A key concern regarding the use of technology to support learning is the capacity of the teacher to utilize the tools effectively. Developing this capacity in Nevada requires effective teacher preparation programs, systematic professional development, and ongoing support.

Preparation

Overall, Nevada teachers consider themselves prepared for the use of technology in the classroom and related tasks (see Table 2). They report strong preparation to integrate technology and in the use of the Internet to find instructional materials. Teachers indicate being less well-prepared in some of the more specific items related to library databases, one-to-one environments and computer based instructional materials.

Table 2. Teachers Preparation

	Percentage responding either <i>Moderately well</i> or <i>Very well</i> <i>prepared</i>
Integrate educational technology into your classroom.	62%
Find effective instructional materials on the Internet.	74%
Incorporate library databases into student research projects.	41%
Teach in a classroom where every student has their own laptop computer (one-to-one).	42%
Teach in a classroom where all of the instructional materials are delivered via the computer.	39%

From the perspective of technology coordinators, the preparation of teachers varies by district. Where districts have made significant investments in site based support, the coordinators are more confident in the preparation of the teachers. The site-based assistance results in more focused training programs

and much more extensive one-on-one activities. The formal preparation that teachers are receiving is somewhat of a mystery to some of the technology coordinators. It is not clear to many coordinators what is occurring in teacher preparation programs regarding technology. It is worth noting that acceptance of a common set of standards (e.g., ISTE – NETS for Teachers) would help a great deal in establishing common ground across and within institutions.

Professional Development

Teachers in Nevada have access to a wide variety of professional development opportunities. In addition, the technology coordinators in the state have a clear sense of the importance of professional development. Overall, teachers seem pleased with the quantity of the opportunities available but are frustrated due to the inability to take advantage.

Table 3. Professional Development Frequency

<i>Which of the following professional development opportunities have been available to you during the current school year?</i>	<i>Percentage responding Yes</i>
One-on-one training from a technology specialist.	26%
Online professional development courses.	33%
Informal training from colleagues.	52%
Inservice training related to technology.	56%

A large number of coordinators and teachers noted how difficult it is to find time for professional development activities. Many teachers would like to be doing much more but do not feel they can justify the time it takes to learn new technologies or plan technology based activities.

One interview with a teacher at a technology-rich school was telling in how powerful time to learn can enhance a school. This particular school has been successful at earning grants to support not only new technologies, but travel to technology conferences. The technology conferences were very successful in getting teachers engaged in the process and seeing what can be done. Others

noted this need for modeling of effective uses. Unfortunately, due to budget constraints and teacher shortages, these types of professional development opportunities rarely occur.

Teachers were somewhat critical of the quality of professional development opportunities available. When asked to rate the quality of the professional development opportunities from *very high* to *very low* on a 7-point scale, teachers gave the lowest marks of any item on the survey. On comparable items in the survey, teachers more frequently responded on the positive side of the ratings (i.e., high). This indicates that professional development quality is a significant concern for teachers. This finding was consistent across professional development providers such as schools, districts and the regional professional development programs (Figure 13). Although still rated quite low, higher education did receive moderately higher ratings. This may be due in part to the more focused and extended nature of college classes. These are characteristics that many teachers and coordinators noted are missing from school and district professional development options.



Figure 13

This finding is consistent with a large-scale study of US federally funded Eisenhower projects that identified various factors associated with successful professional development (Garet, Porter, Desimone, Birman & Yoon, 2001) including:

- (1) The duration of the activity (both time per session and number of sessions). Findings indicate that longer is better.
- (2) Collective participation of groups of teachers from the same school, department, or grade was found to be more effective than individual participation.
- (3) Active learning opportunities were associated with effective professional development.
- (4) Content focus was deemed more effective than generic teaching strategies not tied to particular content areas.
- (5) Coherence is the degree to which the activity is tied to school goals, policies, standards, etc. The greater the coherence for teachers, the more effective is the professional development.

Additional Observations

Through the course of the project, questions beyond the original proposal were raised in discussions with commissioners and technology coordinators. These questions are addressed below with the caveat that the conclusions are based on limited information and lacked the more systematic evaluation plan used to address the prior questions.

Parent Perception of Technology and Schools

Parent's perception and expectations of technology in schools is likely shaped by a number of factors. These include what they hear from their own child, what they see in the media, and how the school presents itself (both in the building and on the Internet).

Given the emphasis on the importance of technology to society, most parents do expect their child to learn a good deal about computers in schools. The results of a parent survey supported this notion. They expect technology to be used regularly during school. What they hear from their children is that much of what is done on the computer is testing. There was limited evidence of any in-depth activities going on with technology.

Parents are also concerned about safety online. Their own experiences with the Internet and what they hear from the media lead them to believe this powerful tool needs to be approached with caution. However, most of them view this as a reason to do more with the technology rather than less.

Parent's views are also shaped by how the schools present themselves. Computer labs, interactive whiteboards, and laptop carts are often featured in parent newsletters, tours, and school websites. Ironically, the web sites for these schools, while very prominent often present a distinctly unprofessional image to visitors. Through the course of this evaluation over fifty school web sites were accessed in an attempt to clarify inconsistencies in staffing. While this does not represent a systematic evaluation of Nevada school web sites, it is clear that many of them are out of date, poorly designed, and provide extremely limited information.

Use of Technology and the Relationship to Student Outcomes

The purchase of technologies for schools represents a massive investment by taxpayers. They expect evidence that the investments are rewarded with commensurate returns in student outcomes. However, the difficulty in making causal connections between investments in technology and test scores cannot be overstated.

Technology money allocated by the state has been used for a wide variety of initiatives in the state. Allocations have been spent for technology coordinator training, online teacher training, laptop carts, interactive whiteboards, and a myriad of software titles just to name a few. Thus, any evaluation of these activities should focus on the particular initiatives and goals of the funded projects. The recent *Evaluation of Educational Technology in Nevada Report* conducted by Shepperdson and Associates (2007) is one possible source of information regarding specific initiatives.

In terms of more general conclusions regarding investments in technology, the teacher survey conducted here may provide some useful information regarding the impact of technology in schools. One notable finding from the data collected in this survey is the relationship between the use of computers and student attendance. In elementary schools where teachers report using computers more frequently with students, the student attendance tends to be significantly higher (see Figure 14).

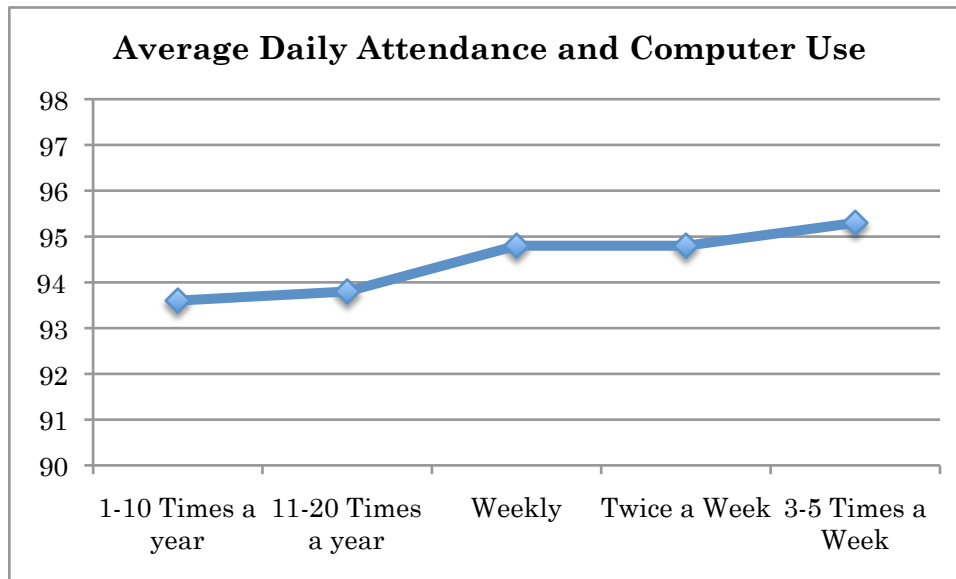


Figure 14

Conclusions

The overall assessment of educational technology needs in Nevada is a combination of optimism and frustration. A number of initiatives and experiences have prompted Nevada educators to be optimistic that technology can prove to be a valuable tool in addressing the many challenges in classrooms. The advances in technology and the growing capacity of teachers indicate that some of the requirements for a technology rich educational experience are being established.

This optimism is tempered with the realization that the infrastructure is not in place to maintain and support systematic and wide scale implementation of computer technologies. The most encouraging experiences described by coordinators and teachers were those in which individual students (or at a minimum pairs of students) had their own computer. The information gathered indicates that this configuration is very rare in Nevada schools.

Frustration is also noted when one looks at the larger picture of technology implementation requirements. Nevada districts distribute resources in different ways. What is similar is that no one school district has been able to distribute it in a way that produces a dependable model for technology integration. While some districts emphasize professional development and support, they are generally left with too few computers to take advantage of their skills. Other districts have invested heavily in hardware only to find the use limited due to an inability to get teachers trained.

Moving forward, the state would benefit from increased coordination and collaboration between the districts. This may be even more beneficial if done between districts of similar sizes. While there are some common issues that all districts face, more frequently the challenges and possible solutions are tied to the size of the student population. Districts naturally look to the state to provide a mechanism to support these collaborations. However, from the perspective of the district technology coordinators, the Nevada Department of Education is not staffed to provide substantive contributions to state technology initiatives.

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Appendices

Appendix A - Teacher Survey

The majority of the survey items were drafted by the authors to directly address the research questions. Questions designed to measure the teaching philosophy of teachers were based upon items from Becker's (1999) Teaching, Learning and Computing survey. These initial items were then revised based upon feedback from content and assessment experts. The revised survey was then evaluated by 16 educational technology experts. The final version of the survey was developed based upon the results of this evaluation.

A purposeful sample of 132 Nevada schools were identified through the following process. In school districts with fewer than 1000 students, all of the schools and classroom teachers were surveyed. In districts with a student population between 1000 and 10,000, 2 elementary schools, 1 middle school and 1 high school were randomly chosen. In districts with enrollments in excess of 10,000, 20% of the schools were randomly selected.

The names of classroom teachers were identified through the Nevada 2007-2008 Directory of Licensed Personnel. Only classroom teachers where a legitimate email address could be identified were included in the study. The sampling was conducted in a manner that insured a cross-section of classroom teachers were invited to participate.

Teacher Selection Parameters:

1. Elementary personnel with an assignment code of 101-105 (grade 1-5)
2. Secondary personnel with a non administrative or special services code (< 600)

3067 teachers were sent email invitations to participate. 1478 teachers (49%) provided usable responses to the survey invitation. 398 of these respondents did not complete the entire survey. Partial responses were included in the analysis.

Technology Coordinators Survey

Twenty-seven open-ended questions were drafted by the authors to address the research questions. Each district was asked to designate at least one district technology representative to complete a survey regarding the use of technology in the school district. Thirteen designees completed the survey (Appendix D).

Interviews

Eight individual interviews were conducted to address the research questions. Five of these were with district technology coordinators, two with school based coordinators and one with a technology representative from the NDE. In addition, a focus group session was conducted with four representatives from the Clark County School District. Each interview and focus group was guided by an interview protocol based upon the original research questions. These sessions were recorded by computer. Notes were taken during the session and later augmented with notes from a subsequent review of the recording.

An additional focus group was conducted with assessment experts from NDE and Measured Progress. This session focused specifically upon the potential for Nevada schools to move towards computer-based testing in state exams such as the High School Proficiency Exam.

Parent Survey

A seven item survey was developed to measure parent's perceptions of the use of technology in Nevada schools. An invitation to participate was sent to twenty nine parents known to have school-aged children. Four completed the survey.

Appendix B – Teacher Survey Items

In my classroom, I have a computer that I can use for administrative tasks (e.g., attendance, lesson planning). (Yes/No)

In general, I find this computer easy to use. (strongly agree – strongly disagree)

How old is this computer?

In my classroom, I have at least one computer that students can use for instructional purposes. (Yes/No)

What is the average age of the computer(s) the students use?

What is the ratio of students to computers during a typical class?

How many computers do you have in your classroom (do not include the computer you use for administrative tasks)?

In general, these computers are easy to use. (strongly agree – strongly disagree)

The computer(s) in my classroom have Internet access. (Yes/No)

The connection speed for classroom computers is such that typical online videos will begin playing . . . (very quickly – very slowly)

The LCD Projector is easy to setup. (strongly agree – strongly disagree)

What comments do you have regarding the technology capacity in your classroom?

Please indicate how well prepared you feel you are to accomplish the following. (very well prepared – not at all prepared)

- Teach in a classroom where every student has their own laptop computer.
- Access and use state assessment data (e.g., CRT scores) to support instructional decisions.
- Access and use district assessment data (e.g., for Clark, IDMS) to support instructional decisions.
- Teach in a classroom where all of the instructional materials are delivered via the computer.
- Find effective instructional materials on the Internet.
- Integrate educational technology into your classroom.
- Incorporate library databases into student research projects.

Which of the following professional development opportunities have been available to you during the current school year?

-
- One-on-one training from a technology specialist.
 - Informal training from colleagues.
 - Inservice training related to technology.
 - Online professional development courses.

Estimate the number of hours you have participated in available technology professional development activities during the current school year.

- One on one training from a technology specialist.
- Informal training from colleagues.
- Inservice training related to technology.
- Online professional development courses.
- One on one training from a technology specialist.

How would you rate the quality of the technology related professional development opportunities offered by the following entities?

- District
- Local higher education institutions
- Regional Professional Development Program
- School

Different teachers have described very different teaching philosophies to researchers. For each of the following pairs of statements, select the point that best shows how closely your own beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the option you select. (see Becker, 1999).

What comments do you have regarding your preparation and professional development opportunities?

Please rate your agreement with the following statements as they relate to your technology professional development opportunities. (strongly agree – strongly disagree)

- They are appropriate for content I am expected to teach.
- The activities focus on general integration strategies.
- They are appropriate for the grade level of my students.
- They generally provide me with opportunities to try what I've learned.
- The activities are ongoing.
- They are best described as 'one-shot' presentations.
- The different activities are a part of a larger related plan.
- They provide opportunities to work with other teachers in my content area.
- They provide opportunities to work with other teachers in my grade level.
- Activities are frequently targeted to specific strategy or method.
- The activities are directed towards the needs of my grade level.
- The activities are directed towards the needs of my school.

Indicate whether or not the following are true as they relate to your most

recent 60 minutes of classroom time. (Yes/No)

- I used a computer for instructional purposes.
- I used the Internet for instructional purposes.

List the five most recent computer applications or web sites that your students used in your class.

List the five most recent computer applications or web sites that you used in your class.

On how many days since the beginning of the school year has a typical student in this particular class (the one you last taught) used a computer for instructional purposes?

Typically, how many students operate any one computer at one time during this class?

What comments do you have regarding your use of technology?

During your most recent 60 minutes of classroom time students used a computer for instructional purposes. (Yes/No)

How many students used computers?

Which of the following technologies do you have in your classroom all the time. (Don't include items you can check out or get from other places. We'll ask about these items on the next page).

- Digital camera
- Digital video camera
- An LCD projector
- A device that allows me to project my computer screen on the TV
- An interactive whiteboard (e.g., SmartBoard or Promethean)

Rate your level of agreement with the following statements

- The system in place for technical support is adequate.
- The time required to get technical assistance is minimal.
- The computers in my classroom are in good working condition.
- I can manage the majority of the technical issues that arise with my classroom computers.
- The Internet connection in my classroom is dependable.
- I can access the web sites I need for instruction.

Through a sign up or check out procedure, I can arrange to have the following technologies available for a finite time in my classroom. (Yes/No).

- A video camera
- A digital camera
- An interactive whiteboard (e.g., SmartBoard or Promethean Activboard)
- An LCD projector

-
- A classroom set of laptop computers
 - A set of laptop computers that permits group work (i.e., one computer per group of 3-5 students)

I believe the Internet filter used at my school is (too restrictive, about right, not restrictive enough)

Rate the ease of accomplishing the following tasks from your classroom computer.

- Checking my school email account via the Web browser.
- Printing and copying documents.
- Accessing storage space on the school network.
- Students accessing storage space on the school network.
- Printing documents.
- Reviewing standardized assessment results for my students.
- Updating grades with our gradebook software.
- Using technology to collaborate with other teachers on the development of instructional materials.

Do you regularly plan lessons with other teachers who teach the same level or content area? (Yes/No)

In what ways do you coordinate this work?

- Using web-based tools that permit document sharing (e.g., Google Docs).
- Using a shared space on the school network.
- Emailing files.
- Printing and copying documents.

Do you have access via the Internet to the following materials? (Yes/No)

- District content objectives.
- Lessons developed by other district teachers.
- District curriculum materials.
- Videos related to the curriculum.

What comments do you have regarding the technology capacity in your school?

Appendix C – Coordinator Interview Protocol

Questions	Response Notes	Tech Plan Notes
1. What is the current status of the district (or school) educational technology plan? (NOTE: Districts representatives can speak about the district plan, school technology coordinators may be able to discuss school and district plans). 1. When was your district educational technology plan last updated? 2. What measurable goals were included and what, if any, data was collected? 3. How well aligned is your district plan with the state and national educational technology plans? 4. How well did the district plans support planning for technology integration? 5. How well did the district plans subsequently impact achievement?		
2. In what ways can educational technologies improve instructional development, delivery, and assessment in your district and/or school? 1. Is your district using any computer-based assessments at this time? (Please describe) 1. What would your reaction be to the use of computer-based assessments for the high school proficiency exam (if applicable, or CRT's for elem coord) 1. Advantages 2. Disadvantages 2. Is your district currently involved in any laptop initiatives (e.g., 1-1 or laptop carts)? 3. Is your district currently involved in any initiatives to replace traditional textbooks with electronic content? 4. Is your district currently involved in any initiatives to use of web-based collaborative technologies to support teachers' lesson planning?		

3. Capacity of the district (or school) in Nevada 1. What is the probability that a classroom teacher in your district (or school) at any given moment will have in their classroom: 1. A computer that is less than five years old, internet connected, and currently in good working condition? Filtering? 2. A ratio of students to computers in the classroom that is less than 5 to 1 3. A projection device that permits all of the students in the classroom to view the computer display and requires minimal setup in terms of time and expertise 4. Access to timely, dependable and effective technical support? 2. What is the probability that a classroom teacher in your district (or school) will have on any given day: 1. Utilized technology to support the delivery of a lesson? 2. Asked students to utilize technology to complete and individual activity? 3. Asked students to utilize technology to complete an activity that requires students to engage in analytic or evaluative tasks. 3. What are the relationships between the access and use? 1. Is this a direct relationship or are there other factors?		
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Appendix D – Technology Coordinator Survey

- (1) Describe the role of the current state educational technology plan in the design, delivery and planning of educational technology in your district.
- (2) Describe the role of the current district educational technology plan in the design, delivery and planning of educational technology in your district.
- (3) Do the schools in your district typically engage in significant technology planning? If so, how does this occur? Do they have school technology plans? Do they have technology committees?
- (4) Describe the status of planning for technology in your district. What are the major challenges?
- (5) Describe in general terms the funding for technology in your district. What are the major sources of funding? Is the funding consistent and predictable?
- (6) What other comments do you have regarding technology planning in your district?
- (7) What do you see as the opportunities and challenges associated with increasing the use of computer-based assessments in your district?
- (8) What do you see as the opportunities and challenges associated with the expanded use of laptops to supplement and in some instances replace textbooks?
- (9) Would the expanded distribution of laptop computers have a positive impact on student outcomes? Why or why not?
- (10) What are some of the more advanced ways teachers in your district are utilizing the Internet to improve student outcomes?
- (11) What are some of the greatest challenges associated with the increased use of the Internet for teachers in your district?

-
- (12) Are teachers in your district using the Internet to collaborate with other teachers in your district? If yes, how?
- (13) What are some of the most important ways teachers can utilize the web to support teaching?
- (14) What other comments do you have regarding the role of technologies in your district classrooms?
- (15) In the following three text boxes, describe three relatively common classrooms that a visitor might see in your district. The three classrooms should represent your view of the low, middle and top in terms of technology availability in your district. In your description include the approximate number, age and condition of the computers in the room, the presence or absence of a projector, the Internet connection capacity and any other technologies that might be available.
- a. Common Low-end classroom
 - b. Common middle classroom
 - c. Common high-end classroom
- (16) Next to each of the designations below, provide a number that represents the approximate percentage of classrooms that closely fit the description.
- (17) What role does open source software such as OpenOffice, Apache or Firefox have in your district's technology planning?
- (18) What support is available to teachers when they need technical assistance in their classroom?
- (19) What other comments do you have regarding the technology capacity your district classrooms?
- (20) What type of professional development is available to teachers in your district?

-
- (21) Describe what you believe are the key components to effective professional development.
 - (22) How do these key components compare to the professional development opportunities you are able to provide to teachers?
 - (23) Is there anything else you would like to share before completing the survey?

Appendix E – Parent Survey

- (1) Does your student regularly use technology to complete homework?
If so, what types of activities do they complete?
- (2) Does your student use technology regularly in school? If so, what types of activities do they complete?
- (3) What are your expectations regarding technology use in schools?
Are these expectations being met?
- (4) What other comments do you have regarding the use of technology in your students school?
- (5) What are your concerns regarding your student's use of technology in school?
- (6) What school district is your student enrolled in?
- (7) What level school is your child currently enrolled in? If you have multiple children in school, select all the applicable levels.